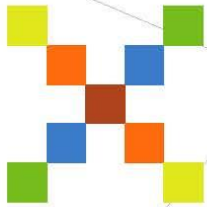


PROJECT MANUAL

2015/08/17

Team Texas / Germany
University of Texas at Austin and Technische Universitaet Muenchen



nexushaus



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PART 1 - SUMMARY OF CHANGES

Significant changes to the project manual that have not occurred at this time.

PART 1 - November 18, 2014

The Project Manual has been updated from the previous issue. Revisions include:

- Revision 1: Update RULE 4-3 of Rules Compliance Checklist PART 2
- Revision 2: Update RULE 4-7 of Rules Compliance Checklist PART 2
- Revision 3: Inserted correctly formatted Detailed Water Budget in Part 5
- Revision 4: Update Summary of Reconfigurable Features PART 6
- Revision 5: Updated AC Inverter Power in Interconnection application form Part 7
- Revision 6: Updated Quantity Takeoff PART 10

PART 2 - March 26, 2015

The Project Manual has been updated from the previous issue. Revisions include:

- Revision 1 Inserted specifications for the Canopy
- Revision 2 Updated Quantity Take Off
- Revision 3 Inserted Energy Analysis
- Revision 4 Structural calculations in a separate package
- Revision 5 Updated insulation
- Revision 6 Updated List of drawing sheets

PART 3 - August 17, 2015

The Project Manual has been updated from the previous issue. Revisions include:

- Revision 1 Inserted specifications for the Canopy
- Revision 2 Updated Quantity Take Off
- Revision 3 Inserted Energy Analysis

- Revision 4 Structural calculations in a separate package
- Revision 5 Updated insulation
- Revision 6 Updated List of drawing sheets
- Revision 7 Updated Landscaping
- Revision 8 Updated Appliances
- Revision 9 Updated Cabinetry

PART 2 - RULES COMPLIANCE CHECKLIST

RULE	RULE DESCRIPTION	LOCATION DESCRIPTION	LOCATION
Rule 4-2	Construction Equipment	Drawing(s) showing the assembly and disassembly sequences and the movement of heavy machinery on the competition site	O 101 – O 204
Rule 4-2	Construction Equipment	Specifications for heavy machinery	Section 01 50 00
Rule 4-3	Ground Penetration	Drawing(s) showing the locations and depths of all ground penetrations on the competition site	C 101
Rule 4-4	Impact within the Solar Envelope	Drawing(s) showing the location, contact area, and bearing pressure of every component resting directly within the solar envelope	G- 201/202
Rule 4-5	Generators	Specifications for generators (including sound rating)	Section 01 50 00
Rule 4-6	Spill Containment	Drawing(s) showing the locations of all equipment, containers, and pipes that will contain liquids at any point during the event	P 003
Rule 4-6	Spill Containment	Specifications for all equipment, containers, and pipes that will contain fluids at any point during the event	Division 22: Plumbing
Rule 4-7	Lot Conditions	Calculations showing that the structural design remains compliant even if 18 in. (45.7 cm) of vertical elevation change exists	A - 201/ 202

Rule 4-7	Lot Conditions	Drawing(s) showing shimming methods and materials to be used if 18 in. (45.7 cm) of vertical elevation change exists on the lot	S 101
Rule 5-2	Solar Envelope Dimensions	Drawing(s) showing the location of all house and site components relative to the solar envelope	G-201/202
Rule 5-2	Solar Envelope Dimensions	List of solar envelope exemption requests accompanied by justifications and drawing references	NA
Rule 6-1	Structural Design Approval	List of, or marking on, all drawing and project manual sheets that will be stamped by the qualified, licensed design professional in the stamped structural submission; the stamped submission shall consist entirely of sheets that also appear in the drawings and project manual	"S" SECTION of DRAWINGS, PART 3 PROJECT MANUAL
Rule 6-2	Finished Square Footage	Drawing(s) showing all movable components that may increase the finished square footage if operated during contest week	G- 101
Rule 6-3	Entrance and Exit Routes	Drawing(s) showing the accessible public tour route	G- 103
Rule 7-1	Placement	Drawing(s) showing the location of all vegetation and, if applicable, the movement of vegetation designed as part of an integrated mobile system	A - 111
Rule 7-2	Watering Restrictions	Drawing(s) showing the layout and operation	"P" Section

		of greywater irrigation systems	of Drawings
Rule 8-1	PV Technology Limitations	Specifications for photovoltaic components	DIVISION 26 & 48
Rule 8-3	Batteries	Drawing(s) showing the location(s) and quantity of all primary and secondary batteries and stand-alone, PV-powered devices	NA
Rule 8-3	Batteries	Specifications for all primary and secondary batteries and stand-alone, PV-powered devices	NA
Rule 8-4	Desiccant Systems	Drawing(s) describing the operation of the desiccant system	NA
Rule 8-4	Desiccant Systems	Specifications for desiccant system components	NA
Rule 8-5	Village Grid	Completed interconnection application form	PART 7
Rule 8-5	Village Grid	Drawing(s) showing the locations of the photovoltaics, inverter(s), terminal box, meter housing, service equipment, and grounding means	E- 101/103
Rule 8-5	Village Grid	Specifications for the photovoltaics, inverter(s), terminal box, meter housing, service equipment, and grounding means	DIVISION 48
Rule 8-5	Village Grid	One-line electrical diagram	E- 601
Rule 8-5	Village Grid	Calculation of service/feeder net computed load per NEC 220	E- 001
Rule 8-5	Village Grid	Site plan showing the house, decks, ramps, tour paths, and terminal box	E- 101

Rule 8-5	Village Grid	Elevation(s) showing the meter housing, main utility disconnect, and other service equipment	E- 101
Rule 9-1	Container Locations	Drawing(s) showing the location of all liquid containers relative to the finished square footage	P- 003
Rule 9-1	Container Locations	Drawing(s) demonstrating that the primary supply water tank(s) is fully shaded from direct solar radiation between 9 a.m. and 5 p.m. PDT or between 8 a.m. and 4 p.m. solar time on October 1	P- 106
Rule 9-2	Team-Provided Liquids	Quantity, specifications , and delivery date(s) of all team-provided liquids for irrigation, thermal mass, hydronic system pressure testing, and thermodynamic system operation	DIVISION 22
Rule 9-3	Greywater Reuse	Drawing(s) showing the layout and operation of greywater reuse systems	P-907
Rule 9-4	Rainwater Collection	Drawing(s) showing the layout and operation of rainwater collection systems	P-102
Rule 9-6	Thermal Mass	Drawing(s) showing the locations of liquid-based thermal mass systems	P-003
Rule 9-6	Thermal Mass	Specifications for components of liquid-based thermal mass systems	DIVISION 22

Rule 9-7	Greywater Heat Recovery	Drawing(s) showing the layout and operation of greywater heat recovery systems	NA
Rule 9-8	Water Delivery	Drawing(s) showing the complete sequence of water delivery and distribution events	P- 003
Rule 9-8	Water Delivery	Specifications for the containers to which water will be delivered	DIVISION 22
Rule 9-9	Water Removal	Drawing(s) showing the complete sequence of water consolidation and removal events	P- 003
Rule 9-9	Water Removal	Specifications for the containers from which water will be removed	DIVISION 22
Rule 11-4	Public Exhibit	Interior and exterior plans showing entire accessible tour route	G-103

PART 3 - STRUCTURAL NARRATIVE AND CALCULATIONS

NOTE: Structural calculations and narrative issued under a separate package.

DETAILED WATER BUDGET

Competition Water Budget				
Function	Per-Event Consumption (gal)	Events	Total Water Use (gal)	Notes
Competition Consumption				
Hot Water Draw	17	16	272	16 water draw events of 15 gal. each during competition. Assuming 2gal lost to warm-up in lines. (Greywater)
Dishwasher	4.1	5	20.5	5 dishwashing events during competition (Blackwater)
Clothes Washer	10	8	80	8 Loads of clothes (Greywater)
Cooking' Test	0.625	6	3.75	No grey or blackwater produced
Hydronic System Fill-up	10	1	10	No grey or blackwater produced
Kitchen Sink Use	10	1	10	Contingency for some kitchen sink use (blackwater)
Contingency Factor	103.75	1	103.75	
		Sub-total:	500	
Non-Consumed Stored Water				
HVAC Thermal Storage + Fire Protection	500	1	500	Operating thermal/water storage tank at 1/2 capacity for competition
Aquaponics System	300	1	300	
		Sub-total:	800	
			1300	
Produced Water (Grey and Black Water)				
Greywater			352	Used for Irrigation
Blackwater			134.25	Used for sizing blackwater collection tank (Includes the contingency water)

PART 4 - SUMMARY OF UNLISTED ELECTRICAL COMPONENTS

None. The nexushaus will not use any unlisted electrical components.

PART 5 - SUMMARY OF RECONFIGURABLE FEATURES

Demonstration of Reconfigurable Features for Jury Tours.

The majority of reconfigurable features in the nexushaus are non-building integrated components, such as free standing furniture and accessories. All reconfigurable features permanently integrated into the nexushaus are described below. During the course of public and jury tours, team members will demonstrate multiple reconfigurable features of the nexushaus. Each has been outlined below.

nexushaus features manually operated twin-size wall bed with a desk that lifts to allow the bed to be pulled down in the studio. During the public and jury tours, a decathlete will move the “murphy bed” to demonstrate the flexibility of the space to all visitors. The operation of this component and the associated details can be viewed in more detail in the Construction Documents.



PART 6 - INTERCONNECTION APPLICATION FORM

Team Texas/Germany, Lot Number 104 - contact: Charles Upshaw, crupshaw@gmail.com and Jonathan Flanigan, JPFlanigan2@gmail.com

PV SYSTEMS

Module Manufacturer	Short Description of Array
SolarWorld	(28) SunModule Plus 290W Mono Silver panels connected to Enphase micro-inverters

Total DC power of array is: 8.12 kW

INVERTERS

Inverter Manufacturer	Model Number	Output Voltage (VAC)	Rating (kVA or KW)
Enphase	M250 Micro-inverter	208-240	250W

AC to DC derating Factor: 0.87. Total AC power of all inverters is 7 kW (in whole numbers)

REQUIRED INFORMATION

	Location
One-Line Electrical Schematic	E-601
Calculations of service/feeder net computed load and neutral load	E-001

(NEC 220)

Plan view of the lot showing the house, decks, ramps, tour paths, E-103
the service point, and the distribution panel or load center

PART 7 - QUANTITY TAKEOFF OF COMPETITION PROTOTYPE HOUSE

Specification Number	Brief Description	Detailed Description	Qty	Unit
Division 01	General Requirements			
01 53 00	Temporary Building Foundations	Central Piers Inc. - CP Standard Piers	60	Each
01 53 00	Temporary Building Foundations	Central Piers Inc. - CP Anchor Brace	16	Each
01 53 00	Temporary Building Foundations	Central Piers Inc. - CP Anchor Pier	5	Each
01 53 00	Temporary Building Foundations	Central Piers Inc. - CP Seismic Pier	6	Each
Division 02	Existing Conditions			
02 43 00	Structure Moving	Standard Structure Moving Equipment	1	Each
Division 05	Metals			
05 50 00	Metal Fabrication: Ramp	Ramp w/ 1/4" Aluminum Non-Slip Plate	105	S.F.
05 12 00	Canopy Columns	HSS4x4x1/8 - 11'-2"	5	Each
05 12 00	Canopy Beams	HSS10x3-1/2x3/16 - 12'-7"	9	Each
05 12 23	Steel Chassis for Buildings	Steel Chassis: w/M10" x 9" Bantam structural steel beams, Chassis Assembly by Palm Harbor Homes REF: Drawing in Proj. Manual	2	Each
05 52 13	Steel Railings	Painted Steel Railing per Drawings	62.5	L.F.
Division 06	Wood, Plastics and Composites			
06 11 00.A1	Wood Framing	2x6 24" O.C. Wall Framing	1053.4	S.F.
06 11 00.A2	Wood Framing	2X12 (Decking Beams) Treaded Lumber	603.48	L.F.
06 11 00.A2	Wood Framing	2X6 (Decking modules Beams) Treaded Lumber	1674	L.F.
06 11 00.H20	Wood Framing	2X10 LVL (Modules)	624	L.F.
06 11 13	Wood Framing	4X12 PSL 11'-11 1/2" (Decking Beams above bladder)	1	Each
06 15 33	Wood Patio Decking	Flooring - Cedar Decking 6x1 (5 1/2" x 3/4") cedar	1157	S.F.
06 16 33.A2	Wood Board Sheathing	OSB 1/2" (Wall Sheathing)	1296.6	S.F.
06 16 33.A2	Wood Board Sheathing	OSB 1 1/8" [Module Floor Decking]	694	S.F.
06 16 33.A2	Wood Board Sheathing	Plywood Roof 1/2" Decking	732	S.F.
06 17 33	Wood and Joists	Floor and Roof framing. TJI 9 1/2"	735	L.F.
06 41 05	Paper Composite Countertops	Paperstone	19.5	L.F.
Division 07	Thermal and Moisture Protection			
07 21 13	Board Insulation	WALL ThermaCork insulation 1"	1053.4	S.F.
07 21 29.A1	Sprayed Insulation	WALL SWD Open Cell Sprayfoam 3 1/2" in between studs	1053.4	S.F.

07 21 29.A2	Sprayed Insulation	ROOF SWD Open Cell Sprayfoam 5 1/2" in between rafters	706	S.F.
07 21 29.A3	Sprayed Insulation	FLOOR SWD Cloed Cell Sprayfoam 2"	706	S.F.
7 26 00.A1	Vapor Retarders	WALL: Delta Vent SA	1296.6	S.F.
7 26 00.A1	UV Layer	WALL: Delta Façade S	1053.4	S.F.
07 46 23	Wood Siding	Exterior cladding : Cedar Slats, 1 x 1 1/2" (Actual)	1053.4	S.F.
07 46 26	Hardboard Siding	Exterior cladding : HardieTrim® Boards 4/4 SMOOTH - .75"x11.25	152	L.F.
07 54 23	Thermoplastic-Polyolefin Roofing TPO	Thermoplastic-polyolefin roofing (TPO), .80 mils, heat welded seams, fully adhered	706	S.F.
07 62 00	Sheet Metal Flashing and Trim	Metal coping and Trim: Custom galvanized steel	185	L.F.
07 71 23	Manufactured Gutters and Downspouts	Sun-shading / Galvanized steel gutters, half round or box, plain, 5" wide, 28 gauge	26.6	L.F.
Division 08	Openings			
08 14 00	Interior: Sliding Wood Doors	Night Module / 2'10"x7'6" sliding interior wood door and frame	2	Each
08 14 00	Interior: Pocket Wood Doors	Bathroom / 2'10"x7'6" pocket interior wood door and frame	1	Each
08 13 16	Exterior: Swinging Glass Doors	Entrance night module / Glass Door, 3'-9"x9'	1	Each
08 13 16	Exterior: Swinging Glass Doors	Bedroom / Glass Door, 3' x9'	1	Each
08 51 13	Exterior: Aluminum Fixed Window	Bathroom / 3'x9'	1	Each
08 51 13	Exterior: Aluminum Sliding Window	Kitchen / 7'-6"x2'-6"	1	Each
08 30 00	Aluminum Folding Door	NanaWall 9'x9' Model: SL60RL	3	Each
Division 09	Finishes			
09 29 82	WALL: Fireproof Gypsum Plastering	WALL: Gypsum Board 5/8" Type X	1113.4	S.F.
09 29 82	CEILING: Fireproof Gypsum Plastering	WALL: Gypsum Board 5/8" Type X	640	S.F.
09 30 13	Ceramic Tiling	Bathroom: Tiling	93	S.F.
09 64 23	Wood Flooring	Wood flooring: 5/8" Reclaimed Pine	504	S.F.
09 91 23	Interior Painting	Interior of modules / Matte Finish Interior Paint	1753.4	S.F.
Division 10	Specialties			
10 24 00	Rolling Exterior Screens	Rolling Exterior Screens: 12'x9' w/ Serge Ferrari Soltice W92 Fabric	2	Each
10 73 16.A1	Canopies	Canopy Type A - 12'-6"x12'-6" w/painted steel frame (tube steel 2"x3") w/Serge Ferrari Soltice W92 White	1	Each
10 73 16.A2	Canopies	Canopy Type B - 12'-6"x12'-6" Sail w/Serge Ferrari Soltice 86 White	4	Each
Division 11	Equipment			
11 30 13.13	Ceiling Fans	Matthews Fan Company: Eliza	3	Each
11 31 13.A2	Induction Cooktop	Summit 24" 4-Burner SINC424220 Induction Cooktop	1	Each

11 31 13.A5	Oven	Blomberg BWOS24100 Built-in Wall Oven	1	Each
11 31 13.A1	Refrigerator/Freezer	Blomberg BRFB1050FFBIN Built-in refrigerator/freezer; 6.1 CF capacity refrigerator, 2.3 CF capacity freezer	1	Each
11 31 13.A7	Dishwasher	Blomberg DW55100FIB Dishwasher	1	Each
11 31 13.A1	Clothes Washer/Dryer	Equator Washer/Dryer EZ 4000 CV – Equator Super Combo	1	Each
11 93 13	Hydroponic Growing Systems	Aquaponics system including tank (300 gal - 48" diameter, 36" tall galvanized steel), aerator, pump, pond liner, grow beds and expanded clay	1	Each
Division 12	Furnishings			
12 35 30	Residential Casework	IKEA VEDDINGE per Drawings		
Division 21	Fire Suppression			
21 20 00	Wet Fire Sprinkler System	Sprinkler System Components, Including 5 Sprinkler Pendants, Piping, Pressurization Pump, and Code-Required Testing Valves and Fittings	5	Each
Division 22	Plumbing			
22 13 36	Greywater Filtration System	Aqua2Use Greywater Diversion Device (GWDD)	1	Each
22 32 00.81	Rainwater Treatment	Trojan UV MAX-IHS22-E4	1	Each
22 12 19	Rainwater Tank	Fol-Da-Tank 2000 gal tank	1	Each
22 11 23	Rainwater Pump	Grundfos MQ3-45 Pressure Boosting Pump	1	Each
22 13 16	Typical Plastic Rough Plumbing Separated Greywater and Blackwater System, Piping, Fittings, 1 kitchen & 1 bath		784	SF/living
22 11 16	Typical PEX Domestic Water Supply Plumbing for 1 bathroom house	PEX Branch Piping (30' of 1/2" PEX, 60' of 3/4" PEX, 80' of 1" PEX, 20' 1" PVC in Water skid), Associated Fittings	784	SF/living
22 13 53	Greywater Holding Tank	Quadel 250 gal	1	Each
22 13 53	Blackwater Holding Tank	Quadel 250 gal	1	Each
22 12 23.13	85 gal Pressure Tank	Goulds V260	1	Each
22 33 00	Heat Pump Hot Water Heater 66 gal	AirTap ATI 66 Hybrid Water Heater	1	Each
22 41 13	Floor Mounted Ceramic Toilet	Kohler Persuade Curv, Comfort Height	1	Each
22 41 16	Wall Mounted Wash Basin - Bathroom	KRAUS KCV-122-CH	1	Each
22 41 16	Under-counter stainless steel kitchen sink	Kohler 18" base cabinet width, single bowl, 9" depth, handcrafted 18 gauge stainless steel	1	Each
22 41 39	Kitchen Faucet	Grohe, single-lever sink mixer 1/2"	1	Each

22 41 23	Shower Faucet and Head	Grohe, Retro-Fit 210 Shower System, 17 3/4" shower arm, metal construction, 2.5 gpm, hand shower 3 sprays	1	Each
22 41 39	Lavatory Faucet	Grohe, Two-Hole Basin mixer, wall-mount	1	Each
Division 23	Heating, Ventilating, and Air-Conditioning			
23 06 60.13	Outdoor Reversible Chiller/Heat Pump Unit	Chiltrix CX30	1	Each
23 57 19.13	Indirect Thermal Storage Heat Exchanger	Alfa Laval water-water plate HX	1	Each
23 21 23	Hydronic Pumps	EcoCircXL 55-45 and 36-45	2	Each
23 71 16	Thermal Storage Tank	CorGal 1000 gal vertical storage tank corrugated galv. Steel	1	Each
23 09 13	Instrumentation and control for HVAC	Built-in Fan coil and pump controllers (not separate system)	3	Each
23 82 19	Ductless Ceiling Mounted Fan Coil Unit	Chiltrix CXI 85, and (2) CXI 34	3	Each
23 21 13	Hydronic piping	1" Insulated PEX Standard Hydronic Piping	120	L.F.
23 82 23	Outside Air Ventilation Fans	Ventomaxx Z- WRG RONDO IQ	3	Each
23 82 23	Bathroom Ventilation Fan	Ventomaxx Comfort IQ	1	Each
Division 25	Integrated Automation			
25 00 00	Architectural Interactive Display and Software (NexSmart)	1/4" Acrylic faceplate container which contains: Puck Sensor from Silicon Labs, Beagle Bone Black, HP Stream 8 Tablet and LED displays	1	Project
25 10 00	Photovoltaic Monitoring System	Gauge network web-based electric energy and power meter for up to 12 circuits on up to 3-phases	1	Each
25 10 00	Water Collection and Consumption Monitoring System	Consumption monitored by flow sensor, collection monitored by rain gauge	1	Each
25 10 00	Weather Station	Ambient Weather WS-1400-IP OBSERVER Solar Powered Wireless Internet Remote Monitoring Weather Station	1	Each
Division 26	Electrical			
26 XX XX	Rule of thumb, Installation, Distribution, Includes all rough electrical work, outlets and switches, no fixtures			SF/living
26 56 00	Exterior Lighting	Wall mounted LED Sconce: Wac Lighting: RUBIX - model: WS-W2509	7	Each
26 51 00	Interior Lighting	Downlight, Recessed 4" LED 120V	10	Each
		Armacost Lighting: 60-Watt AC Dimmable Electronic Power Supply	8	Each
26 51 00	Interior Lighting	Armacost Lighting: LED White Tape Light (3000K)	88.5	L.F.
	Lighting Controls	Lutron Caseta Pro Hub	1	Each
	Lighting Controls	Lutron Caseta: In-Wall Dimmer	16	Each

	Lighting Controls	Lutron Pico Dimmer Remotes	8	Each
Division 28	Electronic Safety and Security			
28 31 00	Fire Alarm Sensor	Protect Wired Smoke Detector and Carbon Monoxide sensors with Wi-Fi connectivity	4	Each
Division 32	Exterior Improvements			
Division 48	Electrical Power Generation			
48 14 00	Solar Energy Electrical Power Generation Equipment	SolarWorld Sunmodule Plus 290W Mono Silver Panels with: Sunmodule Plus Micro Inverters and Dual Rack Jack Base and Rack	28	Each

CONSTRUCTION SPECIFICATIONS

PART 8 - DIVISION 00 – PROCUREMENT AND CONTRACTING REQUIREMENTS

00 01 15 - LIST OF DRAWING SHEETS

Part 1 - GENERAL

1.1 LIST OF DRAWING SHEETS

General

G-000	COVER
G-001	TABLE OF CONTENTS
G-002	GENERAL NOTES AND SYMBOLS
G-101	FINISHED SQUARE FOOTAGE COMPLIANCE PLAN
G-102	EGRESS PLAN
G-103	ADA TOUR ROUTE COMPLIANCE PLAN
G-201	SOLAR ENVELOPE COMPLIANCE ELEVATIONS
G-202	SOLAR ENVELOPE COPMLIANCE ELEVATIONS

Civil

C-101	EXISTING LOT CONDITION
C-201	GROUND CONTACT PLAN
C-202	CIVIL SITE PLAN

Landscape

L-602	AQUAPONICS DETAIL
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Structural

NOTE: Structural drawings issued under a separate package!

Architectural

A-111	FIRST FLOOR PLAN
A-112	ROOF PLAN
A-201	SITE ELEVATIONS
A-202	SITE ELEVATIONS
A-211	ELEVATIONS
A-212	ELEVATIONS
A-301	BUILDING SECTIONS
A-302	BUILDING SECTIONS
A-311	WALL SECTIONS
A-312	WALL SECTIONS
A-313	WALL SECTIONS
A-511	EXTERIOR DETAILS
A-512	EXTERIOR DETAILS
A-531	WINDOW DETAILS
A-541	DOOR DETAILS
A-601	SCHEDULES
A-602	SCHEDULES

Interiors

I-001	INTERIOR SYMBOLS AND NOTES
I-101	INTERIORS PLAN
I-103	REFLECTED CEILING PLAN
I-201	INTERIOR ELEVATIONS
I-202	INTERIOR ELEVATIONS
I-203	INTERIOR ELEVATIONS
I-204	INTERIOR ELEVATIONS
I-205	INTERIOR ELEVATIONS
I-401	ENLARGED PLANS
I-601	INTERIOR DESIGN SCHEDULES
I-701	INTERIOR FINISH PLAN

Fire

F-101 FIRE DETECTION AND ALARM

Plumbing

P-001 SUPPLY + DRAINAGE SIZING CALCULATIONS AND ABBREVIATIONS

P-002 PLUMBING SCHEDULES

P-003 PLUMBING SCHEDULES

P-101 PLUMBING SITE PLAN

P-102 DOMESTIC SUPPLY

P-103 GREYWATER PLAN

P-104 BLACKWATER PLAN

P-105 RAINWATER PLAN

P-201 PLUMBING ISOMETRICS

P-203 PLUMBING SECTION SUPPLY

P-301 PLUMBING FLOW DIAGRAMS

Mechanical

M-001 MECHANICAL SYMBOLS AND SCHEDULES

M-002 MECHANICAL SCHEDULES

M-101 HVAC AIR DISTRIBUTION PLAN

M-201 HYDRONIC PIPING PLAN

M-301 MECHANICAL SYSTEM ISOMETRIC

M-601 HVAC SCHEMATIC DIAGRAM

M-801 SKID CHASSIS

M-802 SKID DETAIL

Electrical

E-001 ELECTRICAL SYMBOLS, ABBREVIATIONS AND NOTES

E-002 SCHEDULES

E-101 ELECTRICAL DISTRIBUTION PLAN

E-102 ELECTRICAL LIGHTING PLAN

E-103 PV CALCULATIONS AND DIAGRAM
E-202 ELECTRICAL ELEVATIONS
E-601 ONE-LINE DIAGRAM
E-602 THREE-LINE DIAGRAM

Operations

O-001 OPERATIONS SYMBOLS AND NOTES
O-101 ARRIVAL SEQUENCE PLAN DAY 1
O-102 ARRIVAL SEQUENCE PLAN DAY 2
O-103 ARRIVAL SEQUENCE PLAN DAY 3
O-104 ARRIVAL SEQUENCE PLANS DAYS 4,5,6,7
O-201 DEPARTURE SEQUENCE PLAN DAY 1
O-202 DEPARTURE SEQUENCE PLAN DAY 2
O-203 DEPARTURE SEQUENCE PLAN DAY 3
O-204 DEPARTURE SEQUENCE PLAN DAY 4

END OF SECTION 00 01 15

00 31 00 - AVAILABLE PROJECT INFORMATION**PART 1 - GENERAL INFORMATION****1.01 PRELIMINARY SCHEDULE**

Schematic Design Phase	April 24, 2014
Design Development Phase	October 9, 2014
Construction Documentation Phase	February 12, 2015
As Built Phase	August 17, 2015
Competition Phase	October 8-13, 2015
Final Report	November 10, 2015

1.02 PRELIMINARY CONSTRUCTION SCHEDULE

Construction in Austin	April - September, 2015
Construction in Irvine	September – October 2015

1.03 PROJECT BUDGET INFORMATION

Total Project Budget: \$323,000

END OF SECTION 00 31 00

PART 9 - DIVISION 01 - GENERAL REQUIREMENTS

01 00 00 – SUMMARY

PART 1 - GENERAL

1.01 SUMMARY

A. Project: NexusHaus, Team Texas/Germany, Solar Decathlon 2015

B. Owner: University of Texas at Austin and Technische Univesitaet Munich

C. Architect: University of Texas at Austin and Technische Univesitaet Munich Decathlon Team

D. Construction location:

2112 Leona Street, Austin, Texas, USA

Orange County Great Park, Irvine, California, USA

E. Project Description: The NexusHaus consists of two modules, exterior shading and deck shown in the referenced drawings and specifications. The house is a prefabricated timber framing construction and is to be delivered as two already built modules.

1.02 WORK RESTRICTIONS

A. Contractor's Use of Site:

The contractor will have full use of the area indicated during the whole construction process. Contractor's use of site is limited by Owner's right to employ other contractors on portions of the Project or perform work independently.

B. Driveways, Walkways, and Entrances:

Driveways and entrances to the site must be kept clear and available to Owner, Owner's employees, and emergency vehicles at all times.

Do not use driveways and entrances for parking or storage of materials.

C. Smoking and alcohol restrictions:

Smoking on construction site is strictly prohibited.

Alcohol consumption on site is strictly prohibited. People under the influence of alcohol are prohibited to enter the site.

D. Health and safety plan:

Work must proceed in accordance with the Solar Decathlon Health and Safety Plan.

1.03 SITE ACCESS

A. Authorized access

Authorized construction personnel, subcontractors, and the CTU Solar Decathlon team members and faculty advisors are allowed to enter the site during the construction period.

All people not listed above are allowed to access the site only with special permit from CTU Solar Decathlon team member or staff.

B. Unauthorized access

Any person entering the site without authorization shall be asked politely to leave the site immediately. Refusing leads to immediate contact of local Police department by owner or contractor.

All criminal entry must be immediately reported to the police department and, insurance company must be informed.

END OF SECTION 01 10 00

01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

This section includes all requirements for products' substitution.

1.02 SUBSTITUTION REQUIREMENTS

Substitution options – substitutions are discouraged except under these conditions:

1. Specified item is no longer available on the market.
2. Specified item is not available on the local market.
3. Specified item is incompatible or incorrect.
4. Specified item can be replaced with cheaper, better or more modern item of similar function.

Visible Item Characteristic

1. Substitution of visible item must be approved by the architect. Item can be rejected for aesthetic purposes alone.

1.03 SUBMITTALS

Product substitution shall be documented by:

1. Product data

2. Shop drawings

3. Samples, if required

Certificates and manufacturers' instructions

END OF SECTION 01 25 00

01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUBMITTALS

Contractor must submit all shop drawings, product data, samples and other relevant documentation.

All documents must be submitted in reasonable time.

All parts of the documentation must be submitted in a minimum of 2 copies.

All submittals shall be documented. Documentation must include:

Date of submission

Project title

Name of:

Contractor

Subcontractor

Client

Manufacturer

Supplier

Identification of section number, location (room number).

1.02 CONTRACTOR' S RESPONSIBILITIES

A. Review shop drawings, product data and samples prior to submission

B. Verify:

1. Measurements
2. Construction Criteria
3. Conformity with specifications and drawings
4. Dimensions and quantities

C. Coordinate each submittal with requirements of the work and of the contract documents

D. At time of submission, notify the Architect/Engineer, in writing, of any deviations in the submittals from the requirements of the contract documents.

END OF SECTION 01 33 00

01 43 00 - QUALITY ASSURANCE

PART 1 – GENERAL

1.01 GENERAL

Comply with applicable codes, regulations, ordinances and requirements of authorities.

Submit copies of inspection reports to Construction Manager.

Deliver, handle, and store materials in strict accordance with manufacturer' s instructions.

Use of any supplier or subcontractor is subject to Owners approval.

1.02 RESPONSIBILITIES

Architects and Engineer shall be responsible for material, system and equipment determination.

The contractor is obligated to inform the architect or engineer if any problem concerning quality of chosen item occurs.

1.03 SHOP DRAWINGS

All shop and producers' drawings must be revised by Engineers or Architects before being accepted as a part of project documentation.

1.04 ASSURANCE DOCUMENTS AND RECLAMATION

Contractor must submit assurance documentation of all products and construction works.

Minimum of 2 year assurance period is provided.

Specification of reclamation process shall be part of client' s contract.

END OF SECTION 01 43 00

01 45 00 - QUALITY CONTROL

PART 1 – GENERAL

1.01 SUMMARY

This section includes information about product quality control.

1.02 ADMINISTRATIVE REQUIREMENTS AND TESTING PROCEDURES

All testing required in contract documentation is arranged by the contractor.

Blower door test is arranged when required by client. Client pays for blower door test if not specified differently in the contract.

1.03 RESPONSIBILITIES

Workers responsible for quality control are appointed by the contractor, the Solar Decathlon team or the Solar Decathlon organizers.

1.04 ON SITE QUALITY CONTROL

Quality control on site is reviewed as followed:

Documents, shop drawings, codes, materials, procedures and workers qualification are reviewed by a qualified person.

Quality maintenance and proper installation are reviewed personally by a qualified person.

Quality tests are done when required after the contractor approves that the construction is ready for testing.

1.05 OBSERVATIONS

The contractor allows the Architect to supervise the construction development.

Control days on site are scheduled at least once a week.

Control day and time is specified at the beginning of the construction process. All relevant people must be notified at least 24 hours in advance, if the schedule is changed.

All important occurrences are to be listed in the construction diary.

When employees of more than one contractor are present on site, a work safety coordinator must be appointed.

1.06 COMPLETE WORK

The architect makes a final inspection before taking over the finished work.

All defects found during the final inspection will be repaired at the contractor' s expense.

END OF SECTION 01 45 00

01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

Section includes information about :

Temporary Electric Power Generator :

Provide connections and extensions of services as required for construction operations.

Temporary Forklift

Temporary Scaffolding

Temporary Barricades

Sanitary facilities: Temporary toilets, wash facilities, and drinking-water fixtures must be provided, if no permanent facilities can be used. All facilities must be in compliance with regulations and health codes.

Lighting: Temporary lighting must be provided when construction works carry on after sunset.

References

NPS noise regulation 36CFR2.12, NCCCCO

Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

1.02 ADMINISTRATIVE REQUIREMENTS

Schedule for forklift operation times:

Construction: 40 hours from 7 a.m. to 11 a.m. and from 1 p.m. to 5 p.m.

Deconstruction: 40 hours from 7 a.m. to 11 a.m. and from 1 p.m. to 5 p.m.

1.03 SUBMITTALS

Product data

1.04 HANDLING

The operation of generators and cranes must be in compliance with owners and manufacturer' s directions.

Scaffolding must follow normatively specified standards and be used in accordance with Health and Safety plan.

PART 2 – PRODUCTS

2.01 GENERATORS:

EU 6500iS Watt 120 Honda Generator

1. 120/240v 6500w max. (54.1/27.1a) 5500w rated (45.8/22.9a)

Full GFCI protection

noise level: 60 Db(a) @ rated load, 52 Db(a) @ 1/4 load

2.02 Forklift

Komatsu BBX50

1. Max. lifting capacity: 6000 lbs.

2.03 BARRICADES

A. Inline Barricades & METAL PRODUCTS, INC.

1. barricade model in-312

2.05 SANITARY FACILITIES

All these facilities will be provided by the organizers on the construction site in Orange County Great Park, Irvine, California, USA.

2.04 LIGHTING

Provide temporary lighting with local switching to allow adequate illumination for construction operations,

observations and inspections

PART 3 - EXECUTION

3.01 TEMPORARY UTILITY INSTALLATION

General: Install temporary services or connect to existing services.

Arrange with the utility company, the Owner, and the existing users a time when service can be interrupted, if necessary, to connect temporary services.

3.02 SECURITY AND PROTECTION FACILITIES' INSTALLATION

Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion.

END OF SECTION 01 50 00

01 53 00 TEMPORARY FOUNDATION

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes: Powder coated steel pier, mounted to a pre-cast concrete pad.

B. Related Sections:

1. Section 05 45 13 MECHANICAL METAL SUPPORTS

2. Section 05 50 00 METAL FABRICATION

1.2 REFERENCES

A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority.

Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.

B. ASTM International:

2009 IBC & 2009 IRC, APPENDIX E: MANUFACTURED HOUSING USED AS DWELLINGS

1. Design loads shall be consistent with local requirements where installed. The following design loads are incorporated herein:

2. Footings are to be supported by either firm, unsaturated, undisturbed soil or compacted fill, asphalt or concrete, footings are designed for 1000 PSF bearing capacity and shall be compatible with local soil conditions. All footings shall be founded in accordance with the IRC AE502 guidelines. Prepare subgrade per soil report, when available.

3. Structural steel:

a. Shall conform to ASTM A36 $F_y = 36$ KSI minimum

- b. Shall be fabricated according to AISC specifications.
 - c. Shall be welded according to AWS specifications.
 - d. All metal components including nails and screws etc. are to be protective coated.
4. The C.P. seismic pier shall be listed and labeled by BSK associates for the ultimate loads.
5. This foundation system is for placing manufactured homes constructed with longitudinal or cross joists.
6. This foundation system is designed to be constructed on a fairly level site with no existing soil problems.
7. The size, type and location of standard vertical support piers and footings must be installed per the home manufacturer's installation manual.

1.3 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract
- B. Product Data: Submit product data, including manufacturer's product information sheet, for specified products.
- C. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including anchorage and accessories.
- D. Samples: Submit selection and verification samples.
- E. Quality Assurance Submittals: Submit the following:
 - 1. Certificates: Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria, and physical requirements.
 - 2. Manufacturer's Instructions: Manufacturer's installation instructions and/or product information sheet.
- F. Closeout Submittals: Submit the following:
 - Warranty document specified herein.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.

B. Regulatory Requirements:

1. Building Code: Verify with Manufacturer for approval by applicable code bodies and industry entities. Design, use and installation must comply with the requirements of all applicable

codes and is the responsibility of a qualified design professional. Product code acceptance is determined by the local authority having jurisdiction.

2. Approvals: Verify applicable standards with regulatory agencies including block manufacturer's requirements.

C. Mock-Ups: Install at project site, a job mock-up using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color, texture, pattern and workmanship standards.

1. Mock-Up Size: Verify with architect and contractor prior to submission of sample to determine appropriate scope and location of mock-up.

2. Maintenance: Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

3. Incorporation: Mock-up may be incorporated into final construction upon Owner's approval.

D. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions and manufacturer's warranty requirements.

1.5 DELIVERY, STORAGE & HANDLING

A. General: Comply with Product Requirements Sections of the specifications.

B. Ordering: Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

D. Storage and Protection: Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

1. 6 PROJECT CONDITIONS

A. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Central Piers inc.
284 North Thorne Ave.
Fresno Ca. 93706
Phone : 1- 800 – 653- 0387

2.2 MATERIALS

CP Seismic Pier by Central Piers Inc.

CP Standard Piers by Central Piers Inc.

CP Anchor Brace by Central Piers Inc.

CP Anchor Pier by Central Piers Inc.

CP SeismicPier:

The CP Seismic Pier is a Powder Coated Steel Pier, mounted to a Pre-cast Concrete Pad (Above ground) or optional Plywood Pad. Also easily attached to in ground concrete. Available for; Mobile Home Permanent Foundations, Commercial

Foundations, Tie downs, Earthquake Bracing, and 2 Story Fleetwood Foundations. Also available for homes with Perimeter Support beams.

2.3 DESCRIPTION

A. Performance Requirements: Provide column bearing blocks that have been manufactured and installed to withstand loads from [Specify code/standard reference.] and to maintain [Specify performance criteria.] performance criteria stated by manufacturer without defects, or damage.

1. Type: Specify type of column bearing block and allowable bearing capacity from the following list of products based on the manufacturer's design data for the specific project under consideration.

2.4 PRODUCT SUBSTITUTIONS

A. Substitutions: No substitutions permitted.

2.5 RELATED MATERIALS

A. Related Materials: Refer to other sections listed in Related Sections paragraph herein for related materials.

2.6 SOURCE QUALITY

A. Source Quality: Obtain column bearing blocks from a single manufacturer.

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, and product installation instructions.

3.2 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.3 PREPARATION

A. Surface Preparation: Specify applicable product preparation requirements per manufacturer's recommendations and standards appropriate for the specific conditions.

3.4 INSTALLATION

A. Column Bearing Block Installation:

1. Install blocks on clean, smooth, dry surfaces. If surfaces are wet, wipe or air dry surfaces to remove moisture before block installation. Do not allow blocks to "bridge" over voids or gaps, or rest on surface projections over 0.125 inch (3.2 mm) high. Use fast-setting cementitious leveling grout between LT column bearing block and mating structure.
2. Oversize predrilled anchor holes approximately 0.375 inch (9.5 mm) to allow for variation in anchor bolt locations.
3. Do not use broken blocks. Comply with installation recommendations from block manufacturer.

B. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.

3.5 FIELD QUALITY REQUIREMENTS

A. Site Tests: As per manufacturer's recommendations.

B. Inspection: To be determined by manufacturer's representative and verified with architect and contractor.

C. The design of this system is based on standard manufactured homes as built by the manufacturer. Site build additions such as garages and secondary roofs have not been included in this design.

D. All dimensions included on this plan, including coach size, roof height and pier height, should be field verified by the local building official. Any discrepancies should be immediately brought to the engineer's attention.

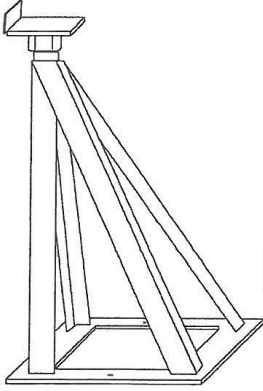
E. The building pad should be inspected to ensure that proper soil conditions and drainage patterns have been established in accordance with the home installation manual.

3.6 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace products that have been installed and are damaged. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project site and legally dispose of debris.

3.7 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.



Standard Perimeter Pier



Standard Pier

MOBILEHOME & ACCESSORY STRUCTURE BUILDING COMPONENT
 HEALTH AND SAFETY CODE, DIVISION 13, PART 2
APPROVED
SUBJECT TO CORRECTIONS NOTED
 Approval does not authorize or approve any omission or deviation
 from requirements of applicable State laws and regulations.

STATE OF CALIFORNIA
 DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
 DIVISION OF CODES AND STANDARDS

By R. Wilson Date 7/5/13
(signature)

BP NO. BP 17-01

This Approval Expires 7/14/15



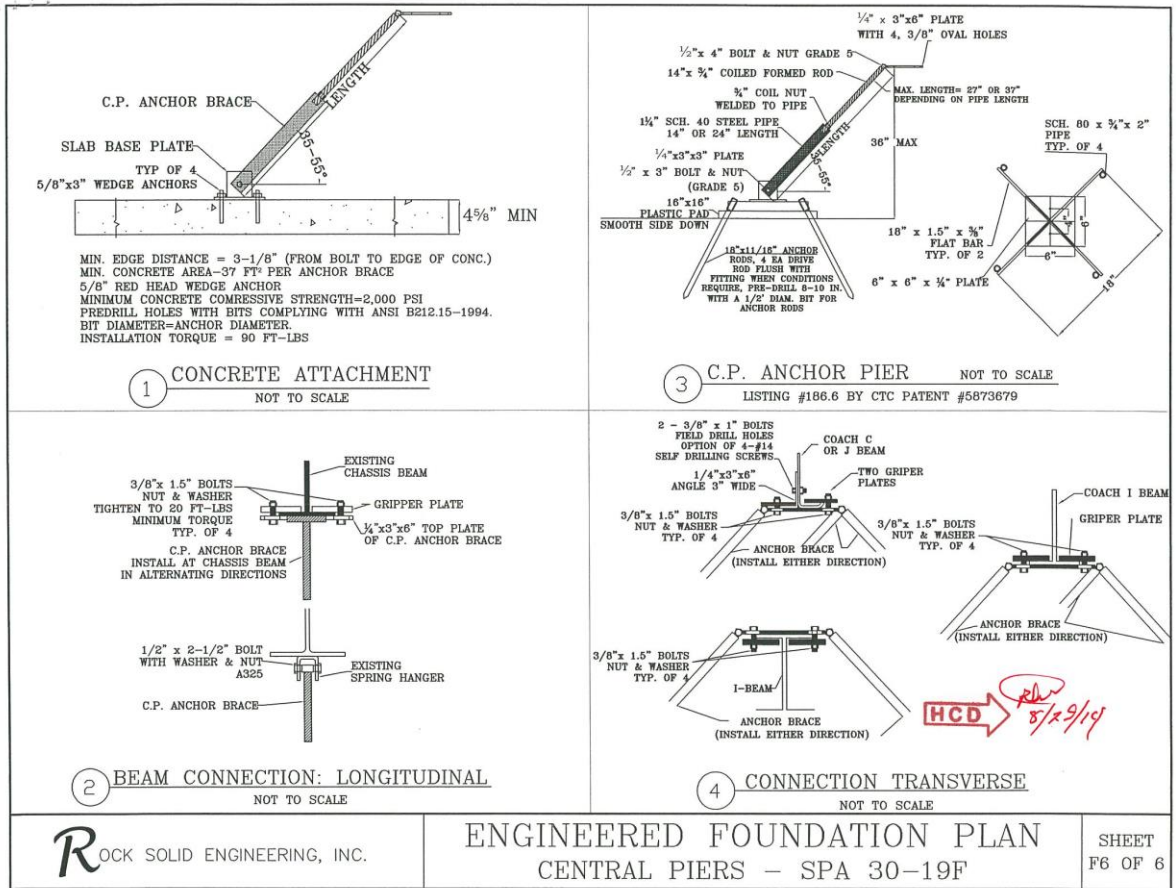
Standard Pier and Standard Perimeter Pier
Listing Agency: Technicon Engineering Services, Inc.
Listing #: 21033.001-Q60

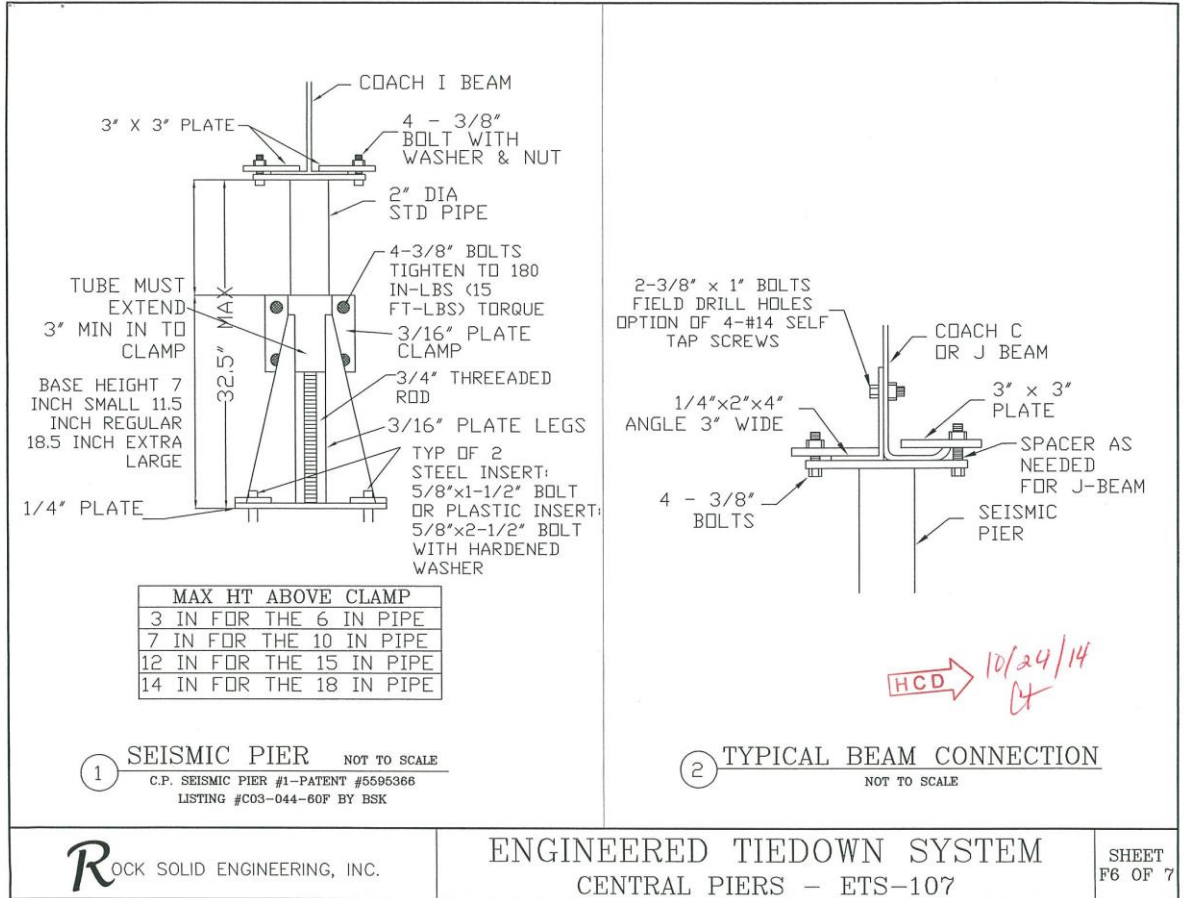
Central Piers Inc.

Standard Pier Heights From 4" to 36" in 2" Increments

Standard Pier 6000 lb. Rating
Standard Perimeter Pier 3000 lb. Rating

Central Piers Inc. 284 N Thorne Ave. Fresno California 93706 Office 559-268-0828 Fax 559-268-1439 centralpiers.com

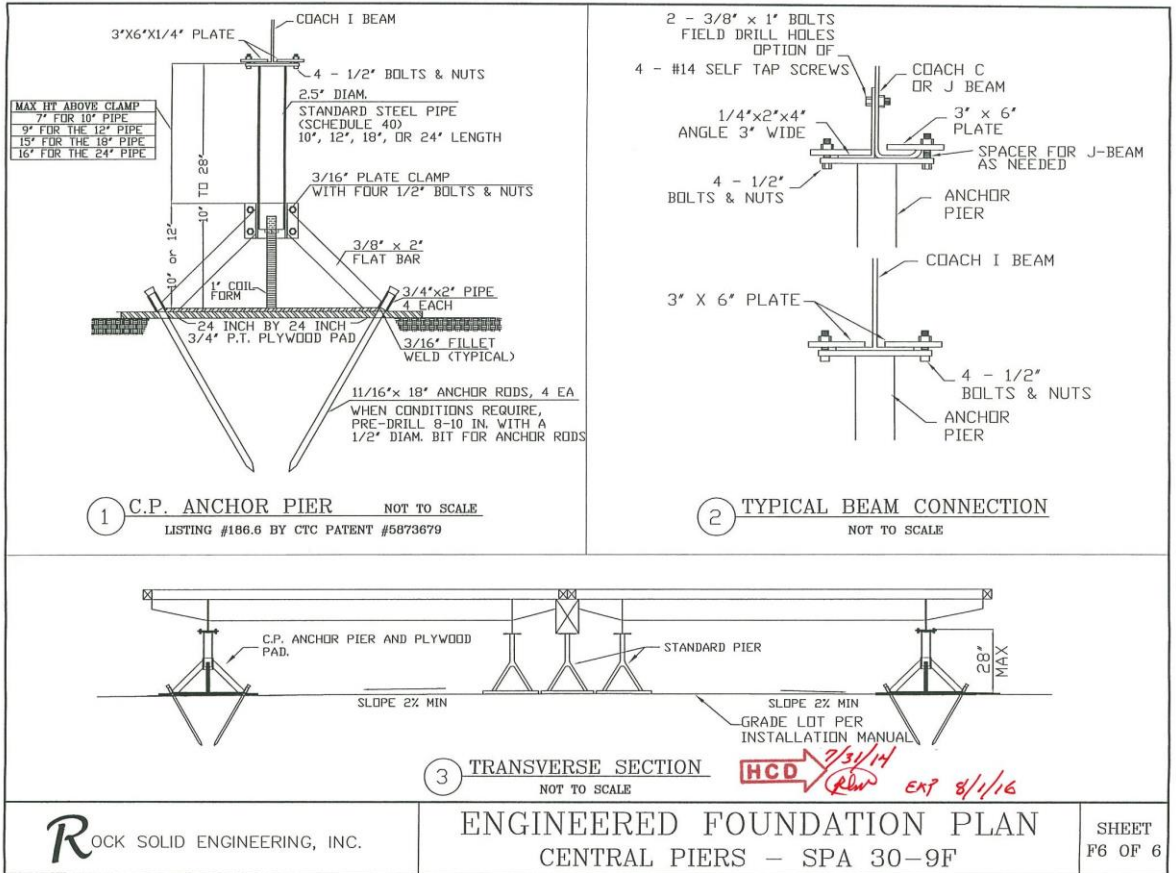




ROCK SOLID ENGINEERING, INC.

ENGINEERED TIEDOWN SYSTEM
 CENTRAL PIERS - ETS-107

SHEET
 F6 OF 7



END OF SECTION 01 53 00

01 60 00 PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.02 SUSTAINABILITY REQUIREMENTS

Products with low LCA impacts are preferred.

Local products shall be preferred.

Product selection must minimize the energetic need of the building.

END OF SECTION 01 60 00

01 65 00 PRODUCT DELIVERY REQUIREMENTS

PART 1 – GENERAL

1.01 GENERAL DELIVERY REQUIREMENTS

Products must be delivered in original undamaged package.

Delivery must be received by an authorized person.

Deliveries have to be documented in the construction diary. This condition does not apply to free standing furniture and accessories.

END OF SECTION 01 65 00

01 66 00 PRODUCT STORAGE AND HANDLING REQUIREMENTS

PART 1 – GENERAL

1.01 GENERAL STORAGE AND HANDLING REQUIREMENTS

Follow manufacturers' requirements for handling and storing.

Products must be stored in dry, ventilated space, if not specified differently in the product documentation.

Product and construction parts must be secured against unauthorized manipulation on the construction site.

1.02 STORAGE AND HANDLING REQUIREMENTS FOR SHIPPING

All products and construction parts must be ensured against spontaneous movement and other devaluation in the shipping container.

Insurance must be arranged before shipping products or relocating building parts.

END OF SECTION 01 66 00

DIVISION 02 – EXISTING CONDITIONS

02 43 00 STRUCTURE MOVING

PART 1 – GENERAL

1.01 SUMMARY

This section includes all information necessary for the transportation of the NexusHaus from the construction site in Austin, Texas to the competition site in Irvine, California.

1.02 TRANSPORTATION REQUIREMENTS

All building parts are to be fitted into an International ProStar+ Truck

53' x 13' 6" x 8' 6" feet long truck base

48,000 lbs. max load

The NexusHaus shall be transported using specified packing and securing methods.

All fragile components must be specially protected against devaluation.

Insurance must be arranged for all shipment.

1.03 SUBMITTALS

Site Operations and Transportation Plan Solar Decathlon 2015 include

Trailer specifications

Route information

Delivery information and site operations.

PART 3 - EXECUTION

3.01 QUALITY ASSURANCE

Intactness of all delivered products must be checked by an authorized person before being taken over.

3.02 DELIVERY, STORAGE & HANDLING

The exact time of delivery to Orange County Great Park in Irvine, California shall be coordinated with the team' s and the organizer' s schedule.

All components must be stored according to product specifications.

3.03 INSTALLATION

Assembly, disassembly, reassembly, packaging and shipping are carried out by designated individuals from the CTU or qualified contractors in accordance with the specified instructions.

END OF SECTION 02 43 00

PART 14 - **DIVISION 05 - METALS**

05 12 23 STRUCTURAL STEEL FOR BUILDINGS

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the followings:

1. Structural steel
2. Bolts, washers, and other steel accessories
3. Welded steel connections

1.02 SUBMITTALS

△ Submit complete Product Data for each product specified

1. Include detail of cuts, connections, splices, and connections materials.
2. Identify members and connections of the seismic-load-resisting system.

▢ Connection design:

1. The Engineer shall be licensed in the state in which the project is located. At the commencement of the project submit a letter signed and sealed by the Engineer that will supervise the steel connection design attesting to this responsibility.
2. Submit calculations of all connections. Calculations and details shall be clearly keyed to the appropriate members on the construction documents. Calculation shall bear the seal of the Engineer supervising design of the steel connections.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Materials shall be kept free from dirt, grease, and other foreign matter.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

PART 2 - PRODUCTS

2.01 Bantam steel angles

A. ASTM A529

2.02 M 10 X 9

A. ASTM A529

2.03 Bantam plates

A. ASTM A529

PART 3 - EXECUTION

3.01 INSTALLATION

A. Prepare ground surface by cleaning, removing projections, filling voids, and as otherwise recommended in steel manufacturer's instructions.

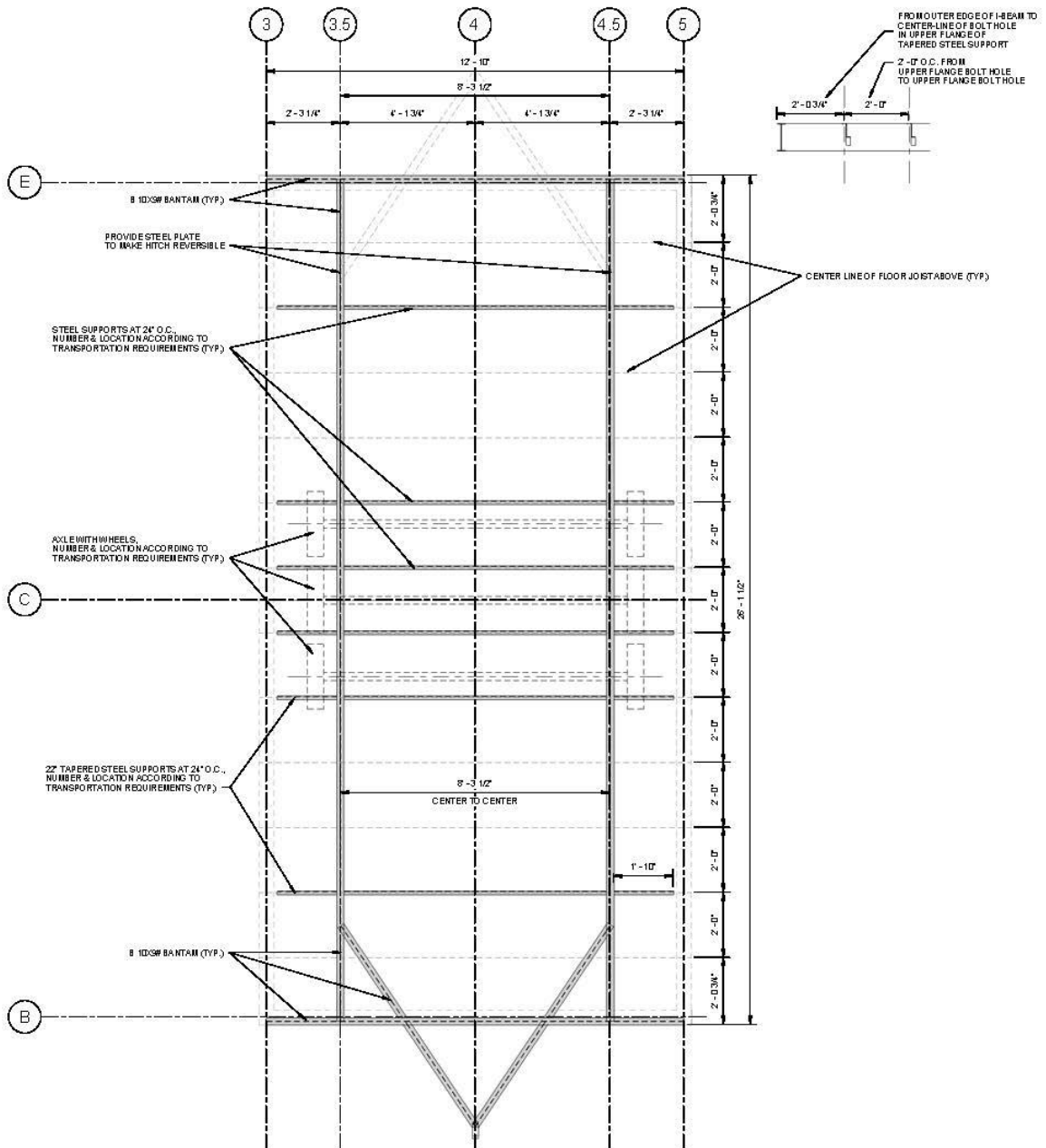
B. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place using appropriate fastening methods.

C. Set structural steel accurately in locations and to elevation indicated and according to AISC 303 and AISC 360. Check plumpness after erection.

D. Where erection requires performing work of fabrication on site, comply with the applicable standards of Part 2 of this specification.

E. Correct deficiencies or remove and re-install any steel framing that does not comply with requirements

F. Repair, refinish, or replace aluminum extrusions and connection hardware damaged during Installation, as directed by Architect.



① CHASSIS PLAN
 1/2" = 1'-0"

END SECTION 05 12 23**05 45 13 MECHANICAL METAL SUPPORTS****PART 1 - GENERAL****1.01 SUMMARY**

A. This section includes the followings:

1. Welded steel connections
2. Angle profiles, "U" profiles, "Z" profiles, flat plate fittings.
3. Connections for wood to wood, wood to steel and wood to concrete

1.02 RELATED SECTIONS

A. 05 12 23 Structural Steel for Buildings

B. 05 50 00 Metal Fabrication

1.03 SUBMITTALS

C Submit complete Product Data for each product specified.

3. Description of each material and finish, product, criteria and limitations.
4. Preparation instructions and recommendations.
5. Storage and handling requirements and recommendations.
6. Identify pieces and parts of connections and assembly.
7. Installation methods and instructions.

B. Shop Drawings

1. Submit shop drawings prepared by the manufacture showing plans, sections, elevations including accessories and finishes.
2. Show connection details with screw types and locations and other fastener requirements

1.04 DELIVERY, STORAGE, AND HANDLING

C. Deliver products in manufacturer's unopened packaging.

D. Protect and store materials in manufacturer's unopened packaging until ready for installation. Keep members classified in different types and uses by the correspondent package.

E. Store supports with manufacturer's labels intact.

F. Materials shall be kept free from dirt, grease, humidity and other foreign matter.

1.05 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.06 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 – PRODUCTS

2.01 MANUFACTURE COMPANY:

A. KNAPP GMBH (Österreich and Export) - Wassergasse 31 A-3324
(Euratsfeld)

2.02 MATERIALS:

A. Load bearing (structural) cold-formed steel members shall be manufactured from structural quality steel having minimum yield strength of 33 ksi, having a minimum protective coating equal to G-60 galvanized finish, and conforming to the following standards: ASTM A 653, ASTM A 1003, and ASTM C 955.

B. Non-load bearing (non-structural) cold-formed steel members shall have a

minimum protective coating equal to G-40 galvanized finish and shall conform to ASTM A 653, ASTM A 1003, and ASTM C 645.

C. Corrosion Protection: Products shall have protective coatings as follows:

D. Load bearing cold-formed steel member shall have engineering properties calculated in accordance with the AISI "Specification for the Design of Cold-Formed Steel Structural Members" and have minimum properties as published by STEELER.

1. FRAMING COMPONENTS

Wall Framing: load bearing (structural) cold-formed steel wall components. Provide wall framing materials, such as studs, tracks, bracing, clip angles, straps, headers and other related accessories.

Floor Framing: Steeler load bearing (structural) cold formed floor components. Provide floor framing materials, including joists, tracks, web stiffeners, bracing, clip angles, straps, rim tracks, and other related accessories.

Roof Rafter Framing: Steeler standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges. Provide roof framing materials, including web stiffeners, bracing, clip angles, straps, and other related accessories.

Ceiling Joist Framing: Steeler load bearing (structural) cold formed ceiling components. Provide framing materials, including joists, tracks, web stiffeners, bracing, clip angles, straps, rim tracks, and other related accessories.

2. FRAMING ACCESSORIES:

Fabricate steel framing accessories of the same material and finish used for

framing members, with a minimum yield strength of 33 ksi (230 MPa).

Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

- Supplementary framing.
- Bracing, bridging, and solid blocking.
- Web stiffeners.
- Gusset plates.
- Deflection track and vertical slide clips.
- Stud kickers and girts.
- Joist hangers and end closures.
- Reinforcement plates.

3. ANCHORS, CLIPS, AND FASTENERS:

Steel Shapes and Clips: ASTM A 36, zinc coated by the hot-dip process according to ASTM A 123.

Cast-in-Place Anchor Bolts and Studs: ASTM A 307, Grade A, zinc coated by the hot-dip process according to ASTM A 153.

Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.

Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer's standard elsewhere.

4. FABRICATION

Framing components may be preassembled into panels. Panels shall be square with components attached.

Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.

Hold members in place until fastened.

Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.

Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:

Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

PART 3 - EXECUTION

3.01 EXAMINATION

Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.

Do not begin installation until substrates have been properly prepared.

If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

5. PREPARATION

Clean surfaces thoroughly prior to installation.

Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

6. INSTALLATION

General Erection Requirements:

Weld in compliance with AWS D.1.3.

Install in compliance with applicable sections of the AISI's Standard for Cold-Formed Steel Framing General Provisions.

Wall Framing:

Stud size and spacing shall be in accordance with the approved shop drawings.

Fasten wall framing members by screws, power actuated fasteners, welding, or a combination of methods in accordance with the approved shop drawings.

Fabricate, handle, and erect members and assemblies in a manner to prevent damage or distortion of the framing.

Cut ends of framing members squarely by shearing or sawing. Install

plumb, square, true to line and securely fastened.

Construct corners using minimum three studs. Provide double stud wall openings at door jambs, and window jambs where indicated on shop drawings.

Erect load bearing studs one piece full length. Splicing of studs or cutting of flange or lips is not permitted.

Track shall have web contact with a uniform and level bearing surface and securely anchored with fasteners, sized and spaced in accordance with the approved connection details.

Erect load bearing studs, brace, and reinforce to develop full strength, to achieve design requirements.

Fully seat axial loaded studs in receiving tracks (maximum 1/8 inch (3.2 mm) gap between stud and track web is acceptable).

Align load bearing studs with joists or trusses or use a load distribution member to transfer loads to other structural components or foundations.

Provide slip connections where required allowing for vertical movements of the structure without imposing vertical loads on the wall framing.

Coordinate placement of insulation in multiple stud spaces after erection. Provide suitable insulation where wall framing assemblies will form voids, that will not be accessible after completion of framing.

Install intermediate studs above and below openings to align with wall stud spacing.

Provide structural framing shear walls where indicated or required in accordance with the shop drawings.

Attach strapping or blocking to studs for attachment of fixtures anchored to walls.

Install framing between studs for attachment of mechanical and electrical items, and to prevent stud rotation.

Floor Framing:

Fasten floor framing members by screws, power actuated fasteners, welding, or a combination of methods in accordance with the approved shop drawings.

Fabricate, handle, and erect members and assemblies in a manner to prevent damage or distortion of the framing.

Cut ends of framing members squarely by shearing or sawing. Install plumb, square, true to line and securely fastened.

Structural joists shall be supported by foundation walls, joist hangers, load distribution members, or line up over vertical supports as indicated on the drawings.

Structural framing joists shall have minimum 1-1/2 inch (38 mm) bearing support and a minimum 10 inches (254 mm) of unpunched web from any bearing support.

Provide joist web stiffeners as required.

Provide additional support under bearing walls that run parallel to the joists and the wall length exceeds one-half the length of the joist span.

Provide end blocking where joist ends are not restrained against rotation.

Floor diaphragms and connections shall be in accordance with the approved shop drawings.

Align joists with load bearing studs or use a load distribution member to transfer loads to other structural components or foundations

Coordinate placement of insulation in multiple framing spaces after erection.

Install framing between joists for attachment of mechanical and electrical items, and to prevent joist rotation.

Roof Rafter Erection: Install as indicated and in accordance with the approved shop drawings.

Make provisions for erection loads. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.

Framing size and spacing shall be in accordance with the approved shop drawings.

Fasten by screws, power actuated fasteners, welding, or a combination of methods in accordance with the approved shop drawings.

Fabricate, handle, and erect in a manner to prevent damage or distortion of the framing.

Do not alter, cut or remove any members or components without advance approval in writing from the Architect.

Support rafters by load bearing metal stud walls, foundation walls, hangers, load distribution members, or line up over vertical supports as indicated on the drawings.

Provide a minimum 1-1/2 inch bearing support.

Provide additional support under bearing walls that run parallel to the rafters and the wall length exceeds one-half the length of the joist span.

Provide end blocking where ends are not restrained against rotation.

Floor or roof diaphragms and connections shall be in accordance with the approved shop drawings.

Align rafters with load bearing studs or use a load distribution member to transfer loads to other structural components or foundations

Coordinate placement of insulation in multiple framing spaces after erection.

Install framing between rafters for attachment of mechanical and electrical items, and to prevent truss rotation.

Repair or replace damaged members only as directed in writing by the Manufacturer.

Do not overload during construction.

7. ERECTION TOLERANCES

Members shall be level, and true to line of 1/8 inch (3 mm) in 10 feet (254 mm) (1:960).

Spacing: Space individual members no more than plus or minus 1/8 inch (3mm) from location indicated. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

Wall Squareness: Fabricate walls to a maximum out-of-square tolerance of 1/8 inch (3mm).

Floor Squareness: Fabricate each cold-formed steel floor to a maximum out-of-square tolerance of 1/8 inch (3mm).

8. ADJUSTING AND CLEANING

Repair or replace damaged installed products in accordance with manufacturer's instructions before owner's acceptance.

Remove from project site and legally dispose of construction debris associated with this work.

9. PROTECTION

Protect installed products until completion of project.

Touch-up, repair or replace damaged products before Substantial Completion.

END SECTION 05 45 13

05 50 00 METAL FABRICATIONS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Metal Walkways
- B. Miscellaneous framing, supports and trim.
- C. Steel pipe guardrails and handrails.
- D. Steel Clips, Angles, Tubes, Pipes and Shapes
- E. Anchors and Bolts
- F. Galvanizing of Steel and Ferrous Metal Items

1.02 RELATED SECTIONS

- A. 05 12 16 FABRICATED FIREPROOFED STEEL COLUMNS
- B. 05 12 23 STRUCTURAL STEEL FOR BUILDINGS
- C. 05 15 19 STAINLESS STEEL WIRE ROPE ASSEMBLIES
- D. 05 16 00 STRUCTURAL CABLING

- E. 05 19 00 TENSION ROD AND CABLES TRUSS ASSEMBLIES
- F. 05 19 19 CANOPY SUPPORT TRUSS ASSEMBLIES
- G. 05 36 13 COMPOSITE STEEL PLATE AND ELASTOMER DECKING
- H. 05 45 13 MECHANICAL METAL SUPPORTS
- I. 05 50 00 METAL FABRICATIONS
- J. 05 52 13 PIPE AND TUBE RAILINGS

1.03 MEASUREMENT AND PAYMENT

A. General

1. Measurement and payment for metal fabrications and miscellaneous metal items will be either by the lump-sum method or by the unit-price method as determined by the listing of the bid item for metal fabrications and miscellaneous metal items indicated in the Bid Schedule of the Bid Form.

2. When metal fabrications or miscellaneous metal items are included as architectural features or components of the structure, they will not be measured separately for payment, but will be included in the lump-sum measurement for Architectural Work.

1.04 SUBMITTALS

A. General: Refer to Section 01 33 00 - Submittal Procedures, and Section 01 33 23 - Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

B. Shop Drawings: Submit fully detailed Shop Drawings of metal fabrications and miscellaneous metalwork, showing sizes, details of fabrication and construction, methods of assembly, locations of hardware, anchors, and accessories, and installation details.

1. Detailing Requirements: Detail steel components as specified in Section 05 12 00 - Structural Steel Framing, and items to be galvanized in accordance with applicable requirements of ASTM A384 and ASTM A385. Detail and fabricate work with suitable drain and vent holes to provide

positive drainage and to prevent trapping of moisture and stagnant air.
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C. Product Data: Submit manufacturers' product data of all manufactured items and products.

1.04 QUALITY ASSURANCE

A. Test Reports: Submit Certified test reports showing compliance with specified performance characteristics and physical properties.

B. Certificates: Submit Product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.05 DELIVERY, STORAGE AND HANDRAILING

A. Deliver, store, handle and protect materials in accordance with Section 01 61 00 Common Product Requirements.

B. Cover exposed stainless steel surfaces with pressure sensitive heavy protection paper or apply strippable plastic coating.

C. Leave protective covering in place until final cleaning of building. Provide instructions for removal of protective covering.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General: Manufactured steel clips and angles will be accepted where such will meet the requirements of the Contract Drawings and are shown on approved Shop Drawings.

B. Steel Materials:

1. Shapes: Standard structural sections, shapes, plates, and bars, as indicated, conforming with ASTM A36. Bars conforming with ASTM A108 will be accepted.

2. Tubing: Steel tubing, conforming with ASTM A500 or ASTM A501, of size and shape indicated.

3. Pipe: Steel pipe or round tubing, conforming to ASTM A53, Type E or S, Grade A, of diameters and sizes indicated. Pipe for sleeves and exterior locations shall be galvanized pipe as specified in ASTM A53.

C. Welding Rods/Electrodes: Refer to Section 05 05 22 - Metal Welding, for requirements.

F. Anchors and Bolts: ASTM A307, A449, A563, and F436, as applicable. Bolts and studs, nuts, and washers shall be hot-dip galvanized in accordance with ASTM A153.

G. Fasteners and Accessories: Furnish anchors and fasteners, washers, straps, and accessories as required for a complete and finished installation. Fasteners shall be stainless steel or galvanized steel as appropriate and approved for the location.

2.02 FABRICATION

A. Metalwork shall be fabricated by firms or shops experienced and skilled in the custom fabrication and construction of metal fabrications and miscellaneous metalwork. There shall be no exposed screws, bolts, and fasteners in the finished work, except as indicated or required. RELEASE – R3.0 SECTION 05 50 00 BART FACILITIES STANDARDS Issued: January 2013 PAGE 7 OF 8 STANDARD SPECIFICATIONS

B. Welded connections shall be made in accordance with requirements of Section 05 05 22 - Metal Welding. Welds where exposed to view shall be ground and dressed smooth, so that the shape and profile of the item welded is maintained.

C. Metal fabrications shall be prefabricated and preassembled in the factory or shop as far as practicable.

D. Form and fabricate the work to meet installation conditions. Include anchors, fasteners, and accessories to secure the work in place, as indicated.

E. The Contractor may furnish standard manufactured products for components when applicable, providing such products meet space limitations and installation conditions and are approved by the Engineer.

2.04 CLEANING

A. Non-galvanized Metalwork:

1. After fabrication, ferrous metalwork shall be power-tool cleaned in accordance with SSPC-SP 3 to remove mill scale, rust, grease, oil, and any other foreign matter. Welds shall be thoroughly wire brushed.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install metal fabrications and miscellaneous metalwork as indicated and in accordance with the approved Shop Drawings, using workers skilled and experienced in the installation of the type of work involved.

B. Install metal fabrications and miscellaneous metalwork with all installation accessories furnished by the fabricator as required for complete and finished installations.

C. Installation of metalwork shall be in accordance with approved Shop Drawings, true and horizontal, perpendicular, or at the required angle, as the case may be, level and square, with angles and edges parallel with related lines of the building or structure.

D. Field welding, where indicated, shall conform to requirements of Section 05 22 - Metal Welding.

E. Where bases and bearing plates require grouting, conform to requirements of Section 03 61 11 - Non-Shrink Grout, and Section 05 12 00, Structural Steel Framing, as applicable.

END SECTION 05 50 00

05 52 13 PIPE AND TUBE RAILINGS

2. GENERAL

1. SECTION INCLUDES

Non-penetrating perimeter safety rail systems, including pipe railings, corners and uprights.

2. RELATED SECTIONS

Section 05 45 13 - Mechanical Metal Supports.

Section 05 50 00 - Metal Fabrications

3. REFERENCES

Occupational Safety and Health Administration (OSHA):

29 CFR 1926.500 - Scope, Application and Definitions Applicable to this Subpart.

29 CFR 1926.501 - Duty to Have Fall Protection.

29 CFR 1926.502 - Fall Protection Systems Criteria and Practices.

29 CFR 1926.503 - Training Requirements.

4. SUBMITTALS

Submit under provisions of Section 01 30 00 - Administrative Requirements.

Product Data: Manufacturer's data sheets for products and assemblies specified.

Preparation instructions and recommendations.

Storage and handling requirements and recommendations.

Cleaning methods.

Shop Drawings:

Indicate profiles, sizes, connections, size and type of fasteners, accessories.

Show location of rails and guardrails including plans, details of components and anchor details.

Field Verified Measurements: Verify dimensions indicated on Drawings.

Verification Samples: For each finish specified, two samples representing actual colors specified.

5. DELIVERY, STORAGE, AND HANDLING

Deliver, store and handle materials and products in strict compliance with manufacturer's instructions and recommendations and industry standards.

Store materials in manufacturer's original sealed, labeled packaging until ready for installation and in accordance with manufacturer's instructions. Protect finishes on rails and uprights from damage.

6. PROJECT CONDITIONS

Maintain environmental conditions (temperature, humidity and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

Field Measurements: Where horizontal rails and uprights are indicated to fit to other construction, check actual dimensions or other construction by

accurate field measurements prior to ordering and installation; show recorded measurements on final Shop Drawings.

7. SEQUENCING AND SCHEDULING

Coordinate fabrication and delivery schedule of handrails with construction progress and sequence to avoid delay of railing installation.

Where field measurements cannot be made without delaying the system fabrication and delivery, obtain guaranteed dimensions in writing by the Contractor and proceed with fabrication of products to not delay fabrication, delivery and installation.

8. WARRANTY

Warranty: Provide manufacturer's standard 2 year warranty against defects in materials and manufacturing.

3. PRODUCTS

1. FABRICATOR

Israel Azmitia
stainless steel fittings and fasteners
995 N. W. 17th Ave.
Unit B Delray Beach , FL 33445
PH [770] 595-2835

Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2. PATIO EDGE PROTECTION

Patio Edge Protection System: Non-Penetrating Perimeter Guardrail System including uprights, horizontal rails and accessories as manufactured by Premier Rail Systems.

System Design: Permanent safety rail system with 42 inch height; 39 inch

minimum, 45 inch maximum height; to provide perimeter guardrail system on the patio to withstand a minimum load of 200 lb at any point in an outward or downward direction per OSHA Regulation 29 CFR 1926.502(b).

System Components:

Materials: Natural finish stainless steel uprights and horizontal rails with stainless steel fasteners.

Tube Diameter: 1-5/8 inches.

Tube Thickness: 0.065 inch.

Mounting: Permanent rail base assemblies.

Mounting: Rail base assemblies for standing seam metal decking.

Fasteners for Structural Attachment: As recommended by Premier Rail System.

For Wood Attachment: RSS Structural Screws by GRK Fasteners.

Toe Boards: Provide 18 gauge toe board brackets.

4. EXECUTION

1. EXAMINATION AND PREPARATION

Inspect and prepare substrates and nailers using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions. Verify that nailers and other structural components of the building are securely fastened and capable of withstanding loads applied by the guardrail system.

Do not proceed with installation until substrates and nailers have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and

conditions.

2. INSTALLATION

Install in accordance with manufacturer's instructions including the following.

Set uprights, horizontal rails and corners accurately in location, alignment and elevation, measured from established lines and levels and per installation drawings.

Install fasteners as recommended by manufacturer in holes provided on the upright bracket.

Inspect final installation and test for capacity in accordance with manufacturer's recommendations.

3. PROTECTION

Protect installed products until completion of project.

Touch-up, repair or replace damaged products before Substantial Completion.

END SECTION 05 52 13

**PART 15 - DIVISION 06 - WOOD, PLASTICS, AND
COMPOSITES**

06 11 00 - WOOD FRAMING

PART 1 - GENERAL INFORMATION

1.01 SUMMARY

A. Section Includes:

1. Framing with dimensional lumber
2. Wood blocking, nailers, and grounds
3. Structural composite lumber
4. Construction panels for miscellaneous uses
5. Support for devices and accessories mounted on and/or in partitions
6. Wood preservative treatment
7. Fire retardant treatment

B. Referenced Sections:

1. Section 06 15 33: Wood Patio Decking
2. Section 06 16 33: Wood Board Sheathing
3. Section 06 17 13: Laminated Veneer Lumber
4. Section 06 17 33: Wood I Joists
5. Section 09 29 82: Fireproof Gypsum Plastering

1.02 SUBMITTALS

A. Provide dressed lumber marked with grade stamp of inspection agency.

B. Product Data:

1. Submit manufacturer's literature describing products to be provided. Information shall include material composition, thickness, sizes, and fire resistance.

2. Submit reports showing compliance with building code in effect for the project for following:

- 1) Wood-preservative-treated wood
- 2) Fire-retardant-treated wood
- 3) Engineered wood products

C. Sustainable Design Submittals:

Submit Forest Stewardship Council certification numbers and copies of invoices bearing these numbers as documentation that lumber was properly segregated from other materials while in storage and production.

1.03 REFERENCES

A. All wood framing including details for bridging, blocking, fire stopping, etc., shall conform to the latest edition of the “National Design Specification for Wood Construction” and its supplements and shall be installed in accordance with the NFPA “Manual for House Framing” .

B. Fastening shall be in accordance with the most restrictive of: The International Building Code 2012 or the manufacturer’ s recommended fastening schedules.

D. National Forest Products Association:

1. National Design Specifications for Stress Grade Lumber and Its Fastening
2. Span Tables for Joists and Rafters
3. Working Stresses for Joists and Rafters Southern Pine Inspection Bureau:
 1. SPIB Standard Grading Rules for Southern Pine Lumber Underwriters Laboratories,

UL 723 Standard Test Method for Surface Burning Characteristics of Building Materials; Underwriters Laboratories, Inc.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Provide products graded in compliance with following:

a. Grading rules of Southern Pine Inspection Bureau, as applicable

B. Certifications:

1. Each piece of lumber shall be factory-marked with grade mark of inspection agency evidencing compliance with grading rule requirements.

2. Lumber Grade Marks:

a. Lumber grade mark stamps shall contain following:

A. Symbol of grading agency certified by Board of Review of American

Lumber Standards Committee ALSC

B. Mill number or name

C. Grade of lumber

D. Species or species grouping or combination designation

E. Rules under which graded were applicable

F. Condition of seasoning at time of manufacture

a) S-GRN: Unseasoned

b) S-DRY: Maximum moisture content 19%

c) MC-15 or KD: Maximum moisture content 15%

b. Inspection agencies and abbreviations used to reference them with

lumber grades and species include:

- 1) NeLMA- Northeastern Lumber Manufacturers Association
- 2) NLGA- National Lumber Grades Authority
- 3) RIS- Redwood Inspection Service
- 4) SPIB- Southern Pine Inspection Bureau

c. provide lumber with each piece factory-marked with grade mark of

inspection agency evidencing compliance with grading rule requirements..

3. Softwood Plywood:

a. Engineered Wood Association rated panels shall bear APA trademark

showing compliance with each specified requirement.

4. Preservative Treated Lumber and Plywood: AWPB Quality Mark

a. Fire retardant lumber and plywood shall have an Underwriter's Laboratory

stamp FR-S.

C. Single Source Responsibility:

1. Obtain each type of fire-retardant-treated wood product through one source from a single producer.

Obtain each type of engineered wood product through one source from a single

1.05 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection:

1. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
2. Store materials not less than 6" above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
3. Do not store seasoned materials in wet or damp portions of site or building. Protect lumber from weather by covering with waterproof sheeting, securely anchored.

4. Protect sheet materials from breaking corners and damaging surfaces while unloading

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Wood Treatments:

1. Arch Wood Protection Inc.
2. Chemical Specialties Inc.
3. Hoover Treated Wood Products, Inc.
4. Osmose Wood Preserving Inc.

B. Fire Retardant Treatment:

Lumber and plywood designated to be fire-retardant-treated shall be pressure treated in compliance with recommended practices of AWPA Use Category System (UCS):

Interior, Dry, Above Ground: AWPA Use Category UCFA

Exterior, Above Ground, Exposed to Weather: AWPA Use Category UCFB

Flame spread rating shall be not more than 25, when tested in compliance with ASTM E84, NFPA 255, or UL 723 with no increase in flame spread and significant progressive combustion upon continuation of test for an additional 20 minutes.

Treatment shall be classified for use as Interior Type A; Low Hygroscopic, in compliance with ASTM D3201.

Fire retardant chemical shall be free of halogens, sulfates, chlorides, ammonium phosphate, and formaldehyde and shall be registered for use as a wood preservative by U.S. Environmental Protection Agency.

Lumber shall be kiln dried to maximum moisture content of 19% after treatment and plywood re-dried to maximum moisture content of 15% after treatment.

National Evaluation Service, Inc. shall rate for treatment structural use at elevated temperatures.

Where fire retardant treated wood is needed, one of following treatments shall be used:

- a) Arch Wood Protection- Dricon
- b) Chemical Specialties - D-Blaze
- c) Hoover – Pyro-Guard
- d) Osmose - FirePro

2.05 COMPONENTS

1. Dimensional Lumber

Provide lumber of the appropriate grade and species as specified by the design criteria for the intended application.

- a. Maximum Moisture Content: 19 percent
- b. Non-Load-Bearing Interior Partitions: Standard, Stud, or No. 3
- c. Framing Other Than Non-Load-Bearing Interior Partitions: WCLIB or WWPA
- d. Exposed Framing: Provide material hand-selected for uniformity of appearance and freedom from characteristics on exposed surfaces and edges that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.

2. Plywood

Provide plywood of the appropriate grade and species as specified by the design criteria for the intended application.

3. Finish:

Plain, uncoated; except at exterior locations and elsewhere as indicated to be hot dip galvanized; ASTM A153 not less than G90 coating class.

4. Structural Composite Lumber

- a. Laminated Veneer Lumber
- b. Parallel Strand Lumber

PART3 EXECUTION

3.01 Treated Wood

A. Fire Retardant Treated Wood:

Fire retardant treated wood shall be provided where wood is used as

blocking or nailers, when part of fire rated assemblies, and where needed

to satisfy building code authority having jurisdiction.

Deliver fire retardant treated materials cut to sizes needed.

3.02 Wood Framing

A. General Framing Requirements:

1. Erect wood framing members true to lines and levels. Do not deviate from true alignment more than 1/4".

2. Space framing members at intervals as indicated on Drawings.

3. Construct members of continuous pieces of longest possible lengths.

4. Construct and erect built-up beams, lintels, and diaphragm beams as needed.

5. Double wall framing members at openings over 100 square inches.

Space short member above and below openings in same manner as for walls.

6. Provide double joist headers at ends and around floor and ceiling openings. Bridge floor joists at mid-span of members. Provide solid bridging at ends of members.

7. Frame members for passage of pipes and ducts to avoid

cutting structural members. Reinforce framing members where damaged by cutting.

8. Install engineered wood products to comply with manufacturer's written instructions.

Sill plates shall be treated lumber

1. Set sill plates 1" from exterior face of foundation, unless otherwise indicated on Drawings. Sills shall be leveled; tolerance of 1/16" in 6' ft.
2. Secure sills with 1/2" diameter by 8" anchor bolts embedded in foundation structure, spaced at 4'-0" on center.
3. Join solid sill members with halved joints, where not continuous and at corners, minimum of 1'-0" lapped joint.
4. Lap built-up sills members a minimum distance of 2'-0".

C. Posts and Columns:

1. Provide two surfaces on posts at right angles to each other for installation of interior finish materials.
2. Arrange and nail together built-up posts to accommodate type of construction.

3. Erect posts straight, plumb with straight edge and level, and brace with tack boards at plate and sill.

D. Stud Framing:

1. Plates and Studs:

a. Provide single bottom plate and double top plate for partitions, nominal 2" thickness by width of studs.

b. Provide studs in continuous lengths without splices.

c. Toenail studs to bottom plate and end-nail to lower top plate.

3. Blocking:

a. Install in continuous horizontal row at mid-height of single story partitions over 8 feet high and multi-story partitions.

b. Wedge, align, and anchor blocking with countersunk bolts,

washers and nuts or nails.

c. Locate blocking to facilitate installation of finishing

materials, fixtures, specialty items, and trim.

d. Firestopping:

- 1) Provide nominal 2" thick by depth of stud in walls at each floor level and top story ceiling level.
- 2) Install nominal 2" thick by depth of framing member blocking fitted to fill openings from one space to another in floor and ceiling framing to prevent drafts.
- 3) Keep wood framing at chimneys and fireplaces a minimum of 2" from outside face of masonry and 4" from fireplace back wall.

E. Joist Framing:

1. Install with crown edges up.
2. Support ends of each member a minimum of $1\frac{1}{2}$ " on bearing surface.
3. Lap members framing opposite sides of beams, girders, or partitions, a minimum of 4", or tie opposite members together by toe-nailing or metal connectors.

4. Provide double floor framing members below partitions parallel to floor framing.
5. Provide solid blocking between joists under door posts.
6. Notches:
 - a. Do not notch in middle third of joist.
 - b. Notches in top or bottom of joists shall not exceed $1/6$ depth of member.
 - c. Notched ends shall not exceed $1/3$ depth of member.
7. Bored holes shall not exceed a size equal to $1/3$ depth of member, with a 2" minimum distance to top or bottom of joist.

Bridging:

At hips, bevel ends of rafters for bearing against hip rafters.

Hip rafters shall be same thickness as regular rafters, and 2" deeper.

Locate collar beams at every third pair of rafters, $1/3$ distance to ceiling joists.

Cut ends to fit slope, and nail to rafters.

G. Beams and Girders:

1. Install with crown edges up.
2. Provide a minimum 4" bearing at ends of each member.
3. Nail built-up beams or girders with two rows of 20d nails spaced at 32" on center maximum, locating one row near top edge and other near bottom edge of member

H. Roof Decking:

1. Install plywood with long dimension of panel across supports with panel continuous over two or more spans. Stagger end joints and locate over supports.
2. Edge support shall be provided in compliance with recommendations of APA by use of panel clips or lumber blocking between joists.
3. Allow a minimum space of $1/8$ " between end joints and $1/4$ " between edge joints for expansion and contraction of panels.
4. Fasten panels at 6" on center along panel edges and 12" on center at intermediate supports using 8d common, smooth ring-shank, or spiral-thread nails.

I. Sub-flooring:

1. Install plywood with long dimension of panel across supports with panel continuous over two or more spans. Stagger end joints and locate over supports.
2. Allow a minimum space of $1/8$ " between end and edge joints.
3. Fasten panels at 6" on center along panel edges and 12" on center at intermediate supports.
4. Use 6d ring- or screw-shank nails for panels $3/4$ " thick.
 5. Fill and thoroughly sand edge joints. Lightly sand surface

roughness, particularly around fasteners.

3.04 FASTENERS

A. General Requirements:

1. Securely attach members work to substrate by anchoring and fastening as required by recognized standards. Countersink bolt heads.
2. Select fasteners of a size that will not penetrate members where opposite side will be exposed to view in finished Work, or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; pre-drill as needed.

B. Wood to Wood Attachment:

1. Space fasteners at intervals not to exceed 12" on center and staggered across face of member. Fasteners shall also be located within 3" of each end of wood member.

a. Provide a maximum spacing of 6" on center, 8'-0" each way from outside corners for roof edge blocking.

2. Fastener heads shall be flush with wood surface and shall penetrate adjoining piece not less than 1 1/4".

3. Withdrawal resistance of fasteners shall be not less than 100 pounds per fastener.

4. Bolt heads and nuts that bear against face of wood shall be provided with metal washers.

5. Anchor bolts 5/8" in diameter and larger shall have malleable iron washers.

END OF SECTION 06 11 00

06 15 33 WOOD PATIO DECKING

PART 1 - GENERAL INFORMATION

1.01. SUMMARY

A. This section includes:

1. Exterior wood flooring.
2. Attachments.

B. Related Sections:

1. Section 05 45 13 MECHANICAL METAL SUPPORTS

1.02. REFERENCES

A. ASTM International (ASTM):

1. A153/A153M—Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

1.03. DELIVERY, STORAGE, AND HANDLING

A. Product shall be delivered to site when needed or ordered by project manager.

B. The Tidewater Cypress shall be protected from the sun and weather.

C. Storage on-site shall be facilitated in a dry location, and product shall be protected from rain and moisture during storage on-site.

D. Product shall be stored between temperatures of 40 F and 120 F.

1.04. WARRANTY

A. Warranty shall be provided by the manufacturer.

1. Warranty provided against manufacturing defects.

PART 2 PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturer:

Eastside Lumber & Decking

3001 E Cesar Chavez ,Austin , Tx 78702

(512) 492-3950

B. Materials

1. Wood Decking 6x1 (5 1/2" x 3/4") planks of Cedar.
2. Mechanical metal supports

2.02. PRODUCT SUBSTITUTIONS

Substitute with the same material in case of damage.

PART 3 EXECUTION

3.01 EXAMINATION AND PREPARATION

Prepare substrates using the methods recommended by the manufacturer for achieving best result for the substrates under project conditions.

Do not proceed with installation until substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected. Commencement of installation constitutes acceptance of conditions.

If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3.02 INSTALLATION

Installation: Install in accordance with manufacturer's instructions. Do not walk on installation until installation is complete and profiles have been secured to frame.

3.03 CLEANING AND PROTECTION

Clean installed products in accordance with manufacturer's recommendations, with water and mild soap; do not use acidic or abrasive cleaning solutions.

Protect installed products until completion of project.

Touch-up, repair or replace damaged products before substantial completion.

END SECTION 06 15 33

06 16 33 WOOD BOARD SHEATHING

PART 1 - GENERAL INFORMATION

1.01. SUMMARY

A. This section includes:

1. Wall, floor, and roof OSB sheathing

B. Related Sections:

1. Section 06 11 00 Wood Framing
2. Section 07 21 13 Board Insulation
3. Section 09 29 00 Gypsum Board

1.02. REFERENCES

A. American Forest and Paper Association (AFPA):

1. National Design Specification for Wood Construction NDS-05, Conventional Wood Frame Construction.

B. American Society of Mechanical Engineers (ASME):

1. B18.2.1-96(R2005), Square and Hex Bolts and Screws.
2. B18.2.2-87, Square and Hex Nuts.
3. B18.6.1-97, Wood Screws.

C. American Society for Testing and Materials (ASTM):

1. A653/A653M-10, Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

2. C954-10, Steel Drill Screws for the Application of Gypsum Board or Metal Plaster

Bases to steel Studs from 0.033 inch (2.24 mm) to 0.112-inch (2.84 mm) in thickness.

3. C1002-07, Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel

Products or Metal Plaster Bases to wood Studs or Metal Studs.

4. D1760-01, Pressure Treatment of Timber Products.

5. F855-07, Washers, Steel, Plan (Flat) Unhardened for General Use.

6. F1667-08, Nails, Spikes, and Staples.

D. Forest Stewardship Council (FSC)

1. FSC STD-01-001, FSC Principles and Criteria for Forest Stewardship.

1.03 SUBMITTALS

A. Product Data

B. Shop Drawings

1.04 QUALITY ASSURANCE

1. Softwood OSB:

Engineered Wood Association rated panels shall bear APA trademark showing compliance with each specified requirement.

2. Preservative Treated Plywood: AWPB Quality Mark

Fire retardant plywood shall have an Underwriter's Laboratory stamp FR-S.

1.05 DELIVERY, STORAGE, AND HANDLING

1. Store materials not less than 6" above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
2. Do not store seasoned materials in wet or damp portions of site or building. Protect from weather by covering with waterproof sheeting, securely anchored.
3. Protect sheet materials from breaking corners and damaging surfaces while unloading.

PART 2 – PRODUCTS

1. OSB Sheathing: Structural sheathing is attached to the exterior wall framing, bracing the walls against positive and negative forces. It prevents wall racking in wood framed structures.
 - A. Wood Board Sheathing: OSB ½" - wall
 - B. Wood Board Sheathing: OSB 1 1/8" - floor
 - C. Wood Board Sheathing: OSB ½" - roof decking

PART 3 - EXECUTION

1. OSB Sheathing:
 - a. Install with face grain horizontal or vertical. Allow 1/8" spacing at panel ends and 1/4" at panel edges.
 - b. Fasten panels at 6" on center along panel edges and 12" on center at intermediate supports with nails or screws as needed to suit Project conditions.

END SECTION 06 16 33

06 17 13 Laminated Veneer Lumber

PART 1 GENERAL

1.01. SUMMARY

A. This work includes the complete furnishings and installation of all Microllam[®] Laminated Veneer Lumber (LVL) as shown on the drawings herein specified and necessary to complete the work.

B. Related Work:

1. Section 05 58 00: Formed Metal Fabrications.
2. Section 06 05 23: Wood, Plastic, and Composite Fastenings.
3. Section 06 11 00: Wood Framing.

1.02. REFERENCES

A. These products shall be designed and manufactured to the standards set forth in the

International Code Council Evaluation Service (ICC-ES) Report Number ESR-138.

B. Materials shall comply with ICC ES ESR-1387.

C. ASTM D-2559 for Adhesives.

1.03. DELIVERY, STORAGE, AND HANDLING

A. Product shall be delivered to site when needed or ordered by project manager.

B. Microllam[®] Laminated Veneer Lumber (LVL) shall be protected from the sun and weather.

C. Storage on-site shall be facilitated in a dry location, and product shall be protected from

rain and moisture during storage on-site.

D. Product shall be stored between temperatures of 40 F and 120 F.

1.04. WARRANTY

A. Warranty shall be provided by the manufacturer.

1. Weyerhaeuser 30-year limited warranty provided against manufacturing defects.

PART 2 PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturer:

B. Materials:

1. Parallel strand lumber 5-1/4" x 9-1/4"

a. Microllam (LVL) is manufactured from strands of a single wood species, or species

combinations that are oriented parallel to the length of the member and coated with

a phenol-formaldehyde adhesive.

b. The wood species or species combinations and adhesive used in the manufacture of

Microllam (LVL) are specified in the approved quality control manual and manufacturing standard.

a. Western Species 28F-2.1 E SP.

2.02. ACCESSORIES

A. Adhesives:

1. Adhesives shall be of the waterproof type conforming to the requirements of ASTM D-2559.

2.03. SOURCE QUALITY CONTROL

A. Fabrication:

1. Microllam (LVL) shall be manufactured by iLevel® Trus Joist® in a plant listed in the reports referred to above and under the supervision of an approved third-party inspection agency. It shall be manufactured from strands of wood fiber in a continuous process with all strands oriented to the length of the member and then fed into a press in the desired lay-up pattern. All members are to be free of finger or scarf joints or mechanical connections in full-length members.

2. Tolerances:

- a. Finished Length (as specified): $\pm 1/4"$.
- b. Depth: $\pm 1/16"$.
- c. Width: $\pm 1/16"$.

3. Identification:

- a. Microllam (LVL) shall be identified by a stamp indicating the product type and grade and ICC-ES evaluation report number, manufacturer's name, plant number and the independent inspection agency' s logo.

2.04. RELATED PRODUCTS

A. See Section 06 10 00: Rough Carpentry for additional specifications and installation instructions.

2.05. PRODUCT SUBSTITUTIONS

A. Product substitutions shall not be allowed.

B. If a substitution is required, approval of a substitute product and associated hardware must be made by the structural engineer and the construction manager.

1. Such approval will require revised structural and architectural drawings and calculations to validate use of substitute product under specified loading and conditions.

PART 3 EXECUTION

3.01. INSTALLERS

A. Installation shall be managed only by trained installers. Union carpenters with appropriate training are allowed as is unskilled labor after receiving proper training.

B. Any equipment operation associated with moving or placing the beams on site shall be performed only by qualified operators and set crews.

3.02. EXAMINATION

A. Prior to installation of PSL beams, site grade shall be verified and level within tolerances specified in project site plan.

B. Base isolators shall be placed and their locations verified prior to installation of PSL beams on-site.

C. Beams shall be inspected for defects and for true cuts prior to installation.

3.03. INSTALLATION

- A. It shall be erected and installed in accordance with the plans and any Weyerhaeuser drawings and installation suggestions. Temporary construction loads that cause stresses beyond design limits are not permitted. Safety bracing is to be provided by the installer to keep the Microllam (LVL) straight and plumb as required and to ensure adequate lateral support for the individual Microllam (LVL) members and the entire system until the sheathing material is applied.
- B. Beams shall be measured and drilled on-site for placement in isolator frames.
- C. Place beams in isolator framework as specified by structural engineering and foundation plans.
- D. Beams shall be laid in Simpson® hangers welded onto isolator tops.
- E. Bolts as specified by structural engineer shall be used to tie beams to isolator tops using provided holes in Simpson hangers. If necessary, drilling of beams may be performed once laid in hangers on isolators.
- F. Bolts shall be tightened as specified by structural engineer.
- G. Straps shall be placed on top of finished beam connections to isolators.
1. Holes for straps shall be drilled after placing beams in isolator hangers.
 2. Wood screws as specified by structural engineer shall be used to attach straps to beams.

3.04. RELOCATION CONSIDERATIONS

- A. Beams shall be remain secured to floors of modules and decking during transportation and relocation.
- B. Repair:

1. Holes may be re-drilled as needed for repair or reattachment of straps or hangers. No

other repairs will be allowed.

C. Replacement:

1. Replacement shall be deemed necessary if damage to the beams is determined by the structural engineer to adversely impact the ability of the beams to maintain the specified loads.

2. Replacement shall be only with identical products as specified by the structural engineer and calculations from Weyerhaeuser, if requested.

3.05. SITE QUALITY CONTROL

A. Structural engineer shall verify installation of beams and placement of hangers, straps, and bolts.

B. Beams shall be checked for level after installation using standard leveling or surveying equipment.

C. Tolerances as specified by the civil engineer for grade shall be met.

D. Exposed beams after installation shall be protected from sun and weather until covered with floor construction.

**Trus Joist® Microllam®
Laminated Veneer Lumber (LVL)**

- Can easily be built up on site to reduce heavy lifting
- Offers reliable and economical solutions for beam and header applications
- Manufacturing process minimizes many of the natural inconsistencies found in wood
- Available in some regions with a Watershed™ overlay for on-site weather protection

Code Evaluations: See CCMC 08675-R



		Microllam® LVL													
2.0E	1¾"	Factored Moment Resistance (ft-lbs)				9,315	9,790	13,420	14,845	20,175	25,875	32,230	34,775		39,220
		Factored Shear Resistance (lbs)				5,150	5,285	6,260	6,610	7,790	8,905	10,015	10,435		11,130
		Moment of Inertia (in. ⁴)				115	125	208	244	400	597	851	961		1,167
		Weight (plf)				4.7	4.8	5.7	6.1	7.1	8.2	9.2	9.6		10.2

END SECTION 06 17 13

06 17 33 WOOD I-JOISTS

PART 1 - GENERAL

1.01 SUMMARY

A. Related Sections:

1. Permanent Bridging and Bracing, Headers and Supports to Frame Openings, and Sheathing: Division 06 carpentry sections.
2. Framing Connectors and Hangers: Division 06 carpentry sections.

1.02 REFERENCES

A. ASTM International (ASTM):

1. ASTM D5055 Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.

B. Canadian Construction Materials Centre (CCMC):

1. CCMC Report Number 13323-R.

C. International Code Council Evaluation Service (ICC-ES):

1. Report Number: ESR-1251.

D. National Institute of Standards & Technology:

1. Voluntary Product Standard PS 2 Performance Standard for Wood-Based Structural-Use Panels.

1.03 ACTION SUBMITTALS

A. Product Data: Submit for specified products as follows:

1. Manufacturer's product data, including descriptions of component materials, dimensions of specified products, design properties, allowable spans and construction details.
 2. Manufacturer' s installation instructions.
 3. Catalog pages illustrating products to be incorporated into project.
 4. Material Safety Data Sheets (MSDS).
- D. Design Data: Submit design calculations sealed by the designer for representative structural members.

1.04 DELIVERY, STORAGE & HANDLING

- A. Delivery and Acceptance Requirements: Deliver materials in manufacturer' s original, unopened, undamaged containers with identification labels intact. Unload material in accordance with manufacturer' s recommendations.
- B. Storage and Handling Requirements: Handle and store materials in accordance with manufacturer' s recommendations.

PART 2 PRODUCTS

2.01 WOOD I-JOISTS

A. Manufacturer: Weyerhaeuser

1. Single Source Responsibility: Provide components and materials specified in this section from a single manufacturer.
2. Compatibility:
 - a. Ensure components and materials are compatible with specified accessories and adjacent materials.

2.02 MATERIALS

A. I-Joist: To ASTM D5055.

1. Height: 9 1/2 inches
3. Flange Material: Laminated Veneer Lumber (LVL) Solid saw.
4. Web Material: Oriented Strand Board (OSB) in accordance with PS 2.
5. Adhesive: Meets requirements of ASTM D5055.

2.03 ACCESSORIES

A. Fasteners: Galvanized steel, sized to suit application.

1. Acceptable Manufacturers:
 - a. Simpson Strong-Tie.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate installation of I-joists in accordance with Section [01 73 19 - Installation].
- B. Coordinate I-joists with work of other trades for proper time and sequence to avoid construction delays.
- C. Comply with manufacturer' s product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.
- D. Install I-joists plumb, level and as indicated.
- E. Fasten joists to supporting framing as recommended by the I-joist manufacturer and hanger manufacturer.
- F. Provide temporary bracing as recommended by the manufacturer to hold joists in position until permanently secured.
- G. Cut openings in joist webs only as allowed by the manufacturer.

3.03 SITE TOLERANCES

A. Joists: Not more than 1/2 inch (12.7 mm) from indicated position.

3.04 CLEANING

A. Perform cleanup in accordance with Section [01 74 00 - Cleaning and Waste Management] and Section [01 74 13 -

Progress Cleaning].

B. Upon completion and verification of performance of installation, remove surplus materials, rubbish, tools and equipment in

accordance with Section [01 74 23 - Final Cleaning].

construction waste created during demolition, construction or final cleaning.

C. Waste Management:

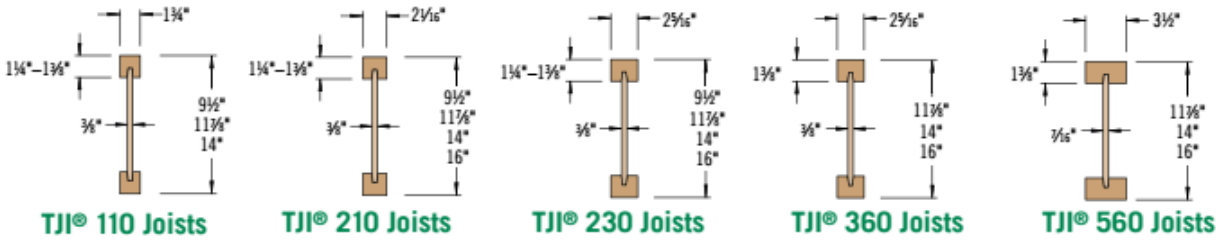
1. Coordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposll.

2. Collect recyclable waste and dispose of or recycle field generated construction waste created during demolition, construction or final cleaning.

3. Remove recycling containers and bins from site.

END OF SECTION 06 17 33

DESIGN PROPERTIES



Design Properties (100% Load Duration)

Depth	TJI®	Basic Properties				Reaction Properties					
		Joist Weight (lbs/ft)	Maximum Resistive Moment ⁽¹⁾ (ft-lbs)	Joist Only EI x 10 ⁶ (in. ² -lbs)	Maximum Vertical Shear (lbs)	1 3/4" End Reaction (lbs)	3 1/2" End Reaction (lbs)	3 1/2" Intermediate Reaction (lbs)		5 1/4" Intermediate Reaction (lbs)	
								No Web Stiffeners	With Web Stiffeners ⁽²⁾	No Web Stiffeners	With Web Stiffeners ⁽²⁾
9 1/2"	110	2.3	2,500	157	1,220	910	1,220	1,935	N.A.	2,350	N.A.
	210	2.6	3,000	186	1,330	1,005	1,330	2,145	N.A.	2,565	N.A.
	230	2.7	3,330	206	1,330	1,060	1,330	2,410	N.A.	2,790	N.A.
11 3/8"	110	2.5	3,160	267	1,560	910	1,375	1,935	2,295	2,350	2,705
	210	2.8	3,795	315	1,655	1,005	1,460	2,145	2,505	2,565	2,925
	230	3.0	4,215	347	1,655	1,060	1,485	2,410	2,765	2,790	3,150
	360	3.0	6,180	419	1,705	1,080	1,505	2,460	2,815	3,000	3,360
14"	560	4.0	9,500	636	2,050	1,265	1,725	3,000	3,475	3,455	3,930
	110	2.8	3,740	392	1,860	910	1,375	1,935	2,295	2,350	2,705
	210	3.1	4,490	462	1,945	1,005	1,460	2,145	2,505	2,565	2,925
	230	3.3	4,990	509	1,945	1,060	1,485	2,410	2,765	2,790	3,150
	360	3.3	7,335	612	1,955	1,080	1,505	2,460	2,815	3,000	3,360
16"	560	4.2	11,275	926	2,390	1,265	1,725	3,000	3,475	3,455	3,930
	210	3.3	5,140	629	2,190	1,005	1,460	2,145	2,505	2,565	2,925
	230	3.5	5,710	691	2,190	1,060	1,485	2,410	2,765	2,790	3,150
	360	3.5	8,405	830	2,190	1,080	1,505	2,460	2,815	3,000	3,360
	560	4.5	12,925	1,252	2,710	1,265	1,725	3,000	3,475	3,455	3,930

- (1) Caution: Do not increase joist moment design properties by a repetitive member use factor.
 (2) See detail W on page 6 for web stiffener requirements and nailing information.

General Notes

- Design reaction includes all loads on the joist. Design shear is computed at the inside face of supports and includes all loads on the span(s). Allowable shear may sometimes be increased at interior supports in accordance with ICC ES ESR-1153, and these increases are reflected in span tables.
- The following formulas approximate the uniform load deflection of Δ (inches):

For TJI® 110, 210, 230, and 360 Joists

$$\Delta = \frac{22.5 wL^4}{EI} + \frac{2.67 wL^2}{d \times 10^6}$$

For TJI® 560 Joists

$$\Delta = \frac{22.5 wL^4}{EI} + \frac{2.29 wL^2}{d \times 10^6}$$

w = uniform load in pounds per linear foot
 L = span in feet
 d = out-to-out depth of the joist in inches
 EI = value from table above

DO NOT walk on joists until braced. INJURY MAY RESULT.

DO NOT stack building materials on unbraced joists. Stack only over beams or walls.

DO NOT walk on joists that are lying flat.

WARNING

Joists are unstable until braced laterally

Bracing Includes:

- Blocking
- Hangers
- Rim Board
- Sheathing
- Rim Joist
- Strut Lines

WARNING NOTES:

Lack of proper bracing during construction can result in serious accidents. Observe the following guidelines:

1. All blocking, hangers, rim boards, and rim joists at the end supports of the TJI® joists must be completely installed and properly nailed.
2. Lateral strength, like a braced end wall or an existing deck, must be established at the ends of the bay. This can also be accomplished by a temporary or permanent deck (sheathing) fastened to the first 4 feet of joists at the end of the bay.
3. Safety bracing of 1x4 (minimum) must be nailed to a braced end wall or sheathed area (as in note 2) and to each joist. Without this bracing, buckling sideways or rollover is highly probable under light construction loads—such as a worker or one layer of unnailed sheathing.
4. Sheathing must be completely attached to each TJI® joist before additional loads can be placed on the system.
5. Ends of cantilevers require safety bracing on both the top and bottom flanges.
6. The flanges must remain straight within a tolerance of 1/2" from true alignment.

06 20 13 - EXTERIOR FINISH CARPENTRY

PART 1 – GENERAL INFORMATION

1.01 SUMMARY

- A. Section Includes:
 - 1. Exterior wood trim
 - 2. Lumber and hardboard siding

1.02 SUBMITTALS

- A. Submit labeled sample of siding materials for approval, with complete specifications and shop drawings
- B. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- C. Compliance Certificates:
 - 1. For lumber that is not marked with grade stamp.
 - 2. For preservative-treated wood that is not marked with treatment-quality mark.
 - 3. For fire-retardant-treated wood that is not marked with classification marking of testing and inspecting agency.
- D. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
 - 2. Fire-retardant-treated wood.
- E. Sample Warranties: For manufacturer' s warranties.

1.03. QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classifications marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.05 WARRANTY

- A. Manufacturer' s Product Warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

2.02 WOOD SPECIES

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install siding system in accordance with manufacturer' s instructions

3.02 FIELD QUALITY CONTROL

A. Field Tests: Northland Forestry Products to perform testing on all wood in the NFP test facilities. Tests not meeting specified performance requirements and units having deficiencies shall be corrected.

3.03 PROTECTION AND CLEANING

A. Protection: Protect installed product' s finished surfaces from damage during construction.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer' s instructions prior to owner' s acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION 06 20 13

06 41 05 – PAPER COMPOSITE COUNTERTOPS

1.01 SUMMARY

A. This section includes the following:

1. PaperStone Countertops

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating materials, component profiles, fastening methods, jointing details, finishes, and accessories.

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store in ventilated areas horizontally on a level surface. Do not cover with impermeable materials.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance requirements of local authorities having jurisdiction.

1.06 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within one year period after Date of Substantial Completion.
- C. Provide fifteen (10) year manufacturer warranty for materials.

PART 2 – PRODUCTS

2.01 MANUFACTURER

A. Solid Surface Panels:

1. PaperStone: Solid Surface Panel; www.paperstoneproducts.com (360) 538-9815
2999 John Stevens Way, Hoquiam, WA 98550

2.02 MATERIALS

A. Solid Surface Panels

1. Properties:

a. See Section 06 15 25.

2. Edge Cap:

a. Size: 1/2 inch (12 mm) thick, 1/2 inch (12 mm) wide solid board.

b. Texture: Smooth Matte.

2.03 ACCESSORIES

A. Fasteners and Anchors:

1. Screws: Bugle head, hardened steel, power driven type, length to achieve minimum 3/4 inch penetration of panelboard.

B. Stains, Sealer and Paint: Select from manufacturer's standard glaze colors.

1. Manufacturer Provided Standard Stain Color:

a. Graphite

PART 3 – EXECUTION

3.01 PREPARATION

A. Do not install materials until room pre-finishing is complete and dry.

3.02 INSTALLATION – CASEWORK

- A. Apply finish stain to individual panelboards prior to assembly.
- B. Assemble panelboards as per shop drawings.
- C. Fit butt end panelboard joints occurring between support members with metal splines to maintain tight, aligned joints.
- D. Secure with manufacturer's proprietary fastener system.

3.03 CLEANING

- A. Clean installation per manufacturer recommendations.
- B. Provide Owner with two copies of cleaning and maintenance instructions through the submittal process noted in Section 01 77 00 - Closeout Procedures.

3.04 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 06 41 05

06 42 13 WOOD BOARD PANELING

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Exterior wood cladding and secondary support system for exterior cladding system application.

1. Cladding with cedar 2x2" slats and 1/2" spacing in between
2. Panelized cladding for easy assemble/disassemble

B. Related Sections:

1. Section 08 91 16 OPERABLE WALL LOUVERS

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Provide panels that have been manufactured, fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.03 SUBMITTALS

A. Shop Drawings:

1. Submit shop drawings in conformance with the requirements of the Architectural
Woodwork Standards.
2. Furnish a Woodwork Institute Certified Compliance Label on the first page of the shop drawings.
3. Submit two copies, one of which will be returned with reviewed notations. Make corrections noted (if any), and distribute required copies prior to the start of work.

B. Samples:

1. Submit four [finished] samples of each species and cut of wood to be used.

Lumber

samples to be minimum 6" by 12" , plywood samples to be minimum 12" by 12" . Samples shall represent the range of color and grain expected to be provided.

2. Submit four additional samples of each material for the use of the paint trade.

C. Mockups:

1. Provide a mockup of one Section of paneling, including an outside and an inside corner.

The mockup shall be of the material and finish to be provided.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer producing product in ISO 9001 certified facility, capable of providing field service representation during fabrication and approving application method.

a. Obtain from a single manufacturer.

2. Fabricator/Installer Qualifications: Installer shall be approved by the manufacturer and experienced in performing work of similar type and scope.

B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

1.05 STORAGE

A. Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.

B. Store all siding on a flat, level surface, off the ground

C. Protect all siding and trim boards from the elements by storing them under a roof or a waterproof covering

D. All siding and trim boards must be dry prior to installation

E. When opening the bundles of siding, cut the lumber wrap along the dotted line at the bottom of the bundle. Save the plastic wrap that is under the lumber wrap to help cover the siding.

PART 2 – PRODUCTS

2.01 Wood Panels

A. Wood Siding: Siding milled from Sinker cypress as specified in Division 06 Section, "Exterior Finish Carpentry" .

1. Panel Profile: Flat with smooth texture.

B. Wood Louvers: Louvers constructed from milled Sinker cypress boards as specified in Division 06 Section, "Exterior Finish Carpentry" with smooth texture.

C. Louver Profiles:

a. Nearly vertical louvers, evenly spaced, with slight slope to shed water.

b. Sloped fixed louvers, evenly spaced.

c. Finish: Clear Sealer and finish.

2.02 ACCESSORIES

A. Supporting system

1. The panels are fastened through.

2. To ensure proper structural performance, the support should be located at appoint equal to 20% of the length of the tile from the edge of the panel.

3. Panels must be capable of easy and fast assembly

4. The replacement of damaged panels, particularly in the middle sections, must be possible using simple methods and should not require special tools.

5. Under no circumstances shall it be possible to remove individual panels unless they are first destroyed.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer' s instructions.

3.02 PREPARATION

A. Surface Preparation: Provide air and moisture barriers, insulation, and primary support structure with sheathing.

3.03 INSTALLATION

A. Comply with manufacturer' s product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

B. Install wall panels plumb and level and accurately spaced in accordance with manufacturer' s recommendations and approved submittals.

C. Fasten wall panels to supporting substrate with fasteners and adhesive approved for use with adjoining construction.

D. Accessory Items: Install corner profiles, gaskets and trim with fasteners and adhesive appropriate for use with adjoining construction as indicated on drawings and as recommended by manufacturer.

3.04 CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer' s instructions prior to Owner' s acceptance. Remove construction debris from project site and legally dispose of debris.

3.05 PROTECTION

A. Protection: Protect installed product and finish surfaces from damage during construction.

END OF SECTION 06 42 13

PART 16- DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 21 13 – BOARD INSULATION

PART 1 - GENERAL

1.01 SUMMARY

Cork panels for thermal and acoustic insulation of buildings, composed by the expansion of the cork granules without using chemicals agents. This product is suitable for the thermal and acoustic insulation of :

- a. outdoor walls with external insulation
- b. insulation from vibration.

Cork insulation is eco-friendly, made of 100% natural components and completely recyclable. It has excellent thermal and acoustic insulation properties. The hollows structure of cork give the panel a high breathability and it can be used in green building and for refurbishment.

1.02 HANDLING AND STORAGE

- a. Handling: No special care required
- b. Storage: Store the product at room temperature, away from rain and in a well-ventilated place. Store the product in well ventilated areas, keep it away from sunlight, water and ice, with temperatures included between +5°C and +35°C.

PART 2 - PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturer:

1. ThermaCork

Imported by Westcoast Associates, Tumwater, WA 98502, United States

Info@WCAssociates.us

(360)-866-8779

B. Materials:

ThermaCork 1" – thermal and acoustic insulation

Density: 110 to 120 kg/m³

PART 3 - EXECUTION

A. PREPARATION

1. The support must be completely hardened, dry and resistant.
2. The surface must be thoroughly clean, well consolidated, without debris or detaching parts.
3. The support temperature must be between +5°C and +35°C

B. INSTALLATION

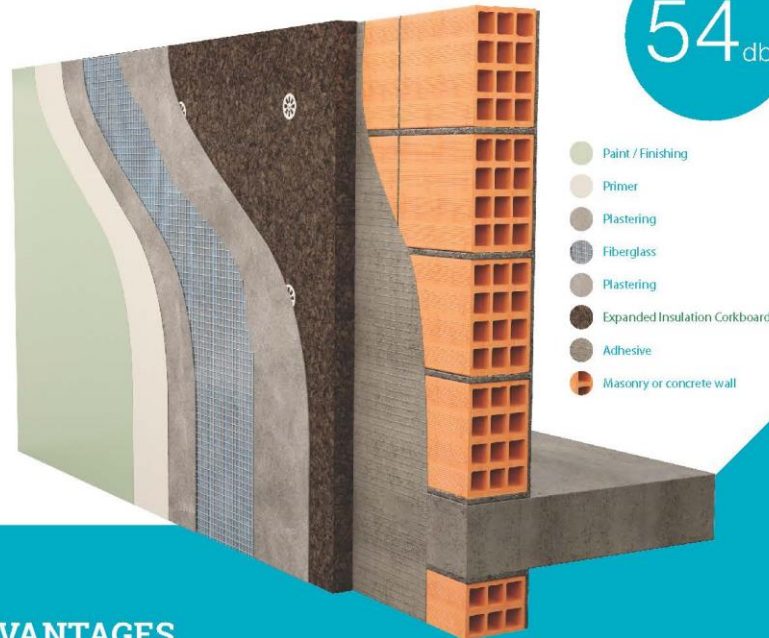
1. Cut the panels in order to reach the needed size, using traditional saw for wood.
2. Mix glue with the prearranged water quantity using a mixing drill.
3. Apply glue on one side of the panel, realizing a border of about 5 cm and two or three piles on the center of the panel, with a width as big as the palm of a hand. The width of the border and the amount of glue must cover at least 40% of the contact surface of the panel.
4. Install the panels, pushing them to surface in order to ensure the perfect contact.
5. Install the panels, pushing them to surface in order to ensure the perfect contact.
6. If there are joints (such as between prefabricated panels) or cracks on the support, there must not be joints between the panels. Board end must be at least 10 cm away from structural joint/cracks.
7. To avoid the possible formation of cracks, the joints between the panels must not be placed in correspondence of the corners of doors, windows or other openings.
8. There can be used residual pieces (with a width of at least 15 cm) distributed on the surface not in correspondence of the outside edges of the building.
9. After bonding the panels, fix them with plugs. Use about 6 plugs each sqm. Increase the number of plugs on the border areas, up to 12 plugs each sqm.

EXPANDED INSULATION CORKBOARD

ETICS / EIFS



54_{db}



- Paint / Finishing
- Primer
- Plastering
- Fiberglass
- Plastering
- Expanded Insulation Corkboard
- Adhesive
- Masonry or concrete wall

NOT CONTRACTUAL PHOTO

ADVANTAGES

1. Excellent thermo-acoustic system performance
2. Excellent mechanical strength
3. Excellent system inertia
4. Dimensional stability of the material
5. High durability without loss of features
6. Healthier natural product
7. Comfort with healthy insulation
8. Excellent breathability capacity
9. Allows energy savings
10. Long term effectiveness

**100%
NATURAL
CHOICE**

EXPANDED
INSULATION
CORKBOARD IS
A SUSTAINABLE
MATERIAL FOR
A SUSTAINABLE
INSULATION

EXPANDED INSULATION CORKBOARD ETICS / EIFS



AMORIM

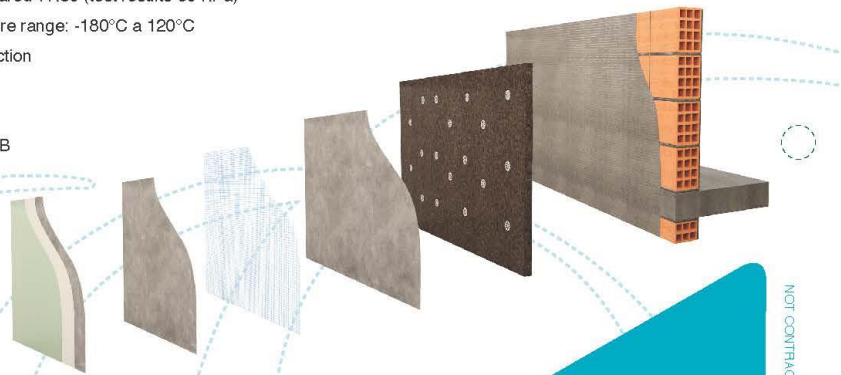
AMORIM ISOLAMENTOS, S.A.

SOLUTION DESCRIPTION

Thermal and acoustic insulation of exterior walls with Expanded Insulation Corkboard by the outside of wall - External Thermal Insulation System

TECHNICAL FEATURES

- Density: 110 to 120 kg/m³
- Thermal conductivity: $\lambda = 0,037$ to $0,040$ W/m²°C
- Bending Resistance: $\geq 1,8 \times 10^6$ kg/m²
- Compression resistance at 10%: ≥ 100 KPa
- Perpendicular Face Resistance: declared TR50 (test results 60 KPa)
- Optimal behaviour in large temperature range: -180°C a 120°C
- Does not absorb water by capillary action
- Excellent soundproofing
- Fire Resistance: Euroclasse E
- System Fire Resistance: Euroclasse B
- Moisture factor resistance: MU 20



ENVIRONMENTAL FEATURES

- 100% NATURAL AND ADDITIVE-FREE INDUSTRIAL PROCESS
- DURABILITY OF 50 TO 60 YEARS WITHOUT LOSS OF CHARACTERISTICS
- TOTALLY RECYCLABLE
- SINK CO₂ (CARBON NEGATIVE)
- LOW EMBODIED ENERGY
- NO EMISSION OF HARMFUL COMPOUNDS FOR INDOOR AIR QUALITY

PRODUCT DIMENSIONS

Standard: 1000x500x [10 to 320mm]
Other sizes: Upon Request

RECOMMENDATIONS FOR APPLICATION

Fix Expanded Insulation Corkboards to the outer surface of the support through the ETICS system. Follow the mortar manufacturer's system instructions.

NOT CONTRACTUAL PHOTO

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END SECTION 07 21 13**07 21 26 – BLOWN INSULATION****PART 1 - GENERAL****1.01 SUMMARY****Section Includes:**

- a. Open-Cell Spray Polyurethane Foam Insulation (JM ocx SPF)
- b. Closed-Cell Spray Polyurethane Foam Insulation (QuadFoam 2.0)

JM ocSPF Spray Applied Polyurethane Insulation is approved for use as a nonstructural thermal insulating material in Type I and V construction under IBC and dwellings under IRC when installed in accordance with ICC ES Report ESR-1655. Insulation is for use in wall cavities, floor assemblies, ceiling assemblies or attics and crawl spaces when installed in accordance with Section 4. Insulation may be used in wall assemblies in fire-resistive rated-construction as described in Sections 3.6 and

QuadFoam® 2.0 is a two component, one-to-one by volume, spray-applied rigid polyurethane foam. A low viscosity, "HIGH YIELD & NO / LOW ODOR" 2.0lb closed cell material that is excellent for insulating and air sealing. It contributes to providing a self-adhering, seamless building envelope that reduces air, dust, pollution and pest infiltration. QuadFoam® 2.0 utilizes an EPA-approved, non-ozone depleting blowing agent. It is designed for use in interior or exterior commercial and residential construction applications, and is compatible with all common construction materials.

4.41.02 RELATED SECTIONS

The following items are not included in this section and are specified under the designated sections:

Section 06 10 00 – Rough Carpentry: Wood Framing

Section 07 26 00 – Vapor Barriers

Section 07 27 00 – Air Barriers

Section 07 62 00 – Sheet Metal Flashing and Trim

Section 09 20 00 – Plaster and Gypsum Board

1.02 HANDLING AND STORAGE

- a. Store products in manufacturer's unopened packaging, clearly marked with the manufacturer's name, brand name, product identification, type of material, safety information, manufacture date, and lot numbers until ready for installation.
- b. Store spray foam materials between 65 degrees F (18 degrees C) and 85 degrees F (29 degrees C) with careful handling to prevent damage to products.

PART 2 - PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturers:

1. Open-Cell Spray Foam Insulation

A. Basis-of-Desig: JM ocSPF by Johns Manville

717 17th Street, Denver, CO 80202

PH (800)-654-3103

Website: www.specJM.com

2. Closed-Cell Spray Foam Insulation

A. Quadrant Urethane Technologies

200 Industrial Blvd., McKinney, TX 75069

PH (866)547-7163

Website: www.quadfoam.com

PART 3 - EXECUTION

3.01 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Mask and protect adjacent surfaces from spray.

C. Prepare surfaces using the methods recommended by the manufacturer(s) for achieving the best result for the substrate under the project conditions.

3.02 INSTALLATION

- A. Install in spray foam in accordance with manufacturer's instructions
- B. Spray polyurethane foam components (A) and (B) shall be processed in accordance with instructions found on the manufactures product datasheet.
- C. Schedule application to anticipate climatic conditions prior to application to ensure highest quality foam and to maximize yield. All substrates to be sprayed must be dry at the time of application. Moisture in the form of rain, fog, frost, dew, or high humidity greater than 85 percent R.H is not permitted unless Contractor reviews means and methods of spraying with manufacturer's representative prior to installation. Use screens, masking and other precautions to prevent damage to adjacent areas from fugitive overspray/
- D. Where spray foam system is installed within attics or crawl spaces where entry is made only for service of utilities, an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 and IRC Section R314.5.4, as applicable. The ignition barrier must be installed in a manner so that the foam plastic insulation is not exposed. JM ocSPF, as described in these sections, may be installed in unvented attics in accordance with IRC Section R806.4.

3.03 PROTECTION

- A. Protect installed products until completion of project
- B. After completing work, clean spattered surfaces
- C. Touch-up, repair or replace damaged products before Substantial Completion.



JM Corbond® ocx SPF
Open-Cell Spray Polyurethane Foam

JM CORBOND®
OCX SPF
IAPMO ER NO. 372

PRODUCT DATA SHEET

PRODUCT DESCRIPTION

JM Corbond® Open-cell Appendix X Spray Polyurethane Foam (ocx SPF) insulation is a two-component, low-density, nonstructural insulation system designed for interior commercial, residential and industrial applications. JM Corbond ocx SPF is Class 1 rated and meets AC 377 NFPA 286 Appendix X requirements for application without an ignition barrier in attics and crawl spaces. JM Corbond ocx SPF is 100% water blown. The low-density nature allows for tremendous yield while providing excellent heat, air, and sound control. This multi-functionality results in high-performing buildings that are energy efficient, comfortable, and have better air quality. JM Corbond ocx SPF is compatible with most common construction materials.

RECOMMENDED USES

- Walls
- Unvented attics
- Ceilings
- Floors
- Vented attics
- Crawl spaces

ENVIRONMENTAL CONSIDERATIONS AND SUBSTRATE TEMPERATURES

Applicators must recognize and anticipate weather conditions prior to application to ensure highest-quality foam and to maximize yield. Ambient air, substrate temperatures and moisture are all critical factors. Extremes in ambient air and substrate temperature will influence the chemical reaction of the two components, directly affecting the yield, adhesion and the resultant physical properties of the foam insulation. To obtain optimum results, JM Corbond ocx SPF should be spray-applied to substrates when ambient air and substrate temperatures are within 45°-120°. All substrates to be sprayed must be free of dirt, soil, grease, oil and moisture prior to the application of JM Corbond ocx SPF. Moisture in any form — excessive humidity (>80% R.H.) rain, fog or ice — will chemically react with components and adversely affect system performance and corresponding physical properties. Precautions must be taken to prevent damage to adjacent areas from overspray.

PROCESSING PARAMETERS

Store at 60°-85°F in a dry well-ventilated area for several days prior to use. Heated trailers or conditioned tank storage may be necessary. Do not store in direct sunlight. Keep drums tightly closed when not in use and under dry air or nitrogen pressure of 2-3 psi after they have been opened. Shelf life is six months from date of manufacture when stored in original unopened containers at 40°-85°F.

JM Corbond ocx SPF should be thoroughly mixed and/or recirculated for 20-30 minutes prior to application. Continue mild agitation throughout application process.

Do not recirculate or mix JM or other suppliers' "A" or "B" components into JM Corbond ocx SPF containers. 2:1 transfer pumps are recommended for material transfer from container to the proportioner.

The plural component proportioner must be capable of supplying each component within ±2% of the desired 1:1 mixing ratio by volume. Heaters should be set to deliver 115°F-140°F materials to the spray gun. Proportioner dynamic pressures should be 800-1450 psi range. These settings will ensure thorough mixing in the spray gun mix chamber in typical applications. Optimum hose pressure and temperature may vary as a function of the type of equipment, ambient and substrate conditions, and the specific application. It is the responsibility of the applicator to properly interpret equipment technical literature, particularly information that relates to the acceptable combinations of gun chamber size, proportioner output and material pressures. The relationship between proper chamber size and the capacity of the proportioner's pre-heater is critical.

CAUTION: Extreme care must be taken when removing and reinstalling drum transfer pumps so as NOT to reverse the "A" and "B" components.



PERFORMANCE ADVANTAGES

- Improves energy efficiency
- Provides an effective air barrier
- Minimizes sound transmission
- Controls moisture infiltration
- Provides R-3.7 at 1 inch

REOCCUPANCY

- Evacuate the building or establish inclosures to isolate the spray area during application
- The application area must be properly ventilated during application and for 24 hours post application
- Re-entry time for non-SPF trade workers: 12 hours
- Re-entry time for building occupants: 24 hours



JM Corbond® ocx SPF
Open-Cell Spray Polyurethane Foam



PRODUCT DATA SHEET

JM CORBOND OCX SPF

TYPICAL PHYSICAL PROPERTIES*

Properties	Test Method	Values
R-value (aged)	ASTM C518	3.7 at 1 inch
Compressive Strength	ASTM D1621	25 psi
Core Density	ASTM D1622	0.5 pcf (Nominal)
Open-cell Content	ASTM D1940	> 95%
Tensile Strength	ASTM D1623	5.1 psi
Dimensional Stability	ASTM D2126	<15% Change in Volume
Sound Transmission Coefficient	ASTM E90	38** (STC)
Surface Burning Characteristics (at 4 inches)	ASTM E84	Flame-Spread Index <25 Surface-Developed Index <450

*These items are provided as general information only. They are approximate values and are not part of the product specifications.
**Residential exterior wall with 16" o.c. 2x4 wood studs, OSB sheathing, and 1/2" gypsum board. STC 40 with fiberboard siding.

PROCESSING PARAMETERS AND PHYSICAL CHARACTERISTICS

Proportioner Temperature	"A" and "B" 115–140°F
Hose Temperature	"A" and "B" 115–140°F
Pressures	800–1450 psi (dynamic)*
Mix Ratio Parts	1 to 1 by volume "A" to "B"
Viscosity at 77°F	750 cps "B"
Shelf Life	6 months @ 40–85°F

*Dependent upon hose length.

FLAMMABILITY CHARACTERISTICS

Surface Burning Characteristics: ASTM E84

Flame Spread: <25

Smoke: <450

Note: This numerical flame spread and all other data presented are not intended to reflect the hazards presented by this or any other material in actual fire situations.

The use of polyurethane foam in interior applications on walls or ceilings presents a fire risk unless protected by an approved 15-minute thermal barrier. One example of an approved "thermal barrier" is 1/2 inch gypsum wallboard. Consultation with building code officials before application is recommended.

Caution: Polyurethane foam may present a fire hazard if exposed to fire or excessive heat (e.g., cutting torches, soldering torches, etc.). Each firm, person or corporation engaged in the use, manufacture, production or application of polyurethane foams should carefully examine construction sequencing and end-use to determine any potential fire hazard associated with such product and to utilize appropriate precautionary and safety measures during construction.

SPRAYING

This spray system may be applied in passes of uniform thickness from a minimum of 2 inches to a maximum of 11.5 inches. For maximum yield and productivity, the product may be applied in a single pass to the specified thickness or up to a 11.5 inch maximum pass.

CLEANUP LIQUIDS

Nonflammable solvents should be used for cleanup. Consult your solvent manufacturer MSDS for handling precautions.

**JM Corbond® ocx SPF**
Open-Cell Spray Polyurethane Foam**PRODUCT DATA SHEET****JM CORBOND OCX SPF****PROTECTIVE EQUIPMENT**

Spraying of polyurethane foam results in the atomizing of the components to a fine mist. Inhalation and exposure to the atomized particles must be avoided.

Applicators must use personal protective equipment recommended by the Center for Polyurethanes Industry for use in high pressure spray foam application.

Please visit www.spraypolyurethane.org for additional information on appropriate PPE selection and use.

SAFETY AND HANDLING

Applicators should ensure the safety of the job site and construction personnel by posting appropriate signs warning that all "hot work" such as welding, soldering and cutting with torches should not take place until a thermal barrier or approved equivalent is installed over any exposed polyurethane foam.

Appropriate literature has been assembled that provides information concerning the health and safety precautions that must be observed when handling JM Corbond ocx SPF. Before working with this product, you must read and become familiar with the available information on its risks, proper use and handling, as well as required personal protective equipment. This cannot be overemphasized. Information is available in several forms, e.g., safety data sheets and product labels. More resources are available at polyurethane.org, sprayfoam.org, www.JM.com or by contacting your Johns Manville representative.

Note: The information contained in this bulletin is current as of January 2015. Please contact Johns Manville to determine whether this publication has been revised.

DESCRIPTION

This system is sprayable, open-cell polyurethane cellular plastic foam insulation designed to insulate buildings. The sprayed product, properly installed, results in a seamless, monolithic insulation adhered to the substrate. JM Corbond ocx SPF spray systems are technologically advanced, sophisticated materials and should be applied only by trained, qualified, experienced polyurethane spray applicators.

WALLS

JM Corbond ocx SPF may be applied to the interior of walls in commercial, residential, and industrial buildings. It may be applied within wall cavities or on flat walls to a variety of substrates including but not limited to: metal, concrete, wood, gypsum board, fiberboard and painted or primed surfaces.

CATHEDRAL ROOFS

JM Corbond ocx SPF may be applied directly to the underside of roof sheathing between the rafters to the desired thickness. Traditional venting is not necessary and should be avoided (section 806.4 of the IRC).

VAPOR RETARDER

JM Corbond ocx SPF insulation is intended for indoor applications. It is vapor permeable and will allow some diffusion of moisture through the insulation. For some applications of JM Corbond ocx SPF insulation, installation of a vapor retarder may be recommended. Refer to local codes and manufacturer's written specifications to ensure compliance.

CLEARANCES TO HEAT SOURCES

A minimum of 3 inches of clearance is required between JM Corbond ocx SPF and combustion appliance flues, fireplace flues, recessed can lights, including IC-rated fixtures, heat lamps and other heat-producing sources.

COMBUSTION AIR TO COMBUSTION APPLIANCES

Modern construction techniques of house tightening require that outside air inlets be provided to deliver combustion air to natural gas, propane or oil-fired appliances such as furnaces, boilers, water heaters, space heaters, etc., including gas or wood-burning fireplaces. Backdraft dampers or positive pressure venting may be needed on combustion appliance vents to prevent negative air pressures developed by bath or kitchen vent fans from backdrafting combustion effluent into the building interior.



JM Corbond® ocx SPF Open-Cell Spray Polyurethane Foam



PRODUCT DATA SHEET

JM CORBOND OCX SPF

FIRE, THERMAL BARRIER AND IGNITION BARRIER WARNING: POLYURETHANE FOAMS WILL BURN WHEN EXPOSED TO FIRE

The use of polyurethane foam in interior applications on walls or ceilings may present a fire risk unless protected by an approved 15-minute thermal barrier. One example of an approved "thermal barrier" is ½ inch gypsum wallboard. See section 316.4 of the IRC or section 2603.4 of the IBC for further information on thermal barriers. Alternative solutions to prescribed thermal barriers are available as tested in accordance with NFPA 286. Please consult a Johns Manville representative for further information. Consulting with building code officials before application is recommended.

JM Corbond ocx SPF is Class 1 rated and meets AC 377 NFPA 286 Appendix X requirements for application without an ignition barrier in attics and crawl spaces that are entered only for service of utilities. JM Corbond ocx SPF may be installed up to a maximum thickness of 12 inches in accordance with these instructions and IAPMO ER NO. 372. Further information can be found in section 316.5.3 and 316.5.4 of the IRC. Please consult a Johns Manville representative for further information.

SUBSTRATE PREPARATION

For optimum results, surfaces receiving JM Corbond ocx SPF should be clean and dry, free of dirt, oil, solvents, grease, loose particulate, peeling coating or other foreign matter. Untreated wood, plywood and oriented strand board (OSB) typically do not need primer. JM Corbond ocx SPF also adheres well without primer to expanded polystyrene, extruded polystyrene, foil-faced insulation boards, concrete masonry units (CMU) and cured concrete. Ferrometallic substrates (especially mild steel) may be sand-blasted for increased adhesion in accordance with SSPC-SP6. Sand-blasted surfaces should be immediately primed with an epoxyimide primer as recommended by the primer manufacturer. Galvanized and stainless steel, and aluminum substrates may be treated with an appropriate wash primer or adhesive prior to application of JM Corbond ocx SPF. Consult your primer manufacturer and JM for a specific recommendation. Acid wash or other pre-wash may also be needed.

SUBSTRATE TEMPERATURE AND MOISTURE

Substrates over 90°F, such as decks of cathedral roofs with sunshine above, require longer than minimum cooling time between passes. JM Corbond ocx SPF technical personnel should be consulted in all cases where application conditions are marginal. Moisture in the form of rain, dew, frost or other sources can seriously affect the adhesion of urethane foam to the substrate or to itself. During application, water reacts with the mixed foam components, seriously affecting the foam's physical properties.

INDOOR APPLICATION PRECAUTIONS

All personnel in the spray area must be equipped with a fresh-air-supplied face mask or hood. Applicators must use personal protective equipment recommended by the Center for Polyurethanes Industry for use in high pressure spray foam application. Additional precautions include, but are not limited to:

- a. Post warning signs at all work area entrances. (Available from JM at no charge.)
- b. No welding, smoking or open flame.
- c. Seal off the work area from adjacent rooms and ventilation ducts.
- d. Mask areas required to prevent overspray such as windows, doors, tubs and showers, etc.
- e. Restrict access of nonapplication personnel.
- f. Provide ventilation as needed.
- g. Provide breathing and eye protection to both workers and spectators.

OUTDOOR APPLICATION PRECAUTIONS

All personnel in the spray area must be equipped with a fresh-air-supplied face mask or hood. Applicators must use personal protective equipment recommended by the Center for Polyurethanes Industry for use in high pressure spray foam application. The area surrounding the spray operation should be protected from overspray and exposure of individuals not involved in the spray operations. Additional precautions include, but are not limited to:

- a. Post warning signs a minimum of 100 feet from all work areas.
- b. No welding, smoking or open flame.
- c. Close all air-intake vents on air-handling equipment on the building.
- d. Provide breathing and eye protection for spectators.
- e. Move vehicles out of area.
- f. Do not apply when the wind velocity is greater than 10 mph to avoid overspraying of perimeter areas.



JM Corbond® ocx SPF Open-Cell Spray Polyurethane Foam



PRODUCT DATA SHEET

JM CORBOND OCX SPF

CLIMATIC CONDITIONS

Cold temperatures and high wind speeds retard the exothermic reaction of foam and can lead to poor adhesion, increased density and loss of yield, as well as thermal shock. Avoid moisture in the form of rain, dew and frost.

PROCESS SAFETY, HEALTH AND TOXICITY INFORMATION

Safety Data Sheets on product components and the finished product are available from JM. Installers of this product should read and understand the SDS before use.

PROTECTIVE EQUIPMENT

Spraying of polyurethane foam results in the atomizing of the components to a fine mist. Inhalation and exposure to the atomized droplets must be avoided. Applicators must use personal protective equipment recommended by the Center for Polyurethanes Industry for use in high pressure spray foam application. Precautions include, but are not limited to:

- a. Full-face mask or hood with fresh air source
- b. Fabric coveralls
- c. Non-permeable gloves
- d. Solvent-resistant gloves when handling new materials and cleaning solvents.

WARNING: Exposure may occur even when no noticeable odor is encountered.

PHYSICAL EXAMINATIONS OF PERSONNEL

All personnel to be employed in the spraying of these materials should have a complete physical examination prior to employment. Periodic checkups are recommended if the personnel continue to spray these materials. Personnel with the following conditions should avoid the spraying of these components:

- a. Asthma or chronic bronchitis
- b. Chronic respiratory disorders
- c. Sensitization to chemical substances including polymeric isocyanates

DERMAL EXPOSURE

If a major splash or spill of the raw material (A) or (B) component comes in contact with the skin, the affected area should immediately be washed with generous amounts of water from a safety shower or other water source. Contaminated clothing should be removed and the skin wiped with a clean dry cloth to remove residual material. The affected area should then be wiped with a 70% solution of rubbing alcohol (isopropol) followed by repeated washing with soap and water. If a rash develops, a physician should be consulted immediately.

EYE EXPOSURE

Splashes of either component into the eyes should be flushed immediately with generous amounts of water for at least 15 minutes.

CONSULT TRAINED MEDICAL PERSONNEL IMMEDIATELY.

INHALATION

Symptoms of vapor inhalation are characterized by coughing, tightness in the chest and shortness of breath. Excessive exposure can produce serious, possibly irreversible lung damage. Smoking in the area of application increases the risk of pulmonary injury and must be prohibited. High concentrations of isocyanate may cause symptoms and problems to appear immediately. However, chronic exposure may also lead to the same symptoms and problems. **IF BREATHING HAS STOPPED, ARTIFICIAL RESPIRATION MUST BE PROMPTLY APPLIED.** If breathing is short, oxygen (if available) should be administered by trained medical personnel. **OBTAIN MEDICAL ATTENTION IMMEDIATELY.**

APPLICATORS

See the A&B component SDS for more complete raw material handling information.

CLEANUP

Nonflammable solvents should be used for cleanup. Consult your solvent manufacturer for handling precautions.

INCOMPATIBLE MATERIALS

The isocyanate component (A) is incompatible with strong bases, tertiary amines or water. These materials may cause rapid, spontaneous polymerization with subsequent generation of heat and gas.

**JM Corbond® ocx SPF**
Open-Cell Spray Polyurethane Foam**PRODUCT DATA SHEET****JM CORBOND OCX SPF****DECONTAMINATION OF SPILLS**

In the event of a major isocyanate (A) spill, the area should be immediately evacuated. Only personnel equipped with appropriate respiratory and eye protection equipment should remain. If the spill occurs indoors, the area should be ventilated and leaking containers should be taken outdoors and the remaining isocyanate transferred to other containers.

The spill should be covered with sawdust, ekoperl, vermiculite, fuller's earth or other oil-absorbing material and should then be treated with a dilute solution of ammonium hydroxide/detergent. The neutralized material should be swept up and placed in a suitable container. The material should then be disposed of by a standard method consistent with good industrial practice and in accordance with environmental protection regulations in your area. Where permissible, sanitary landfill disposal is recommended.



Visit our website at www.JM.com or call **800-654-3103** | **Building Insulation Division** P.O. Box 5108 | Denver, CO 80217-5108

Technical specifications as shown in this literature are intended to be used as general guidelines only. The physical and chemical properties of JM Corbond ocx SPF insulation listed herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. The properties are based on using appropriate spray foam application equipment settings for mixing, temperature and pressure. They are supplied as a technical service and are subject to change without notice. Any references to numerical flame-spread or smoke-developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with the sales office nearest you for current information. All Johns Manville products are sold subject to Johns Manville's Limited Warranty and Limitation of Remedy. For a copy of the Johns Manville Limited Warranty and Limitation of Remedy or for information on other Johns Manville thermal and acoustical insulation and systems, call the 800 number or write to the address above.

BID-217 01/15

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QuadFoam® 2.0 TECHNICAL DATA SHEET

QuadFoam® 2.0 is a two component, one-to-one by volume, spray applied rigid polyurethane foam. **QuadFoam® 2.0** utilizes an EPA approved, non-ozone depleting blowing agent. A low viscosity, "HIGH YIELD" 2.0 lb. closed-cell material that is excellent for insulating, air sealing and noise reduction. It contributes to providing a self-adhering, seamless building envelope that reduces air, dust, pollution and pest infiltration. It is designed for use in interior commercial and residential construction applications, and is compatible with most common construction materials.

QuadFoam® 2.0 has been tested and approved in accordance to AC 377 (NFPA 286) Appendix X **without any Coatings** and with 3 dry mils of DC 315 Ignition Barrier from International Fireproof Technology, Inc.

Spray Foam Insulation Advantages

- Reduces Energy Consumption
- Controls Air Infiltration
- Vapor Retarder
- Controls Moisture Infiltration
- Structural Properties
- Highest R value Per Inch
- Improves Indoor Air Quality
- Structural Properties
- Zero ODP

For proper use of this Quadrant insulating material or any polyurethane foam, please refer to the Quadrant application information and any of the following codes or guidelines:

- API Fire Safety Guidelines for Use of Rigid Polyurethane and Polyisocyanurate Foam Insulation in Building Construction (AX230)
- ICC, International Building Code, (IBC), Section 2603
- International Residential Code, (IRC), Section R314

TYPICAL PHYSICAL PROPERTIES

Density ASTM D-1622	2.0 pcf
Closed Cell Content ASTM D-1940	> 90%
Tensile Strength ASTM D-1623	42 psi
R-value at 1 inch ASTM C-518	7.4
Moisture Vapor ASTM E-96	1.5 perm/ in
Air Permeance ASTM E-96	0.001 cfm/ft ²
Dimensional Stability ASTM D-2126	< 12%
Compressive Strength ASTM D-1621	25 psi
Flammability ASTM E-84 at 4 inches	Flame Spread <25 Smoke Dev. < 450

NOTE: The above values are average values obtained from laboratory experiments and should serve only as guidelines. Free rise core density should not be confused with overall density. Overall densities are always higher than free rise core densities and take into account skin formation, thickness of application, environmental conditions, etc.

Quadrant Urethane Technologies
200 Industrial Blvd.
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(972) 542-0072
www.QuadFoam.com



QuadFoam® 2.0 TECHNICAL DATA SHEET

QuadFoam® 2.0

APPLICATION INFORMATION

STORAGE AND USE OF CHEMICALS

Storage temperatures should be 65-85°F for several days before use, and should not exceed 90°F. Do not store in direct sunlight. Keep drums tightly closed when not in use and under dry air or nitrogen pressure of 1-2 psi after they have been opened. Shelf life is six months from date of manufacture when stored in original unopened containers at 50-85°F.

SAFE HANDLING OF LIQUID COMPONENTS

Caution, contents may be under pressure. Loosen the small bung first and allow any pressure to release prior to removing. B-component may froth at elevated temperatures. Avoid prolonged breathing of vapors. In case of chemical contact with eyes, flush with water for at least 15 minutes and get medical attention. For further information refer to "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal" publication AX-119 published by the Alliance for the Polyurethanes Industry, Arlington, VA.

EQUIPMENT AND COMPONENT RATIOS

The mix ratio is 1 to 1 by volume. The pre-heater and hose temperature should be set at 105-135°F, +/- 5°F.

APPLICATION GUIDELINES

QuadFoam® 2.0 is suitable for application to most construction materials including wood, masonry, concrete, and metal. All surfaces to be sprayed with foam should be clean, dry, and free of oil, greases, dew and or frost. Application temperature range of 45-120°F. Application Temperatures below 40°F may require winter or cold weather foam grades. Do not exceed 4 inches application thickness for closed cell foam for each layer. Allow at least twenty minutes between each pass to allow for cooling. Multiple layers can be applied to reach the desired thickness and R-value.

As with all Spray Polyurethane Foam systems, proper application techniques must be followed. Examples of improper techniques include, but are not limited to, excessive thickness of SPF, off ratio material and spraying into or under rising foam. Potential results of improperly installed SPF include dangerously high reaction temperatures that may result in fire and offensive odors that may or may not dissipate. Improperly installed foam must be removed and replaced with properly installed SPF.

Foam insulation is combustible. Heat sources such as cutting torches, space heaters and welders must not be used in close proximity to any foam.

FINISHED FOAM PROTECTION

The finished surface of the sprayed polyurethane foam should be protected from sunlight and ultraviolet rays, which can cause dusting and discoloration. Protective coatings designed for use with polyurethane foams are available from **Quadrant Urethane Technologies**.

HEALTH & SAFETY

Due to the reactive nature of these components, vapors and liquid aerosols present during application and for a short period thereafter must be considered – and appropriate protective measures taken – to minimize potential risks from overexposure through inhalation, skin, or eye contact. These protective measures include: adequate ventilation, safety training for installers and other workers, use of appropriate personal protective equipment, and a medical surveillance program. All OSHA, NIOSH and other regulations (as applicable) must be followed. See our website and MSDS for more information.

BUILDING CODES

Building codes require the installation of an approved thermal and or ignition barrier between the foam insulation and the occupied space, such as ½-inch gypsum board or other tested and approved materials. Refer to specific building codes for details.

QuadFoam® 2.0 has been tested and approved in accordance to AC 377 (NFPA 286) Appendix X **without any Coatings** and with 3 dry mils of DC 315 Ignition Barrier from International Fireproof Technology, Inc.

The information herein is to assist customers in determining whether our products are suitable for their applications. The Customer assumes full responsibility for quality control, testing, and determination of suitability of product for its intended use or application. **Quadrant Urethane Technologies** warrants only that the material shall meet its specifications; this warranty is in lieu of all other written, expressed or implied warranties and **Quadrant Urethane Technologies** expressly disclaims any warranty of merchantability or fitness for a particular purpose. Accordingly, buyer assumes all risks whatsoever as to the use of the material. Buyer's exclusive remedy as to any breach of warranty, negligence or other claim shall be limited to the purchase price of the material. Failure to adhere to any recommended procedures shall relieve **Quadrant Urethane Technologies** of all liability with respect to the material or the use thereof.

Quadrant Urethane Technologies
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END SECTION 07 21 26**07 27 00 - WATER-RESISTIVE BARRIERS/WEATHER BARRIERS****PART 1 - GENERAL****1.01 SUMMARY OF WORK**

- A. This Section specifies self-adhered water-resistive barriers, air barriers, and accessories.

1.02 RELATED REQUIREMENTS

- A. Section [07 28 00].

1.03 REFERENCE STANDARDS

- A. Air Barrier Association of America (ABAA)
 - 1. ABAA [2011], Installer's Certification Program.
 - 2. ABAA [2012], Water-resistive Barrier Installation Guideline.
- B. American Association of Textile Chemists and Colorists (AATCC)
 - 1. AATCC 127 [2008], Water Resistance: Hydrostatic Penetration Test.
- C. American Architectural Manufacturer's Association (AAMA)
AAMA 711-[2007], Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products.
- D. ASTM International (ASTM).
 - 1. ASTM D1204-[2008], Standard Test Method for Linear Dimensional Changes of Nonrigid Thermoplastic Sheeting or Film at Elevated Temperature.

2. ASTM D3330-[2010], Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape.
 3. ASTM D5034-09, Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
 4. ASTM E84-[2010b], Standard Test Method for Surface Burning Characteristics of Building Materials.
 5. ASTM E96/96M-[2010], Standard Test Methods for Water Vapor Transmission of Materials.
 6. ASTM E154-[2008a], Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
 7. ASTM E2178-[2003], Standard Test Method for Air Permeance of Building Materials.
 8. ASTM E2357 – 11, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- E. International Code Council (ICC)
1. AC308, Acceptance Criteria for Water-resistive Barriers
- F. US Green Building Council (USGBC).
1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.
- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and one week prior to commencing work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;
 - b. Consultant;
 - c. [Air] [Water-resistive] barrier installer;
 - d. Manufacturer's Technical Representative.
 3. Ensure meeting agenda includes review of methods and procedures related to [air] [water-resistive] barrier installation including co-ordination with related work.

4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for [air] [water-resistive] barrier membrane and accessories, indicating compliance with specified requirements and material characteristics.
 1. Submit list on [air] [water-resistive] barrier manufacturer's letterhead of materials, components and accessories to be incorporated into Work.
 2. MSDS report.
 3. Include product names, types and series numbers.
 4. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 1. Submit duplicate 12 x 12 inches sample of membrane.
 2. Submit duplicate 12 inches long samples of seam tape and each type of flashing materials.
- D. Test Reports:
 1. Submit test reports showing compliance with specified performance characteristics and physical properties including air permeance, water vapour permeance and structural performance.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 1. LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements]
- G. Installer Qualifications:
 1. Submit [verification of manufacturer's approval of installer] [letter verifying installer's experience with work similar to work of this Section] [verification of ABAA certification].
- H. ICC compliance: Submit ICC-ES Evaluation Report (ESR) verifying compliance with ICC AC38.

1.06 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: Supply maintenance data for [air] [water-resistive] barrier materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.07 QUALITY ASSURANCE

A. Installer Quality Assurance: [manufacturer's approval of installer] [[2] years' experience with work similar to work of this Section] [ABAA certification]

1.08 DELIVERY STORAGE AND HANDLING

A. Delivery and Acceptance Requirements:

1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
2. Deliver materials and components in manufacturer's original packaging with identification labels intact and in sizes to suit project.

B. Storage and Handling Requirements: Store materials off ground and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1. Ensure materials are protected from sunlight and UV radiation.

C. Packaging Waste Management:

1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.

1.09 WARRANTY

A. Project Warranty: Refer to Contract Conditions for project warranty provisions.

B. Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.

1. [10] years limited material warranty.

C. Warranty period: [1] years commencing on Date of Substantial Performance of Work.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Manufacturer: Cosella-Dörken Products Inc., 4655 Delta Way, Beamsville, Ontario, L0R 1B4, Canada, Phone: 1-905-563-3255, Toll Free: 1-888-4DELTA4 (1-888-433-5824), e-mail: info@cosella-dorken.com , URL: <http://www.cosella-dorken.com>.

2.02 DESCRIPTION

A. Vapor permeable [air] [water-resistive] barrier, highly tear-resistant 3-layer membrane, with 2 outer layers of spun-bonded polypropylene fabric, water-tight polymeric middle layer and highly aggressive adhesive coating on the back.

1. Includes factory applied self-adhesive strip on each front upper longitudinal edge of barrier membrane.
2. Ensure materials meet requirements of AAMA 711.

2.03 DESIGN CRITERIA

A. Comply with ICC AC38.

B. Water Vapor Permeance: To ASTM E96 (Procedure A) 31 perms, (Procedure B) 50 perms.

C. Water Vapor Transmission: To ASTM E96 (Procedure A), 214 g/m²/24 hr, (Procedure B) 343 g/m²/24 hr.

D. Air Leakage of Air Barrier Assembly: To ASTM E2357 -11 < 0.2 L/(s•m²) @ 75 Pa (0.04 cfm/ft² @ 1.57 lb/ft²)

E. Water Penetration: To AATCC 127, Pass.

F. Air Permeance: To ASTM E2178, <0.0034 cfm/sq ft @ 0.3 inches wg (< 0.02 l/(s x m²) @ 75 Pa).

G. Resistance to Puncture: To ASTM E154, 78.6 lbs.

H. Breaking Strength: To ASTM D5034, MD 71 lb, CD 65.4 lb minimum.

I. Elongation at Break: To ASTM D5034, MD 27.8 %, CD 60.1 % minimum.

- J. 90° Peel Adhesion: To ASTM D3330, Pass.
- K. Peel Adhesion at Elevated Temperatures (176° F): To ASTM D3330, Pass (Level 3).
- L. Linear Dimensional Change at Elevated Temperature: To ASTM D1204, MD -1.4 %, CD +0.1 %.
- M. Fire Rating Characteristics: To ASTM E84:
 - 1. Rating: NFPA Class A, IBC Class A minimum.
 - 2. Flame Spread: 14 maximum.
 - 3. Smoke Developed: 47 maximum.

2.04 MATERIALS

- A. [Air] [Water-resistive] Barrier for Walls: Self-adhesive vapor permeable [air] [water-resistive] barrier; highly tear-resistant 3-layer membrane, with two outer layers of spun-bonded polypropylene fabric and a water-tight polymeric middle layer and factory applied adhesive edge strip.
 - 1. Weight: 40 lb/roll nominal.
 - 2. Roll Dimensions: 4 feet 11 inches x 115 feet.
 - 3. Color: Matte Gray.
- B. Acceptable Material: Cosella-Dörken Products Inc., DELTA®-VENT SA.

2.05 ACCESSORIES

- A. Seam tape: Acrylic-based adhesive tape in accordance with [air] [water-resistive] barrier manufacturer's written recommendations.
 - 1. Acceptable material: Cosella-Dörken Products Inc., DELTA®-MULTIBAND (2-1/2" x 65' 7")
- B. Flashings: Self-adhering, butyl-rubber based [air] [water-resistive] flashing membrane [in accordance with [air] [water-resistive] barrier manufacturer's written recommendations] [and] [in accordance with Section 07 65 00 – Flexible Flashing]
 - 1. Acceptable material: Cosella-Dörken Products Inc., DELTA®-FLASHING [(4" x 75')] [9" x 75']].
- C. Penetration Flashings: Stretchable butyl-rubber based adhesive on non-woven fabric flashing membrane [in accordance with [air] [water-resistive] barrier manufacturer's written recommendations].
 - 1. Acceptable material: Cosella-Dörken Products Inc., DELTA®-FLEXX BAND 4" x 33".

D. Sealants and Adhesives: Elastomeric sealant and adhesive in accordance with [[air] [water-resistive] barrier manufacturer's written recommendations] [Section 07 92 00 – Joint Sealants].

1. Ensure sealants are compatible with adjacent materials.
2. Acceptable material: [Cosella-Dörken Products Inc., DELTA®-THAN] [Dow Corning® 758].

E. Window Corner: Prefabricated rubber-compound window corner.

1. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-FAS CORNER.

F. Primers: In accordance [air] [water-resistive] barrier manufacturer's written recommendations.

1. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-LVC PRIMER.

2.06 PRODUCT SUBSTITUTIONS

A. Ensure all accessories such as seam tape, flashing membranes, window corners, and sealants come from same source as [air] [water-resistive] barrier membrane.

B. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

PART 3 - EXECUTION

3.01 INSTALLERS

A. Use only [Cosella-Dörken Products Inc. authorized installers for] [installers with 2 years minimum experience in work similar to] [ABAA certified installers for] work of this Section.

3.02 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for [air] [water-resistive] barrier installation in accordance with manufacturer's written recommendations.

1. Visually inspect substrate in presence of Consultant.
2. Inform Consultant of unacceptable conditions immediately upon discovery.
3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.03 PREPARATION

- A. Ensure step flashings and kick-out flashings are installed before beginning installation of [air] [water-resistive] membrane.
- B. Ensure protrusions that may penetrate [air] [water-resistive] barrier membrane are removed before beginning installation.

3.04 INSTALLATION

- A. Install [air] [water-resistive] barrier before installation of windows and doors in accordance with manufacturer's written recommendations.
- B. Do installation in accordance with ABAA written recommendations for installation of [air] [water-resistive] barriers.
- C. Unroll [air] [water-resistive] barrier with printed side out, wrapping entire building, including rough openings for windows, doors and other protrusions or penetrations.
 - 1. Prime substrate before applying [air] [water-resistive] barrier in accordance with manufacturer's written recommendations.
 - a. Allow to dry 120 minutes or until tacky (depending on weather conditions) before applying [air] [water-resistive] barrier.
 - 2. Install [air] [water-resistive] barrier plumb and level to exterior face of structural [sheathing board] [insulation board] [exterior gypsum board] members in accordance with manufacturer written recommendations.
 - 3. Ensure [air] [water-resistive] barrier is installed with printed side facing installer.
 - 4. Remove release liner from back of membrane and press firmly onto substrate.
 - a. Roll firmly in place with hand roller.
- D. Start installation of [air] [water-resistive] barrier at building corner, leaving 6-12 inches of membrane extended beyond corner.
- E. Install horizontally starting at bottom of wall.
 - 1. Overlap [air] [water-resistive] barrier membrane as follows:
 - a. Exterior Corners: [12] inches minimum.
 - b. Vertical seams: [6] inches minimum.
 - c. Horizontal seams: [4] inches minimum. Remove release liner and press firmly together
 - d. Other seams, joints or at protrusions and penetrations: [6] inches minimum.
- F. Sill Plate Interface: Extend lower edge of [air] [water-resistive] barrier over sill plate interface 3 - 6 inches.

1. Adhere to substrate by removing release liner in accordance with [air] [water-resistive] barrier manufacturer's written recommendation.
- G. Ensure installed [air] [water-resistive] barrier is not exposed to UV for longer than 50 days.

3.05 FIELD QUALITY CONTROL

- A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].
- B. Site Installation Tolerances:
- 1.
- C. Manufacturer's Services:
1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].
 - a. Have manufacturer review work involved in handling, installation, protection, and cleaning of [air] [water-resistive] barrier and components, and submit written reports in acceptable format to verify compliance of Work with Contract conditions.
 2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
 3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of [air] [water-resistive] barrier and components, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. 50 days after installation to ensure [air] [water-resistive] barrier has not unnecessarily been left exposed to UV.
 - e. Obtain reports within three days of review and submit immediately to Consultant.

3.06 CLEANING

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
1. Leave work area clean at end of each day.

- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 – Cleaning and Waste Management].
- C. Waste Management:
 - 1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 - 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
 - 3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 PROTECTION

- A. Protect installed products and components from damage during construction.
- B. Repair damage to adjacent materials caused by [air] [water-resistive] barrier installation.

END OF SECTION 07 27 00

07 28 26 - WATER-RESISTIVE BARRIERS/WEATHER BARRIERS

PART 1 - GENERAL

1.01 SUMMARY OF WORK

- A. This Section specifies water-resistive barriers and accessories.

1.02 RELATED REQUIREMENTS

- A. Section [07 27 00].

1.03 REFERENCE STANDARDS

- A. Air Barrier Association of America (ABAA)
 - 1. ABAA [2011], Installer's Certification Program.
 - 2. ABAA [2012], Water-resistive Barrier Installation Guideline.
- B. American Association of Textile Chemists and Colorists (AATCC)
 - 1. AATCC 42 [2007], Water Resistance: Impact Penetration Test.
- C. ASTM International (ASTM).
 - 1. ASTM D882-[2010], Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 2. ASTM E84-[2010b], Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E96/96M-[2010], Standard Test Methods for Water Vapor Transmission of Materials.
 - 4. ASTM E2178-[2003], Standard Test Method for Air Permeance of Building Materials.
- D. US Green Building Council (USGBC).
 - 1. LEED® NC Version 2.2-[2009], LEED (Leadership in Energy and Environmental Design): Green Building Rating System Reference Package For New Construction and Major Renovations.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Co-ordination: Co-ordinate work of this Section with work of other trades for proper time and sequence to avoid construction delays.
- B. Pre-installation Meeting: Convene pre-installation meeting after Award of Contract and one week prior to commencing work of this Section to verify project requirements, substrate conditions and coordination with other building sub-trades, and to review manufacturer's written installation instructions.
 - 1. Comply with Section 01 31 19 - Project Meetings and co-ordinate with other similar pre-installation meetings.
 - 2. Notify attendees 2 weeks prior to meeting and ensure meeting attendees include as minimum:
 - a. Owner;

- b. Consultant;
 - c. Water-resistive barrier installer;
 - d. Manufacturer's Technical Representative.
3. Ensure meeting agenda includes review of methods and procedures related to water-resistive barrier installation including co-ordination with related work.
 4. Record meeting proceedings including corrective measures and other actions required to ensure successful completion of work and distribute to each attendee within 1 week of meeting.

1.05 ACTION AND INFORMATIONAL SUBMITTALS

- A. Make submittals in accordance with Contract Conditions and Section 01 33 00 - Submittal Procedures.
- B. Product Data: Submit product data including manufacturer's literature for water-resistive barrier membrane and accessories, indicating compliance with specified requirements and material characteristics.
 1. Submit list on water-resistive barrier manufacturer's letterhead of materials, components and accessories to be incorporated into Work.
 2. MSDS report.
 3. Include product names, types and series numbers.
 4. Include contact information for manufacturer and their representative for this Project.
- C. Samples:
 - .1 Submit duplicate 12 x 12 inches sample of membrane.
 - .2 Submit duplicate 12 inches long samples of seam tape and each type of flashing materials.
- D. Test Reports:
 - .1 Submit test reports showing compliance with specified performance characteristics and physical properties including air permeance, water vapour permeance and structural performance.
- E. Field Reports: Submit manufacturer's field reports within 3 days of each manufacturer representative's site visit and inspection.
- F. Sustainable Design (LEED).
 - .1 LEED Submittals: In accordance with Section [01 35 21 – LEED Requirements]
- G. Installer Qualifications:

- .1 Submit [verification of manufacturer's approval of installer] [letter verifying installer's experience with work similar to work of this Section] [verification of ABAA certification].

1.06 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Supply maintenance data for water-resistive barrier materials for incorporation into manual specified in Section 01 78 00 - Closeout Submittals.

1.07 QUALITY ASSURANCE

- A. Installer Quality Assurance: [manufacturer's approval of installer] [[2] years' experience with work similar to work of this Section] [ABAA certification]
- B. Sustainability Standards Certification (LEED).
 1. LEED NC Version 2.2 submittals: In accordance with Section 01 35 21 - LEED Requirements.
- C. Mock-up: Construct full size 10 ft x 10 ft mock-up of wall showing water-resistive barrier using proposed procedures, materials and quality of work where directed by Consultant [and in accordance with Section 01 43 00 - Quality Assurance].
 1. Include examples of window frame, door frame, interior corner, exterior corner and common protrusions or penetrations of barrier membrane.
 2. Purpose: To judge quality of work and material installation.
 3. Allow Consultant [24] hours minimum prior to inspection of mock-up.
 4. Do not proceed with work prior to receipt of written acceptance of mock-up by Consultant.
 5. When accepted, mock-up will demonstrate minimum standard of quality required for work of this Section.
 6. Approved mock-up will [not] remain part of finished work.

1.08 DELIVERY STORAGE AND HANDLING

- A. Delivery and Acceptance Requirements:
 1. Deliver material in accordance with Section 01 61 00 - Common Product Requirements.
 2. Deliver materials and components in manufacturer's original packaging with identification labels intact and in sizes to suit project.
- B. Storage and Handling Requirements: Store materials off ground and protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
 1. Ensure materials are protected from sunlight and UV radiation.

- C. Packaging Waste Management:
 - 1. Separate and recycle waste packaging materials in accordance with Section 01 74 19 - Construction Waste Management and Disposal.
 - 2. Remove waste packaging materials from site and dispose of packaging materials at appropriate recycling facilities.
 - 3. Collect and separate for disposal paper and plastic material in appropriate on-site storage containers for recycling [in accordance with Waste Management Plan].

1.09 WARRANTY

- A. Project Warranty: Refer to Contract Conditions for project warranty provisions.
- B. Manufacturer's warranty: Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.
 - 1. [10] years limited material warranty.
- C. Warranty period: [1] years commencing on Date of Substantial Performance of Work.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Manufacturer: Cosella-Dörken Products Inc., 4655 Delta Way, Beamsville, Ontario, L0R 1B4, Canada, Phone: 1-905-563-3255, Toll Free: 1-888-4DELTA4 (1-888-433-5824), e-mail: info@cosella-dorken.com , URL: <http://www.cosella-dorken.com> .

2.02 DESCRIPTION

- A. Vapor permeable water-resistive barrier with highly tear-resistant thermo-bonded non-woven polyester substrate, and waterproof acrylic highly UV resistant coating.
 - 1. Include factory applied self-adhesive strip at longitudinal edges of barrier membrane.

2.03 DESIGN CRITERIA

- A. Water Vapor Permeance: To ASTM E96 (Procedure A), 204 perms minimum.
- B. Water Impact Penetration Resistance: To AATCC 42, no water passing.
- C. Air Permeance: To ASTM E2178, 0.9 L/(s x m²) @ 75 Pa.
- D. Tear Resistance: To ASTM D 1922, [1916] [2564] g minimum.
- E. Dry Tensile Strength: To ASTM D882, MD 47.4 lb/in², CD 28.7 lb/in² minimum.
- F. Elongation at Break: To ASTM D882, MD 40 %, CD 45 % minimum.
- G. Fire Rating Characteristics to ASTM E84:
 - 1. Rating: NFPA Class A, IBC Class A minimum.
 - 2. Flame Spread: 10 maximum.
 - 3. Smoke Developed: 145 maximum.

2.04 MATERIALS

- A. Water-resistive Barrier for Walls: Vapor permeable water-resistive barrier with tear-resistant thermo-bonded, non-woven polyester substrate and waterproof acrylic polymeric coating stabilized against oxidation and UV degradation [and factory applied adhesive edge strips].
 - 1. Service Life Expectancy: > 25 years.
 - 2. Weight: 5.5 lb/100 ft², 270 g/m², 44 lb/roll nominal.
 - 3. Roll Dimensions: 4' 11" x 164'.
 - 4. Color: Black

COSELLA-DÖRKEN GUIDE NOTE: Specify DELTA®-FASSADE S if you are going to include tape to seal the joints. Specify DELTA®-FASSADE S PLUS if you want to use a water-resistive barrier membrane which has factory applied adhesive strips applied to the long edges of the membrane for sealing overlapping joints.

- B. Acceptable Material: Cosella-Dörken Products Inc., [DELTA®-FASSADE S] [DELTA®-FASSADE S PLUS].

2.05 ACCESSORIES

- A. Seam tape: In accordance with water-resistive barrier manufacturer's written recommendations.
 - 1. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-FASSADE TAPE (2-1/2" x 65' 7")

B. Flashings: Self-adhering, water-resistive flashing membrane [in accordance with water-resistive barrier manufacturer's written recommendations] [and] [in accordance with Section 07 65 00 – Flexible Flashing].

1. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-FASSADE FLASHING [(4" x 65' 7") [9" x 65' 7")].

C. Fasteners: Water and vapour resistant fasteners in accordance with water- resistive barrier manufacturer's written recommendations.

1. #4 nails with 1" minimum diameter plastic caps.

D. Sealants and Adhesives: Elastomeric sealant and adhesive in accordance with [water-resistive barrier manufacturer's written recommendations] [Section 07 92 00 – Joint Sealants].

1. Ensure sealants are UV resistant and compatible with adjacent materials.
2. Acceptable materials: Cosella-Dörken Products Inc., DELTA®-THAN.

E. Primers: In accordance with flashing manufacturer's written recommendations.

2.06 PRODUCT SUBSTITUTIONS

A. Ensure all accessories such as seam tape, flashing membranes, fasteners and sealants come from same source as water-resistive barrier membrane.

B. Substitutions: [In accordance with Section 01 23 13 - Product Substitution Procedures] [No substitutions permitted].

PART 3 - EXECUTION

3.01 INSTALLERS

A. Use only [Cosella-Dörken Products Inc. authorized installers for] [installers with 2 years minimum experience in work similar to] [ABAA certified installers for] work of this Section.

3.02 EXAMINATION

A. Verification of Conditions: Verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for water-resistive barrier installation in accordance with manufacturer's written recommendations.

1. Visually inspect substrate in presence of Consultant.
2. Inform Consultant of unacceptable conditions immediately upon discovery.

3. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Consultant.

3.03 PREPARATION

- A. Ensure step flashings and kick-out flashings are installed before beginning installation of water-resistive barrier membrane.
- B. Ensure protrusions that may penetrate water-resistive barrier membrane are removed before beginning installation.

3.04 INSTALLATION

[COSELLA-DÖRKEN GUIDE NOTE](#): Refer to the water-resistive barrier manufacturer's current installation guide for detailed information regarding specific details and integration of auxiliary materials.

- A. Install water-resistive barrier before installation of windows and doors in accordance with manufacturer's written recommendations.
- B. Do installation in accordance with ABAA written recommendations for installation of water-resistive barriers.
- C. Unroll water-resistive barrier with printed side out, wrapping entire building, including rough openings for windows, doors and other protrusions or penetrations.
 1. Install water-resistive barrier plumb and level to exterior face of structural [sheathing board] [insulation board] [exterior gypsum board] or directly to framing members in accordance with manufacturer written recommendations.
 2. Ensure water-resistive barrier is installed with textured side facing substrate.
- D. Start installation of water-resistive barrier at building corner, leaving 6"-12" of membrane extended beyond corner.
- E. Install horizontally starting at bottom of wall.
 1. Overlap water-resistive barrier membrane as follows:
 - a. Exterior Corners: [12] inches minimum.
 - b. Vertical and horizontal seems: [6] inches minimum.
 - c. Other seams, joints or at protrusions and penetrations: [6] inches minimum.
- F. Sill Plate Interface: Extend lower edge of water-resistive barrier over sill plate interface 3"- 6".

1. Secure to substrate with elastomeric sealant in accordance with water-resistive barrier manufacturer's written recommendation.

G. Attachment of Water-resistive Barrier Membrane to Substrate:

- a. Secure using fasteners and [custom caps] [metal gasketed washers] spaced [18] inches maximum vertically on center along stud line and 24 inches maximum on center, horizontally.
- b. Ensure fasteners penetrate securely through metal studs [$\frac{3}{4}$] inch minimum.
- c. Install fasteners [6] inches from sill and frame of window and door openings.
- d. Ensure fasteners are installed [9] inches minimum from window or door head.

2. Attach water-resistive barrier to wood stud framing through exterior sheathing with [mechanical fasteners] [and] [elastomeric adhesive in accordance with manufacturer's written recommendations].

- a. Secure using fasteners and custom caps spaced [18] inches maximum vertically on center along stud line and 24 inches maximum on center, horizontally.
- b. Ensure fasteners penetrate wood studs [$\frac{3}{4}$] inch minimum.
- c. Install fasteners [6] inches from sill and frame of window and door openings.
- d. Ensure fasteners are installed [9] inches minimum from window or door head.

3.05 FIELD QUALITY CONTROL

A. Field Inspection: Coordinate field inspection in accordance with Section [01 45 00 - Quality Control].

B. Site Installation Tolerances:
1.

COSELLA-DÖRKEN GUIDE NOTE: Specify requirements if manufacturers are to provide field quality control with onsite personnel for instruction or supervision of product installation, application, erection or construction. Manufacturer field reports are included under PART 1, Action and Informational Submittals.

C. Manufacturer's Services:

1. Coordinate manufacturer's services with Section [01 45 00 - Quality Control].
 - a. Have manufacturer review work involved in handling, installation, protection, and cleaning of water-resistive barrier and components, and submit

written reports in acceptable format to verify compliance of Work with Contract conditions.

2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for product installation review in accordance with manufacturer's instructions.
 - a. Report any inconsistencies from manufacturer's recommendations immediately to Consultant.
3. Schedule site visits to review work at stages listed:
 - a. After delivery and storage of water-resistive barrier and components, and when preparatory work on which Work of this Section depends is complete, but before installation begins.
 - b. Twice during progress of work at 25% and 60% complete.
 - c. Upon completion of Work, after cleaning is carried out.
 - d. Obtain reports within three days of review and submit immediately to Consultant.

3.06 CLEANING

- A. Progress Cleaning: Perform cleanup as work progresses [in accordance with Section 01 74 00 - Cleaning and Waste Management].
 1. Leave work area clean end of each day.
- B. Final Cleaning: Upon completion, remove surplus materials, rubbish, tools, and equipment [in accordance with Section 01 74 00 - Cleaning and Waste Management].
- C. Waste Management:
 1. Co-ordinate recycling of waste materials with 01 74 19 - Construction Waste Management and Disposal.
 2. Collect recyclable waste and dispose of or recycle field generated construction waste created during construction or final cleaning related to work of this Section.
 3. Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.07 PROTECTION

- A. Protect installed products and components from damage during construction.
- B. Repair damage to adjacent materials caused by water-resistive barrier installation.

END OF SECTION 07 28 00**07 46 23 WOOD SIDING**

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: Wood panels, wood louvers, and secondary support system for wall cladding system application.

1. Cladding with western cedar 1 ½ x 1" slats and 1" spacing in between
2. Horizontal battens of 1x4"
3. Panelized cladding for easy assemble/disassemble

B. Related Sections:

1. Section 06 42 13 WOOD BOARD PANELING
2. Section 08 91 16 OPERABLE WALL LOUVERS

1.02 SYSTEM DESCRIPTION

A. Performance Requirements: Provide panels that have been manufactured, fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

1.03 SUBMITTALS

A. Product Data: Submit manufacturer' s product data for specified products.

B. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including edge conditions, panel joints, fixture location, anchorage, accessories, finish colors, patterns and textures.

C. Samples: Submit selection and verification samples for finishes, colors and textures.

1.04 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Manufacturer producing product in ISO 9001 certified facility, capable of providing field service representation during fabrication and approving application method.

a. Obtain from a single manufacturer.

2. Fabricator/Installer Qualifications: Installer shall be approved by the manufacturer and experienced in performing work of similar type and scope.

B. Delivery: Deliver materials in manufacturer' s original, unopened, undamaged containers with identification labels intact.

1.05 STORAGE

- A. Store materials protected from exposure to harmful weather conditions, at temperature and humidity conditions recommended by manufacturer.
- B. Store all siding on a flat, level surface, off the ground
- C. Protect all siding and trim boards from the elements by storing them under a roof or a waterproof covering
- D. All siding and trim boards must be dry prior to installation
- E. When opening the bundles of siding, cut the lumber wrap along the dotted line at the bottom of the bundle. Save the plastic wrap that is under the lumber wrap to help cover the siding.

PART 2 – PRODUCTS

2.01 WOOD WALL PANELS

- A. Wood Siding: Siding milled from cedar as specified in Division 06 Section, “Exterior Finish Carpentry” .
 - 1. Panel Profile: Flat with smooth texture.
- B. Wood Louvers: Louvers constructed from milled cedar boards as specified in Division 06 Section, “Exterior Finish Carpentry” with smooth texture.
- C. Louver Profiles:
 - a. Nearly vertical louvers, evenly spaced, with slight slope to shed water.

b. Sloped fixed louvers, evenly spaced.

c. Finish: Clear Sealer and finish.

2.02 ACCESSORIES

A. Supporting system; Fastening method: Horizontal 1x4" wood battens screwed to the supporting structure.

1. The panels are through-fastened to 1x4" wood battens.

2. To ensure proper structural performance, the clips should be located at a point equal to 20% of the length of the tile from the edge of the panel.

3. Panels must be capable of easy and fast assembly

4. The replacement of damaged panels, particularly in the middle sections, must be possible using simple methods and should not require special tools.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions, which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

3.02 PREPARATION

A. Surface Preparation: Provide air and moisture barriers, insulation, and primary support structure with sheathing.

3.03 INSTALLATION

- A. Comply with manufacturer' s product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.
- B. Install wall panels plumb and level and accurately spaced in accordance with manufacturer' s recommendations and approved submittals.
- C. Fasten wall panels to supporting substrate with fasteners and adhesive approved for use with adjoining construction.
- D. Accessory Items: Install corner profiles, gaskets and trim with fasteners and adhesive appropriate for use with adjoining construction as indicated on drawings and as recommended by manufacturer.

3.04 CLEANING

- A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer' s instructions prior to Owner' s acceptance. Remove construction debris from project site and legally dispose of debris.

3.05 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction.

END SECTION 07 46 23

07 46 26 HARDBOARD SIDING

Part 1-GENERAL

1.01 SUMMARY

A. This section includes information about:

1. Hardie Board

1.02 RELATED SECTIONS

- A. 08 71 00: Door Hardware

1.03 SUBMITTALS

A. Indication of the following in Shop drawings:

1. Hardie Board, Roof Parapet

1.05 QUALITY ASSURANCE

A. Delivery, storage, and handling

1. Store products in a location that will protect it from being damaged from water, sunlight, and extreme temperature.
2. Handle with hand protection and do not drag along floors or other surfaces.

1.06. WARRANTY

A. Manufactures warranty.

PART 2—PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: James Hardie

1. 231 S. LaSalle St., Suite 2000
Chicago, IL 60604
TEL: (800) 542-7343
Website: www.jameshardie.com

2.02 DOOR CONSTRUCTION Sliding Wood Doors

A. Description

1. Type: Sliding Wood door $\frac{3}{4}$ " x11' $\frac{1}{4}$ "
2. Finish: Painted wood
 5. See drawings and elevations to see profiles and dimensions

PART 3—EXECUTION

3.01-INSTALLATION

1. General-Install doors in accordance with manufacturer' s instructions
2. Assemble and secure correctly

3.02-PROTECTION

1. Allow doors to be protected to prevent damages, but normal weathering may occur.

END SECTION 07 46 26

07 54 23 THERMOPLASTIC -POLYOLEFIN ROOFING

PART 1 – GENERAL

SUMMARY

Thermoplastic polyolefin roofing is a type of roofing commonly used on commercial roofs to keep rain water from entering a structure. Single-ply membranes are manufactured from ethylene propylene rubber and available in white, gray or black. Thermoplastic polyolefin roof membrane is either fully-adhered, mechanically fastened or ballasted to a roof surface.

1.02 RELATED SECTIONS

- A. Division 07 Section Thermal Insulation- for insulation beneath the roof deck.
- B. Division 07 Section Sheet Metal Flashing and Trim- for metal roof penetration flashings, flashings, and counterflashings.

REFERENCES

A. ASTM International:

1. ASTM C920; Standard Specification for Elastomeric Joint Sealants.
2. ASTM C1193; Standard Guide for Use of Joint Sealants.
3. ASTM D882; Test Method for Tensile Properties of Thin Plastic Sheeting.
4. ASTM D1117; Standard Guide for Evaluating Non-woven Fabrics.
5. ASTM E84; Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM E96; Test Method for Water Vapor Transmission of Materials.

7. ASTM E1677; Specification for Air Retarder Material or System for Framed Building

Walls.

8. ASTM E2178; Test Method for Air Permeance of Building Materials.

B. AATCC – American Association of Textile Chemists and Colorists:

1. Test Method 127 Water Resistance: Hydrostatic Pressure Test.

C. TAPPI:

1. Test Method T-410; Grams of Paper and Paperboard (Weight per Unit Area).

2. Test Method T-460; Air Resistance (Gurley Hill Method).

PART 2 – PRODUCTS

Thermoplastic-polyolefin roofing (TPO), 60 mils, heat welded seams, fully adhered

White UltraPly TPO membranes are listed with the Cool Roof Rating Council (CRRC), and meet or exceed the new Title 24 requirements for low-slope roofing membranes.

PART 3 – EXECUTION

3.01 REQUIREMENTS

A.Slope Requirement

Positive slope required for warranty.5

B. Construction Type

New construction, complete tear-off, or recover with any wet or damaged materials removed prior to installation.

C. Building Height Limitation

Firestone UltraPly™ TPO Adhered Systems are limited to buildings 250' (76.2 m) or less.

D. Use of Air Barrier

An air barrier is required for projects with large wall openings greater than 10% of the total wall area.

E. Base Tie-Ins

Must be attached to substrates which provide a minimum of 200 lbf (1 kN) in any direction.

F. Increased Wind Speed and Codes Any wind speed coverage exceeding 55 mph (88 km/h) or projects with codes requirements must be reviewed by a Firestone Roof Systems Advisor.

INSTALLATION

A. Firestone UltraPly TPO and UltraPly TPO XR shall be installed in accordance with Firestone Building Products published installation instructions, subject to the Limitations / Conditions of Use noted herein.

B. System attachment requirements for wind load resistance are set forth in Appendix 1.

“MDP” = Maximum Design Pressure is the result of testing for wind load resistance based on allowable wind loads. Refer to FBC 1609.1.5 for determination of design wind pressures.

C. For mechanically fastened membrane systems (Type D) over profiled steel deck, membrane shall be installed running perpendicular to steel deck flutes.

D. For InvisiWeld installations, care shall be taken to ensure that the InvisiWeld Plates do not lineup with seams in the TPO membrane. This condition precludes proper induction welding of the membrane to the InvisiWeld Plates.

E. Mechanically Attached System

Firestone recommends that when installing mechanically attached membranes over steel decks, the field attachment should run perpendicular to the deck panels. If a project is Factory Mutual insured or specified, per FM 1-29 for Global Loss Prevention Data Sheets, attachment must run perpendicular.

1. Plates and Fasteners

a) Membrane Placement: Perimeter Sheets

i. Place membrane panel, unroll over the acceptable substrate and allow to relax for a minimum of 30 minutes before attaching or splicing. The Firestone UltraPly TPO Mechanically Attached Roofing Systems are installed starting at the low point of the roof using up to four sheets, determined by job requirements, that are half the width of the field panels. Ensure proper sheet overlap allowances for system roof edge details and seams, consult Firestone UltraPly TPO Lap and edge or base tie-in details.

ii. The Firestone TPO System shall be installed so that the seams shed or run parallel to the flow of water.

iii. Placement of additional rolls of membrane shall provide for overlapping the sides of the adjoining sheets 6" (152.4 mm) as marked on the top side of the membrane and overlapping

the ends of adjoining sheets a minimum of 3" (76.2 mm). For sufficient seaming overlaps of membranes, see standard lap splice details for robotic and hand welding.

iv. Note: Orient Firestone UltraPly TPO panels such that the exposed (cut) edges of the membrane are used as the bottom panel in splices whenever possible. If cut edges are exposed on the weather side, they must be sealed with Firestone UltraPly TPO Cut Edge Sealant after welding.

b) Fold the membrane back

i. After making sure the sheet is placed in its final position allowing for the proper lap width per Firestone details and specifications, fold it back evenly onto itself without wrinkles to expose the underside mating surface of the sheet.

c) Remove any dirt or debris

i. Sweep surfaces with a stiff broom to remove any debris or dirt that may have accumulated.

d) Install first perimeter panel

i. The inside edge of the half sheet(s) is attached using Firestone HD-Reel-Fast collated Seam Plates, loose bulk or HD+ Seam Plates AP, HD or HD+ Fasteners as required a minimum of 2" (50.4mm) from membrane edge.

ii. Install each fastener so that it is properly engaged in the deck and the head is flush within the countersunk portion of the Seam Plate.

iii. The first field side sheet is then heat welded to the perimeter half-sheet side and one end seam and fastened along the opposite edge. Continue this procedure for all perimeter sheets. If the slope changes direction, begin working at the lower edge of the adjoining side of the roof up the slope until reaching previous work.

iv. A half sheet is installed over a ridgeline and welded to the two panels. Refer to Firestone details.

e) Position First Field Panel

i. Roll out the first field panel and position the panel along the laying line of the perimeter panel that has been attached. Heat weld the lap in accordance with Firestone details.

ii. Layout Firestone Seam Plate and fasteners, as required in the Wind Design Section of this manual and lap splice details.

f) Install fasteners

i. Install each fastener so that it is properly engaged in the deck and the head is flush within the countersunk portion of the Seam Plate.


g) Position Subsequent Field Panels

i. Roll out and position subsequent field membrane sheets in the same manner, overlapping the sides of the adjoining sheets 6" (152.4 mm) as marked on the top side of the membrane and overlapping the ends of adjoining sheets a minimum of 3" (76.2 mm). Heat weld lap to previously anchored panel prior to fastening in place.

h) Splice the lap

i. If membrane has been open for more than 12 hours or become contaminated with dirt, debris, moisture, wash seam surfaces at least 6" wide with Splice Wash SW-100 and allow to dry.

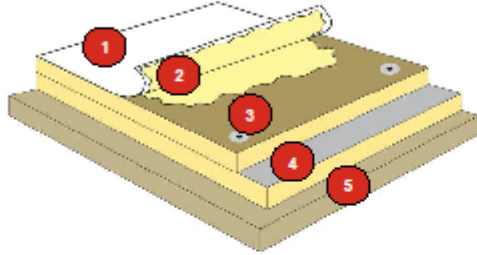
ii. Splice the laps with hot air weld as specified and refer to UT-LS details



UltraPly™ TPO Membrane

Fully Adhered, Wood Deck

30 Year
Red Shield Platinum™
Warranty



1. Firestone UltraPly™ Platinum™ TPO Membrane
2. Fully Adhered with Bonding Adhesive
3. Mechanically Attached or Adhered Cover Board (Optional for Platinum P, Required for Platinum PH and Platinum PHW)
4. Mechanically Attached or Adhered Insulation
5. Wood Deck

Consult Firestone Technical Specifications, Guides and Details at www.firestonebpc.com

Slope Requirement
Positive slope required for warranty.⁵

Construction Type
New construction or complete tear-off down to a sound structural deck.

Building Height Limitation
Firestone UltraPly™ TPO Adhered Systems are limited to buildings 250' (76.2 m) or less.

Use of Air Barrier
An air barrier is required for projects with large wall openings greater than 10% of the total wall area.

Base Tie-Ins
Must be attached to substrates which provide a minimum of 200 lbf (1 kN) in any direction.

Increased Wind Speed and Codes
Any wind speed coverage exceeding 55 mph (88 km/h) or projects with codes requirements must be reviewed by a Firestone Roof Systems Advisor.

Deck Requirement

- Minimum 1/2" Plywood
- Minimum 7/16" OSB

Fastener Type

- Firestone All Purpose Fastener
- Firestone Heavy Duty Fastener
- Firestone HallGuard™ Fastener (with HallGuard Composite Board or OSB only)

Insulation Adhesive*

- Firestone I.S.O. Twin Pack™ Insulation Adhesive
- Firestone I.S.O. Spray™ S Insulation Adhesive
- Firestone I.S.O. Fix™ II Insulation Adhesive
- Firestone I.S.O. Stick™ Insulation Adhesive

*Note: Max. 4' x 4' boards must be used when attaching insulation with adhesives.

Adhesive Attachment

- Bead Spacing: F: 12", P: 6", C: 4"
- Full Application (I.S.O. Spray S Insulation Adhesive)

Membrane Requirement

- UltraPly Platinum™ TPO, 0.080"
- ReflexEON Platinum™ TPO, 0.080"

Seaming Requirement
Firestone 5" WideWeid™ System OR 1.5" Single Weld System (use robot welder) stripped-in with 8" UltraPly TPO Cover Strip or UltraPly TPO QuickSeam™ Flashing. Joint covers are required at all joints and at angle changes 1:12 or greater.

Firestone Membrane Adhesive

- UltraPly Bonding Adhesive
- Single-Ply LVOC Bonding Adhesive
- Single-Ply LVOC Bonding Adhesive 1168

Edge Metal System

- Firestone EdgeGuard™ System
- Firestone AnchorGard™ System
- Firestone Coping System

Insulation Fastener and Insulation Plate Attachment Rates – Field Rates for Standard 55 mph Wind Speed

Insulation (Top Layer)	4' x 8'	Coverboard (Optional for Platinum P, Required for Platinum PH and PHW)	
		4' x 8'	4' x 8'
1.0" to 1.4" Firestone ISO 95+™ GL or RESISTA™ Insulation	16	Firestone ISOGARD™ HD Cover Board	16
1.5" to 1.9" Firestone ISO 95+ GL or RESISTA Insulation	16	1/4" SECUROCK® Gypsum-Fiber or DensDeck® I (Prime)	16 16/(16)
2.0" to 4.0" Firestone ISO 95+ GL or RESISTA Insulation	16	1/2" SECUROCK Gypsum-Fiber or DensDeck I (Prime)	16 16/(16)
Min. 1.5" Firestone HallGuard™ Composite Board	16	5/8" SECUROCK Gypsum-Fiber or DensDeck I (Prime)	16 16/(16)
Firestone ISOGARD™ HD Composite Board	16		

Detail Description

Wall Terminations:	Firestone Termination Bar with AP Sealant applied along the caulk lip. Surface mounted or inserted counter flashing may also be used in accordance with current Firestone 30 year details.
Curb & Wall Flashings:	Curbs, walls, and expansion joints must be anchored with appropriate base tie-in detail, using HD Seam Plates and HD Fasteners. Curbs and walls must be flashed using a minimum 0.060" UltraPly TPO Membrane, or UltraPly TPO 18" Curb Flashing, per Firestone 30 year details. Flashings may be sealed with welded details only. Details may include UltraPly TPO Coated Metal.
Corners:	UltraPly TPO Inside/Outside Corners, per current Firestone 30 year details.
Roof Edges/Parapets:	Firestone AnchorGard™ or EdgeGard™ Fasola or Drain Bar systems. ANSI/SPRI ES-1 rated edge metal may also be used / Firestone Coping System or UltraPly TPO Coated Metal. Complete per Firestone 30 year details.
Penetrations:	Flash with UltraPly Pipe Flashing (weldable), UltraPly TPO Penetration Pocket, or UltraPly TPO Unsupported Flashing, per current Firestone 30 year details.

Notes:

1. Only Firestone brand products are covered in a Red Shield warranty.
2. Refer to the Firestone Technical Database at www.firestonebpc.com for additional information regarding UltraPly TPO Roof Systems.
3. Refer to the Firestone RoofGenuity™ tool to create roof assemblies with high-performance Firestone products at www.DensDeck.com
4. DensDeck is a registered trademark of Georgia-Pacific Gypsum LLC.
5. It is the installing contractor's responsibility to follow applicable building codes.
6. SECUROCK is a registered trademark of USG Corporation.

QS-TPO-205

Firestone Building Products Company, LLC
250 West 96th Street • Indianapolis, IN 46260
Technical: 1-800-428-4511 • Sales: 1-800-428-4442 • www.firestonebpc.com

Rev. 3/29/2013

END SECTION 07 54 23

07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

- A. All of the contract documents, including general and supplementary conditions and division 1 specification sections, apply to the work of this section.
- B. Examine all drawings and all other sections of the specifications for requirements therein affecting the work of this section.
- C. Coordinate work with that of all other trades affecting or affected by work of this section. Cooperate with such trades to assure the steady progress of all work under the contract.

1.02 DESCRIPTION OF WORK

- A. The work of this section shall include, but not be limited to, the following:
 - 1. Custom profiles: shop-fabricated architectural zinc flashing & trim profiles utilized for [steep-slope, mid-slope, low-slope, vegetated] roof-edge metal, custom roof drainage, custom metal roofing accents, exposed wall flashings, exterior ornaments & other miscellaneous architectural metal details as indicated on the drawings including but not limited to coping, cornice, fascia, soffit, etc. Custom metal fabrications shall include all accessories for a weatherproof installation. Although custom profiles described here are not typically tested (wind or fire resistance), they may provide acceptable performance based on sound design & installation practices.
 - 2. Prefabricated profiles (system partner): architectural zinc products (profiles) & systems fabricated from sheet/coil material produced by the zinc manufacturer. Available in standard shapes & sizes, system partners offering zinc profiles shall satisfy the architectural design

intent and performance criteria unless otherwise approved by the architect. Single-source fabricator/ system partner to provide prefabricated profiles & component parts for undivided responsibility. Available prefabricated profiles include but not limited to: [coping, fascia, soffit, cornice, ornaments, gutter, downspout, ridge cap, etc.] As indicated on the drawings.

3. Prefabricated profiles (zinc manufacturer): architectural zinc products (profiles) & systems fabricated by the zinc (sheet/coil) manufacturer.

. Concealed sheet metal flashing integral with masonry & other wall cladding/ rainscreen wall construction as indicated on the drawings or required for a weathertight installation. Concealed flashing profiles to be fabricated from stainless steel.]

5. Interior architectural sheet metal trim as indicated on the drawings.

B. Related sections:

1. Section 06 10 00 – rough carpentry

2. Section 07 21 00 – building insulation

3. Section 07 26 50 – air and vapor barrier membrane

1.03 REFERENCES

1. Architectural zinc [titanium-zinc alloy] material standards: ASTM b69-13 – types 1 and 2 – standard specification for architectural rolled zinc sheet & coil; DIN EN 988.

2. Stainless steel alloy material standards: ASTM a167-99 & a240. Type [304, 316, 316L].

3. Architectural zinc design guidelines (handling, fabrication, & installation issues specific to

zinc): RHEINZINK div. 7 binder; 5th edition.

SMACNA – Architectural Sheet Metal Manual; 7th edition; chapters 2, 3, and 4 as a

minimum standard or these specification and details where they exceed (subordinate to architectural zinc guidelines).

Manufacturing quality control: ISO 9001 (quality management) & ISO 14001

(environmental management).

6. Ecological footprint: ISO 14025, type iii – Environmental Product Declaration (EPD), cradle – gate environmental impact analysis of zinc sheet intended for roof, façade, gutter & other exterior building applications. Comprehensive report including: life-cycle analysis (ISO 14040), end of life use, Primary Energy Concentration (embodied energy), Global Warming Potential (GWP) and evidence of expected atmospheric corrosion and surface loss (erosion).

7. IZA - International Zinc Association: research publications addressing Life Cycle Assessment (LCA) & sustainability issues.

8. MBDC Cradle to Cradle Certification.

9. Names of the applicable building codes or other authorities having jurisdiction:

10. As all documents are intended to be complementary, in the event of contradiction in the references, the RHEINZINK division 7 binder (latest edition) will govern.

1.04 SUBMITTALS

A. Provide product data sheet for architectural zinc [titanium-zinc] material including zinc rolling mill name, quality control (including ASTM & ISO standards), physical properties, intended uses, and storage & handling requirements.

- B. Environmental Product Declaration (EPD): ISO 14025 verification of completion at time of bid. Short-form epd for verification (long-form e-document as requested by architect).
- C. LEED submittals including: recycled content (post-industrial & post-consumer), local products (location of primary fabrication).
- D. Material samples: submit 3" x 4" [prepatina bright-rolled, prepatina blue-grey, prepatina graphite-grey] samples of each zinc-alloy [& prepatina surface color] included in the finished work.
- E. Shop drawings: indicate location of all fabricated sheet metal flashing & trim shapes on [roof, soffit/ reflected] plans and [exterior wall, interior wall] elevations included in the work. Include detail of profile attachment (thru-fastened or indirect/clipped), terminations, joints, corners, supports, anchorage points/ slot locations, cleats, hooks/ hems/ edge conditions, closures, and special details. Provide anticipated profile dimensions & bend angles for all critical sheet metal profiles when required by the architect. Indicate profiles that are "custom fabricated" and those that are "prefabricated" profiles.
1. Provide sheet metal flashing & trim details required by drawings & associated [roof, façade] installation. Show all shop fabricated sheet metal fabrications including seam pattern/ alignment, seam configuration and dimensions.
 2. Indicate metal type, thickness, surface finish [prepatina], & zinc alloy for all sheet metal profiles.
 3. Show all accessory products to be provided including but not limited to: waterproof underlayment, ventilation mat, slip sheet, mechanical fasteners, vhb tape, clips, sealant, & sealant tape.

4. Details for joining and securing sheet metal components, including layout, number of fasteners, clip spacing, & soldered connections.
 5. Detail of expansion provisions including sliding joints, use of clips/ prepunched slotted holes, anticipated direction(s) of movement, maximum allowable movement, and fixed-point location.
 6. Details of [roof, wall] penetration flashing such as vents, skylights, chimneys, dormers, doors, windows, louvers, and special conditions.
 7. Details of coordinated trades: provide flashing details for integrating mechanical, electrical and plumbing conditions.
 8. Show all concealed cleats (keepers) and clip material, size, & gauge. Design attachment for roof edge flashing to meet ansi/spri es-1 standard.
 9. Termination details of connections to adjoining work.
- F. Profile samples: when further shop drawing clarification is required by architect, provide 12" min. Fabricated profile (full width).
- G. Mock-up: as required by architect, provide architectural zinc flashing & trim profiles required by other [roof, wall] panel assemblies specified (in other sections). Maximum total mockup size to be 10' x 10' .
- H. Engineering calculations: as required by local building code or by the architect, provide prefabricated sheet metal flashing & trim profiles by system partners capable of supplying completed test data prior to the bid date. Where testing data is not available, provide sheet metal flashing & trim attachment schedule that meets the uplift requirements provided herein or as indicated on the drawings. Provide engineering calculations signed & stamped by a structural engineer certifying wind-uplift resistance [xx psf] of exposed architectural sheet metal work.

1.05 QUALITY ASSURANCE

- A. Fabricator qualifications: zinc flashing & trim fabricator to have minimum of 5 years experience fabricating architectural zinc or similar metals (anodized aluminum or copper) and must be trained by the zinc-alloy manufacturer. Architectural zinc fabrication & application training program to be directed by the zinc rolling-mill (or third-party reseller).
- B. Installer qualifications: installer shall have completed training provided by the zinc rolling mill [or third-party reseller]. Installers new to architectural rolled zinc applications shall have prior work experience using aluminum, copper, & other natural weathering non-ferrous metals.
- C. Product source: provide sheet metal flashing & trim which are produced by one manufacturer. Provide accessory materials (fasteners, clips, etc.) Which are compatible to the zinc manufacturer. Award installation of zinc flashing & trim including [weather barrier, waterproof underlayment] and ventilation mat to a single firm for undivided responsibility.
- D. Industry standard: except as otherwise shown or specified, comply with applicable recommendations and details of the rheinzink division 7 binder (latest edition) and smacna architectural sheet metal manual, 6th edition. Conform to dimensions and profiles shown or as approved on shop drawing submittal.
- E. Field measurements: prior to fabrication of sheet metal flashing & trim, compare architectural drawings, approved shop drawings, and actual field measurements of substrates to receive sheet metal flashing & trim. Make necessary minor adjustments to satisfy design intent and functional performance. Notify contractor of any major discrepancies to structure and substrate that deviate from the original intent of the architect.
- F. Pre-installation conference: as needed for field coordination and required by the architect, convene an installation conference to include the architect, general contractor, [masonry contractor, wall cladding contractors, roofing contractor], and architectural sheet

metal installer in order to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work. Notify local sales manager employed by rolled zinc manufacturer one week prior to meeting date.

1. Review methods and procedures for installation including, but not limited to: substrates, sub framing, penetrations and other preparatory work.
 2. Review drawings, specifications, submittals and other contract documents.
 3. Review construction schedule verifying availability of all materials, personnel and equipment needed to proceed and avoid delays. Verify that all masonry cleaning will be completed in the immediate area that would adversely impact the installed architectural zinc sheet metal.
 4. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including cold temperatures.
- G. Mock-up: as determined to be helpful by the architect, provide sheet metal flashing & trim cladding for exterior wall & roof conditions. Incorporate materials and methods of fabrication and installation identical with project requirements. Install mock-up at roof & façade location directed by architect. Retain accepted mock-up as quality standard for acceptance of completed metal facade. If accepted, mock-up may be incorporated as part of the finished work.
1. Provide mock-up of sufficient size and scope to show typical pattern of [standing] seams, panel width, edge construction, and finish color.
 2. Extent of the mock-up that is to be included in the final work as indicated on the drawings.
 3. Obtain architect' s written approval of mock-ups prior to proceeding with final installation.

- H. Soldering: in accordance with instructions provided by manufacturer of architectural rolled zinc.
- I. Corrosion control: avoid direct contact of incompatible materials including but not limited to copper, red rosin paper, wet concrete & mortar, masonry cleaning solutions, & de-icing materials.

1.06 PERFORMANCE REQUIREMENTS

- A. Design wall assembly to conform to the requirements of the building code.
- B. Install sheet metal flashing & trim and underlayment materials shingle fashion to avoid trapping of water. Flashing to divert all moisture infiltration to the building exterior.
- C. Wind load: as required by local code and the contract documents, design and engineer sheet metal flashing & trim, including size, spacing, & quality of mechanical fasteners & clips, and meeting requirements established by engineering calculations and local building codes.
- D. Thermal movement: provide zinc profiles and detail connections which allow for thermal movement of the metal resulting from ambient temperature range of 120 · f. Individual zinc flashing & trim profiles shall have a fixing point zone (typically 36 inches) as needed to allow thermal movement of the zinc profiles.
- E. Structural performance: provide zinc flashing, trim, anchors and attachments, which resist loads as required by code [and as documented in engineering requirements] without permanent deflection or deformation.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver all sheet, coil, and prefabricated zinc profiles unopened factory labeled packages. Protect materials from damage at all times. Rolled zinc to be transported according to manufacturer' s recommendations.
- B. Store and handle in strict compliance with manufacturer' s instructions and recommendations.
 - 1. Protect zinc flashing & trim to the greatest extent possible. Store in covered shelter when possible minimizing exterior exposure until installation time. Stack materials on platforms or pallets, covered with tarpaulins or other suitable ventilated weatherproof covering. Slope cover & pallets to shed moisture. Allow for free airflow around covered material to exchange outside air.
 - 2. All personnel to wear clean white cotton gloves when handling zinc flashing & trim profiles when no strippable film is present.
 - 3. Do not store zinc profiles in contact with or below materials that might cause staining, denting, or other surface damage.
 - 4. Store zinc profiles so that they will not accumulate water or excess moisture.
- C. Exercise care in unloading, storing, and erecting zinc flashing & trim to prevent bending, warping, or surface damage.
- D. Sequence deliveries to avoid delays, but minimize on-site storage.

1.08 WARRANTY

- A. Material only warranty: provide 10-year limited warranty for titanium-zinc alloy from original rolling mill manufacturer. Warranty to cover the material quality of the sheet/ coil material used to fabricate sheet metal flashing & trim profiles appropriate for zinc installation.

B. Fabrication warranty: provide 2-year fabrication warranty against sharp bends that fracture the metal, tears, and equipment induced damage to the architectural zinc sheet or coil.

C. Installation warranty: provide 3-year guaranty covering the proper material or product application preventing failure due to hot-water corrosion, damage due to inappropriate slip sheet, absorptive separation material, or other installer induced failure.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Architectural rolled zinc manufacturers: subject to compliance with requirements, manufacturers of rolled-zinc sheet & coil used to fabricate custom flashing & trim profiles & prefabricated flashing & trim profiles used for exposed exterior building applications include:

1. RHEINZINK America, inc. (basis-of-design)

Woburn, ma 01801 ph: (781) 729.0812 www.rheinzink.us

B. Rolled zinc alloy sheet/coil:

1. Titanium-zinc alloy containing approximately 99% electrolytic shg zinc (with 99.995% degree of purity) with additives of copper (0.08% - 1.0%), titanium (0.07% - 0.12%), and aluminum (0.001% - 0.015%) in accordance with astm b69-13, type 1 and type 2 (containing higher copper content).

Manufactured surface aesthetic:

A. Prepatina rolled zinc produced by submerging rolled zinc alloy in acid solution (etching/ pickling process) without the use of phosphates or pigmented color coatings.

1. Rheinzink prepatina blue-grey (ppbg), astm b69 -13, type 1
 2. Rheinzink prepatina graphite grey (ppgg), astm b69 -13, type 2 (dark rheinzink)
- B. Prepatina rolled zinc with backside colored paint coating designed to provide a protective barrier against occasional water exposure for applications with limited air changes behind the profile. Note: backside coating is not intended to replace a capillary break, ventilation mat, or “zinc considerate” design.
1. RHEINZINK Ppbg Proroofting, ASTM b69 -13, type 1
 2. RHEINZINK Ppgg Proroofting, ASTM b69 -13, type 2
- C. [prepatina bright rolled zinc, shiny surface without preweathered treatment:
1. Rheinzink prepatina bright rolled (PPBR), ASTM b69 – 13, type 1]
 2. Minimum zinc sheet thickness based on profile’ s primary face dimension:
 - a. 0.7mm (24 ga.) [for face width < 8”]
 - b. 0.8 mm (22 ga.) [for face width < 12”]
 - c. 1.0 mm (20 ga.) [for face width < 18”]
 3. Minimum flashing thickness: 0.7 mm (24 ga.) [0.8 mm (22 ga.)] Or as required to minimize oil-canning & provide acceptable wind resistance.
- D. Zinc flashing & trim fabricator or system manufacturer:
1. Local/ regional sheet metal fabrication shop

- a. Select zinc flashing & trim fabricator that has appropriate zinc-friendly equipment and personnel trained by the zinc rolling mill capable of producing quality zinc flashing & trim profiles.
- b. Contractor may elect to purchase prefabricated zinc flashing & trim profiles as fabricated by an approved rheinzink fabricator or system partner.
- c. Stainless steel sheet: provide stainless steel type 304 with 2b finish for concealed sheet metal applications including: [masonry receiver & thru-wall] flashing, holddown cleats, and concealed clips. Use appropriate gauge metal [24 ga., 26 ga., 28 ga.] As required for structural performance of the zinc flashing & trim profile.

2.02 ACCESSORIES

- A. Provide all components necessary for a complete, functional, weatherproof assembly including, but not limited to, trims, copings, fascias, sills, flashings, counter flashings, door frame trim, corner units, clips, wall caps, copings, sealants, closures and fillers. Metal materials shall match panels and be zinc compatible.
- B. Clips & fasteners: provide stainless steel concealed clips and stainless steel fasteners; supplied in accordance with manufacturer's recommendations and to meet the load requirements as specified by architect and confirmed by engineering calculations. Attachment clips shall permit expansion and contraction of the panel system throughout the specified temperature range. When permeable air barrier sheets are used and as required by the architect to resist liquid water penetration at the fastener penetration, provide fasteners with watertight washer gaskets (such as self-adhered membrane).
- C. Solder: lead-tin solder containing 50% tin and 50% lead in accordance with astm b32 – 08 or lead-free solder. Flux: felder zd-pro or equal.

- D. Self-adhered waterproof underlayment: non-permeable self-adhering, high-temperature composite, butyl rubber-based, polyethylene-backed membrane including grace vycor ultra, or other high-temperature unreinforced rubberized-asphalt self-adhered membrane.
- E. Permeable underlayment: permeable breather type underlayment membrane: roofshield or wallshield as manufactured by vaproshield or a.proctor group (note fastener gasket requirement) or equal accepted by zinc manufacturer.
- F. Air barrier underlayment: vapor permeable sheet underlayment: tyvek commercial wrap with taped seams or equal (note fastener gasket requirement) or equal accepted by zinc manufacturer.
- G. Synthetic underlayment: high tear strength non-bituminous felt (no asphalt felt) produced from polypropylene/ polyethylene fibers such as grace tri-flex 30 or equal accepted by zinc manufacturer (note fastener gasket requirement).
- H. Ventilation mat/ capillary break/ slip sheet: entangled nylon filaments creating a drainage space/ ventilation cavity to allow air movement and the possibility for liquid water or water vapor to escape. Provide enkamat 7010 by bonar or air-z by rheinzink. Note: use of red rosin paper or other moisture-holding material as a slip sheet is not acceptable.

2.03 PROFILE FABRICATION

- A. General: fabricate zinc flashing & trim in a heated shop and when metal temperature is 50 degrees f. Comply with minimum "soft" bend requirements based on metal thickness (min. Bending radius to be 1.5 times metal thickness). Provide details as shown provided they do not interfere with functional performance of the zinc. Comply with recommendations found in rheinzink "applications in architecture" , 2nd updated edition, smacna

“architectural sheet metal manual” , 6th edition, and rheinzink division 7 binder (most recent update). Apply all zinc-specific recommendations to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate zinc flashing & trim to greatest extent possible in interior shop environment.

B. Fabricate zinc flashing & trim to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.

1. Lay out sheet metal flashing & trim work so cross seams, when required, are made in direction of flow with higher profile overlapping lower profile. Stagger cross seams when aesthetics are critical.

2. Form and fabricate sheets, seams, strips, cleats, edge treatments, integral flashing, and other components of zinc flashing & trim to profiles, patterns, and drainage arrangements shown and as required to resist water infiltration without excessive use of sealants (dry joints) while also allowing any water infiltration behind the wall panels to weep out.

C. Expansion provisions: where lapped or bayonet-type expansion provisions in the work cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with non-acidic sealant (concealed within joints).

D. Separating dissimilar products: provide permanent separation materials on concealed profile surfaces where zinc profile would otherwise be in direct contact with substrate materials that are non-compatible or could result in corrosion or deterioration.

PART 3 – EXECUTION

3.01 INSPECTION

1. Contractor shall inspect all surfaces, areas and other contingent construction in or to which his work is to be installed and insure himself that they are in proper condition to receive the work to be performed under this section.
2. Verify that sheathing surfaces are sound, dry, properly secured and that provision has been made for flashings, anchorage, and all other interface items attaching to or penetrating through the work of this section has been completed.
3. The contractor shall notify the architect in writing, before any work is installed, of any condition requiring correction. Failure to make such a report shall be construed as acceptance of the existing conditions and the responsibility to provide an acceptable installation.

3.02 PREPARATION

- A. Verify field dimensions before fabrication. Notify architect of any discrepancies between field measurements and dimensions indicated in construction documents.
- B. Underlayments: identify locations to receive various types of self-adhered, mechanically attached, & loose laid underlayment materials. Ensure substrate is clean & dry prior to proceeding. Provide substrate primer as required for cold weather application. Place [air barrier, permeable underlayment, waterproof] membrane on substrate surfaces to receive sheet metal flashing & trim. Conceal underlayment fasteners with side and head laps to greatest extent possible. Comply with manufacturer' s instructions.
 1. Coordinate installation of underlayment with [roof, wall] material or product manufacturer so that sheet metal flashing, & trim will provide a weatherproof, secure and durable installation.

2. Provide underlayment end and side laps as recommended by underlayment manufacturer' s instructions for proper attachment, seaming, and termination recommendations.
 3. Use cap nails or screws with rubber gaskets (do not use staples)
- C. For breather-type permeable /air barrier membranes, consult the architect for strategies preventing infiltration through fastener holes by applying sealant to backside of clips.

3.03 INSTALLATION

A. Rolled zinc manufacturer' s recommendations: except as otherwise shown or specified, comply with recommendations and instructions of manufacturer of sheet metal being fabricated and installed.

1. Do not install in inclement weather or over a damp substrate.
2. Use screws rather than nails to greatest extent possible
3. Provide ventilation mat under zinc flashing & trim whenever possible without interfering with the primary [roof, wall] cladding material. When slope of zinc flashing & trim is greater than 30%, backside coating alone is acceptable. For slopes over 50%, no backside coating is required. If covering of zinc flashing is required, take extra precautions to ensure long-term waterproof seal over the zinc.

B. Install work to be truly straight and square or conform to curvilinear geometry indicated on drawings.

1. Fabricate and install work with lines and corners of exposed units true and accurate.

2. Form exposed faces free of buckles, excessive waves, and avoidable tool marks considering temper and reflectivity of metal.
 3. Shim and align zinc flashing & trim within installed tolerance of $\frac{1}{4}$ inch in 20' $-0''$
 4. All seams shall be of uniform appearance and dimensions, straight and level with minimum exposure of solder.
 5. Except as otherwise shown, fold back sheet metal to form an open hem (water check) on concealed side of exposed edges.
 6. Form all seams to be weatherproof, leaving room for expansion and contraction with specified and required tolerances.
 7. Comply with rheinzink rheinzink division 7 binder (latest edition); and smacna architectural sheet metal manual for flashings and sheet metal work.
- C. Conceal fasteners and expansion provision where possible in exposed work, and locate so as to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- D. Provide work as indicated on approved shop drawings
1. Form and fabricate sheets, seams, strips, cleats, edge treatments, integral flashings, and other components of metal wall cladding to profiles, patterns, and drainage arrangements shown and as required for water shedding construction. Ensure that all shop & field fabricated bends have an acceptable "rounded" or radius bend. No sharp breaks.
- E. Separate non-compatible materials with a rubberized asphalt underlayment.
- F. Install work to meet specified performance requirements.

3.04 CLEANING AND PROTECTION

- A. Remove protective film (if any) from zinc panel surfaces promptly upon installation (or prior if film covers any concealed seam areas) with care to avoid damage to finish.
- B. Clean exposed metal surfaces of substances that would interfere with uniform oxidation and weathering and as recommended by panel manufacturer and maintain in a clean condition during construction. Use wd-40 applied to a clean cloth and apply pressure to remove contaminated surface. Never apply cleaner directly to zinc surface.
- C. Ensure that cleaning by other trades working in proximity to zinc installation is in accordance with the recommendations of the zinc manufacturer.
- D. Damaged units: replace panels and other components of the work that have been damaged or have deteriorated beyond successful repair by means of finish touch-up or similar minor repair.

3.05 RECYCLING

- A. Collect all zinc drop-offs (scrap) and return to local scrap metal recycling facility for current market monetary return.

3.06 CLEAN-UP

- A. During the progress of the work, keep premises clear of debris resulting from these operations and remove surplus and waste materials from the site as soon as possible.
- B. Upon completion of the work, contractor shall remove from the site all equipment and materials used on the work as well as any debris resulting from the operations.

END OF SECTION 07 62 00

07 71 23 MANUFACTURED GUTTERS AND DOWNSPOUTS

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. RHEINZINK Zinc Sheathed Hanger gutters and downspouts.

1.02 RELATED SECTIONS

- A. Section 07 62 00 - Sheet Metal Flashing and Trim.

1.03 DESIGN REQUIREMENTS

- A. Reference RHEINZINK-Gutter Systems Brochure

- 1. Gutter Installation Instructions Brochure 104655-RZ-USA.000.03.06

- B. Conform to SMACNA - Architectural Sheet Metal Manual; 7th Edition for sizing components for rainfall intensity determined by a storm occurrence of 1 in years and as required by local building code.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

- B. Shop Drawings: Provide roof plan and roof eave wall sections. Indicate perimeter drain upstand locations, plug-in outlet and downspout locations, configurations, jointing methods, fastening methods, special component locations and installation details.

C. Samples: Submit one zinc sheathed bracket, one gutter, and one downspout sample, each 12" long where applicable, illustrating component design, finish, color, size, and configuration.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Stack material restrained vertically. Prevent twisting, bending, or abrasion. Keep dry and provide ventilation.

B. Prevent contact with materials during storage and installation which may cause discoloration, staining or damage.

1.06 PROJECT CONDITIONS

A. Coordinate the work with perimeter drain tile upstand pipe location.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Gutters and Downspouts:

1. RHEINZINK (5" or 6") Preweathered Half-round Gutter System with zinc sheathed gutter

hangers.

2. RHEINZINK (3-1/8" or 4") round downspouts. Standard downspout profile to be smooth (without corrugations) with expanded hub ends for clean, tight, friction fit connections.

2. Titanium Zinc Alloy: RHEINZINK 99.995% pure electrolytic high-grade zinc alloyed with titanium and copper in accordance with ASTM B69-13-Type 1 and Type 2.
3. Surface: Standard Preweathered RHEINZINK (Blue Gray or Graphite Gray) "Pro" coated material for gutters, downspouts and prefabricated accessories unless noted otherwise.
4. Substitutions: Not permitted.

2.02 COMPONENTS

- A. RHEINZINK Gutters: (5" or 6") Half-round Profile as indicated on drawings.
- B. RHEINZINK Downspouts: (3-1/8" or 4") smooth plain round profile to fit corresponding gutter size. All downspouts, elbows, offsets and downspout accessories must be high frequency welded.
- C. RHEINZINK Plug in Outlets: Funnel inlets at transition between half-round gutter and downspouts.
- D. RHEINZINK Smooth Round Elbows (60° or 72°) without corrugations.
- E. RHEINZINK prefabricated roof drainage accessories:
 1. RHEINZINK Leaf Collector and Rainwater Diverter (3-1/8" or 4")
 2. RHEINZINK Rainwater Collector w/ Garden Hose Connector (3-1/8" or 4")
 3. RHEINZINK 90° Miters: Preformed seamless, inside corner & outside corner (5" or 6")

4. RHEINZINK Half-round Leaf Guard (5" or 6")
 5. RHEINZINK Half-round gutter expansion joint (5" or 6")
 6. RHEINZINK Leader Head (w/ 3-1/8" or 4" round outlet)
 7. RHEINZINK Gutter End Caps (5" or 6")
 8. RHEINZINK Spherical End Caps (5" or 6")
 9. RHEINZINK Drain Tile Extension (3-1/8" or 4")
 10. RHEINZINK Offset (3-1/8" or 4")
 11. RHEINZINK Wire Strainer
- F. Anchors and Supports: Sized to suit gutters and downspouts.
1. Anchoring Devices: In accordance with RHEINZINK and SMACNA requirements.
 2. Gutter Supports: RHEINZINK sheathed gutter hangers.
 3. Downspout Supports: Prefabricated two piece RHEINZINK Downspout Brackets or
RHEINZINK Hidden Downspout Hangers.
- G. Fasteners:
1. Galvanized steel or stainless steel wood screws for attaching zinc sheathed gutter hangers.
 2. RHEINZINK galvanized steel lag bolt for Hidden Downspout Hangers

2.03 ACCESSORIES

- A. Solder: 50-50 (lead-tin) low antimony solder.
- B. Soldering Flux: ZD-pro by Felder

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify existing conditions before starting work. Notify General Contractor of any conditions unsuitable for gutter installation.
- B. Examine fascia board to ensure that substrate alignment is straight, level, & plumb and adequate for fastening to transfer structural loads. Determine if sloped gutter installation is required. Otherwise, provide level or minimal pitch to drain (1/16" per foot) unless otherwise directed by General Contractor.

3.02 GUTTER and OUTLET INSTALLATION

- A. Insert gutter into zinc clad gutter hanger and mark the height of the back of the gutter on the hanger. This hanger will be used for the highest point of the gutter. Similarly mark all hangers that will be used to locate the high and low points of the gutter run.
- B. On the low point hangers put a mark above the first mark to establish the amount of pitch that is to be used (1/4" in 10') to the outlet locations on the gutter run.
- C. Bend high and low point hangers to the pitch of the roof with the gutter hanger bender at appropriate locations on each hanger's attachment strap.
- D. Attach bent hangers to roof substrate at appropriate locations for the high and low points of the gutter run. Wrap a brick layers line 1/4" below the front of the hanger, pull tight

and connect similarly to the remaining hangers. Wrap the brick layers line around the center of the hanger pull tight and connect similarly to the remaining hangers to establish a guideline for intermediate hanger placement.

E. Hold each remaining intermediate hanger up to the line at the appropriate points, and with a pencil laying flat on the roof, mark the back of the hanger. Transfer the line to the front of the hanger and then bend it and install it, minding that when finished the hanger should just be touching the line.

F. Attach remaining intermediate hangers in the same manner to the roof substrate with appropriate fasteners at spacing not to exceed 36" O.C. or as determined by project gutter load requirements.

G. Place half-round gutter into hangers and bend attachment clips to secure gutter. Solder additional sections of half-round gutter up to maximum 49' of straight runs. Provide expansion capability within 25' of restrained end caps or inside or outside miters.

3.03 DOWNSPOUT INSTALLATION

A. Attach elbows beginning at gutter plug-in outlet. Friction fit connections without use of rivets, screws, solder, sealant, or adhesive. Install hanger at offset elbow at wall if concealed hanger is used, otherwise shim clamp below expanded portion of topmost downspout run using half bead. Install all hangers at same height on building. Vary heights at grade location only. Use continuous long lengths. For partial downspout sections, utilize downspout expanding tool attachment with electric drill to form female hub connection.

B. Connect downspouts to perimeter drains and storm sewer system where applicable.

C. For surface drainage, install prefabricated elbow 6" above finish grade for splash block installation by landscape contractor.

3.04 ACCESSORIES INSTALLATION

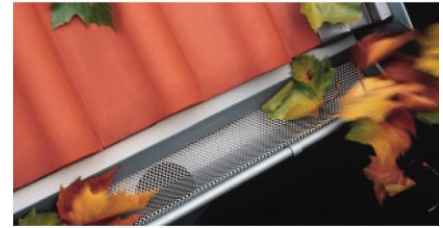
- A. Provide leaf guard accessories to gutter systems as loose fit installations.
- B. Provide leaf collector to downspouts on main runs connected to perimeter drains with clean-out height at 4' 0" above grade or to fit rain barrel height.
- C. Provide Rainwater diverter to accommodate remote rain barrel location where specified.

3.05 RECYCLING

- A. Collect, store and return RHEINZINK scraps to local metal recycler.



Fig. 33: Private Residence - USA



RHEINZINK Leaf Guard



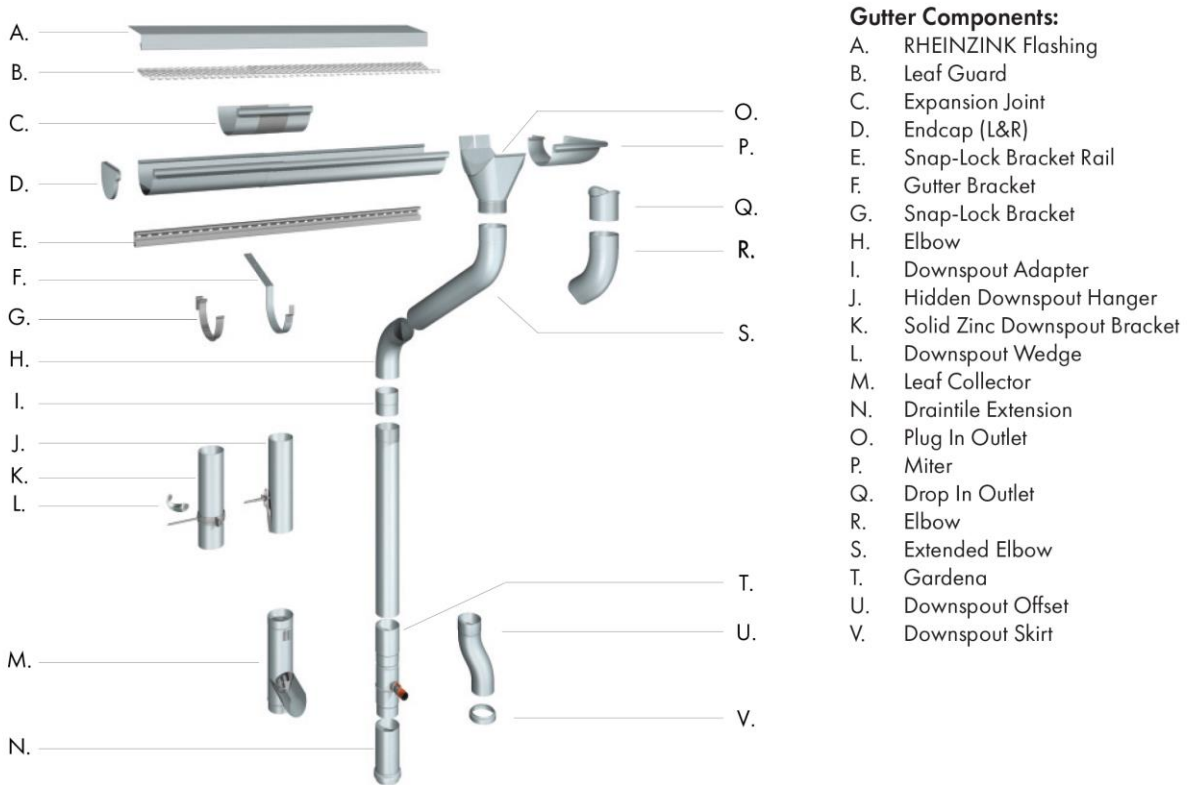
RHEINZINK Snap-Lock Bracket

RHEINZINK Gutter Systems

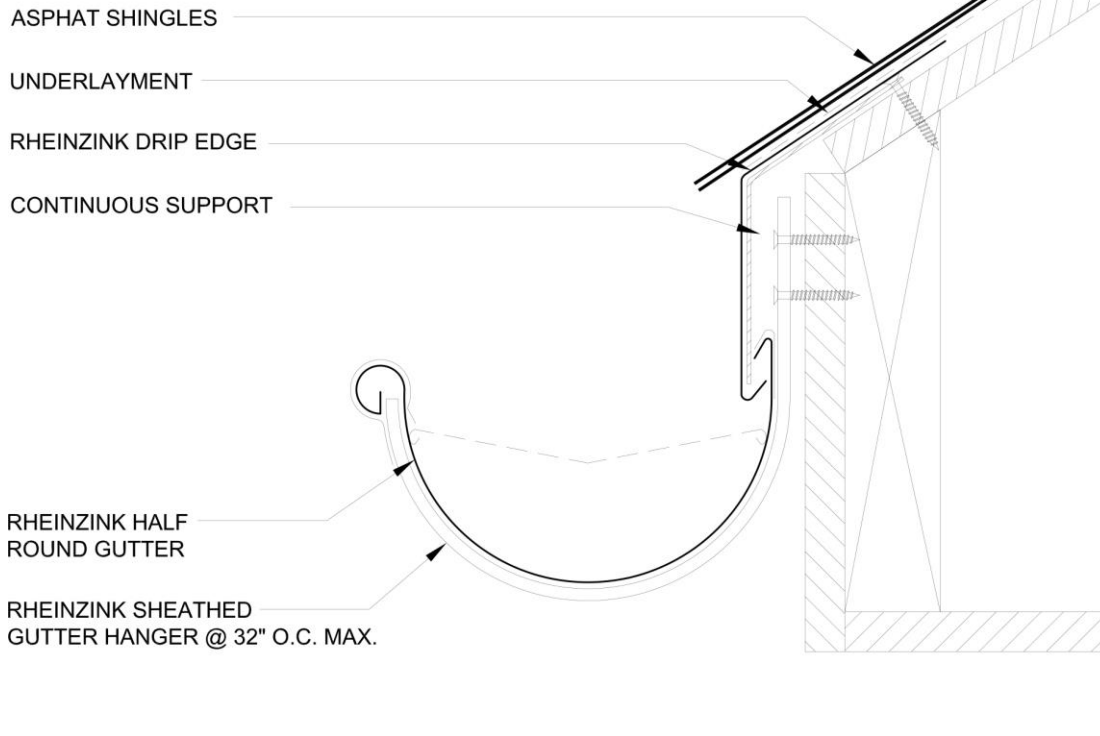
1. RHEINZINK gutters are available in the PATINA PRODUCT LINE only.
2. RHEINZINK Gutter Systems may be used with asphalt shingle roofing applications as well as many other roofing materials (Please refer to Chapter 1 - "Influences from other Building Materials" for the complete list of compatible roofing products)
3. Easy to install
4. Water diversion and collection parts available.
5. Economical and Environmentally Friendly
6. Water diversion and collection parts available.
7. ProRoofing recommended on all gutter flashings.
8. Available thicknesses:
 - 0.8 mm
 - 0.7 mm
9. Available Gutter lengths:
 - 10'
 - 20'
10. Available Gutter Sizes:
 - 5" (0.7 mm)
 - 6" (0.7 mm)
 - 7-1/2" (0.8 mm)
11. Precision-fitted pieces
12. Requires little or no maintenance
13. Refer to the RHEINZINK baseline details for design options. Consult the RHEINZINK technical department for customized applications as well as soldering and complete installation instructions.
14. RHEINZINK Gutter Systems can adapt to new or retrofit construction.



Photo on page prior: Fig. 32

GUTTER SYSTEMS

Gutter Details

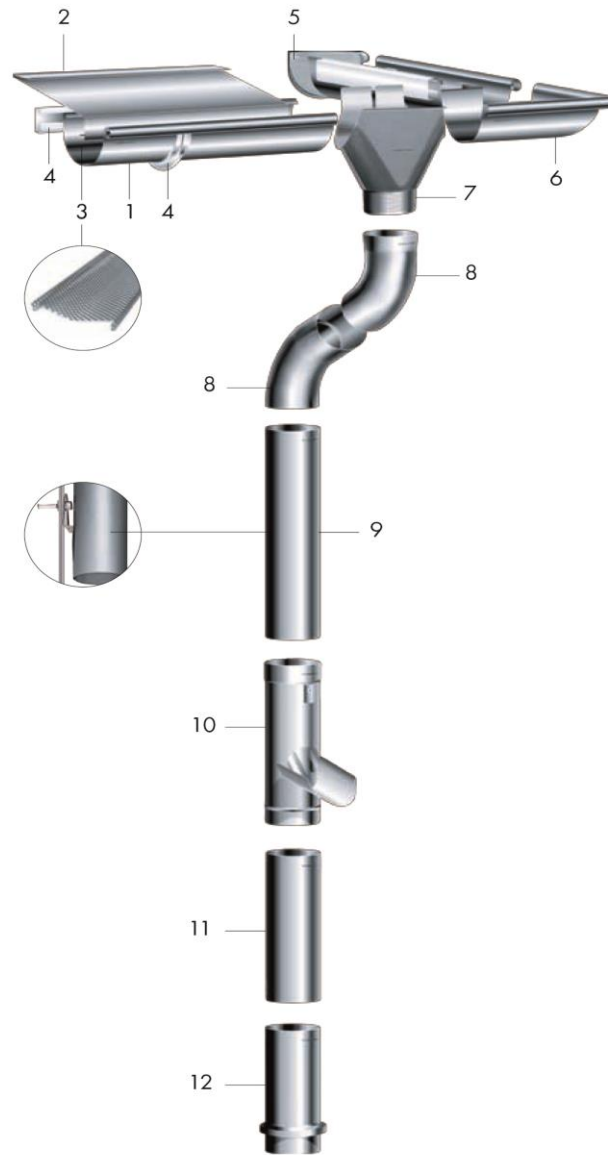
- RZG-1 - Snap-Lock Bracket & Gutter - Slate / Shingle Roof
- RZG-2 - Snap-Lock Bracket & Gutter - Standing Seam Roof
- RZG-3 - Snap-Lock Bracket & Gutter - Existing Asphalt Shingle Roof
- RZG-4 - Snap-Lock Bracket with Mounting Rail Strap - Tile Roof
- RZG-5 - RHEINZINK Sheathed Fascia Hanger - Exist. Asphalt Shingle Roof
- RZG-6 - RHEINZINK Gutter with Galvanized Fascia Hanger - Existing Asphalt Shingle Roof
- RZG-7 - RHEINZINK Gutter with Galvanized Fascia Hanger - Existing Slate / Shingle Roof
- RZG-8 - RHEINZINK Gutter with Galvanized Fascia Hanger - Tile Roof
- RZG-9 - RHEINZINK Gutter with Zinc Sheathed Fascia Hanger - Slate / Shingle Roof
- RZG-10 - RHEINZINK Gutter with Galvanized Fascia Hanger - Existing Slate / Shingle Roof
- RZG-11 - RHEINZINK Gutter with Snap-Lock Bracket and Shim - Tile Roof



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Website: www.rheinzink.com E-mail: info@rheinzink.com

INFORMATION AND DETAILS HEREIN ARE ONLY A BASELINE FOR SYSTEM DESIGN AND INSTALLATION. MODIFICATION TO MEET PROJECT REQUIREMENTS IS THE RESPONSIBILITY OF THE DESIGNER AND ARCHITECT. RHEINZINK AMERICA STAFF ARE AVAILABLE TO ASSIST THE DESIGNER AND ARCHITECT IN THIS PROCESS. RHEINZINK AMERICA MAKES NO REPRESENTATIONS AND WARRANTIES OTHER THAN THOSE EXPRESSED HEREIN.

PROJECT:	SHEATHED FASCIA HANGER	DATE:	01-2012
DRAWING TITLE:	EXISTING ASPHALT SHINGLE ROOF	SCALE:	N.T.S.
COPYRIGHT RESERVED. THIS DRAWING REMAINS THE PROPERTY OF RHEINZINK.		SHEET:	RZG-5



Example

- 1 Half Round Gutter *
- 2 Drip Edge
- 3 Leaf Guard
- 4 Snap-Lock Bracket System
- 5 End Cap
- 6 Miter
- 7 Plug in Outlet
- 8 Elbow
- 9 Hidden Downspout Hanger with concealed lightning rod clip
- 10 Leaf Collector and Rainwater Diverter with removeable leaf screen
- 11 Downspout
- 12 Drainfile Extension

* Not all accessories are available in box gutters and square downspouts.

07 95 13 BACKER ROD W/ SEALANT

PART 1 - GENERAL INFORMATION

1.01 SUMMARY

This section includes the following:

Backer rod with sealant

1.02 SUBMITTALS

Submit complete specifications and shop drawings

PART 2 - PRODUCTS

ACKER ROD

Closed cell, polyethylene, flexible, rope like foam joint backing material; ASTM C133-96, Type C or ASTM D 5249-92, Type 3

Manufacturer: TBD

2.02 SEALANT

Sealant to be approved by backer rod manufacturer; to be chosen among:

#224 SOF-SEAL two part, low modulus, polymer joint sealant

#225 #158 rubberized joint sealant

#226 GARADOX horizontal joint sealant

#235 SAFE-SEAL 3405 high performance, multi-purpose, asphalt joint sealant

#784 - 788 DECK-O-SEAL one and two part polysulfide sealants

PART 3 - EXECUTION

3.01 APPLICATION

Joint or opening must be clean, dry and free of obstructions

Select the proper rod diameter and cut to length

With blunt instrument or roller, uniformly install rod at a level recommended by the sealant manufacturer, specifier or architect.

Do not tear, puncture, twist, or overly compress the backer rod during installation.

Caution should be used to avoid any situation where voids may form and trap air/moisture between backer rod and sealant.

Care should also be taken to prevent the introduction of air bubbles into the sealant during mixing and/or installation

END OF SECTION 07 95 13

PART 17 - DIVISION 08 – OPENINGS

08 14 73.01 SLIDING WOOD DOORS

Part 1-GENERAL

1.01 SUMMARY

A. This section includes information about:

1. Sliding wood door

1.02 RELATED SECTIONS

- A. 08 71 00: Door Hardware

1.03 SUBMITTALS

A. Indication of the following in Shop drawings:

1. Door number, Door Type, Door sizes, and Fire rating.

B. Hardware templates

C. Product Data

1.05 QUALITY ASSURANCE

A. Delivery, storage, and handling

1. Store products in a location that will protect it from being damaged from water, sunlight, and extreme temperature.

2. Handle doors with hand protection and do not drag along floors or other surfaces.

1.06. WARRANTY

A. Manufactures warranty.

PART 2—PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Door Outlet

2. 8701 Research Blvd.

Austin, TX 78750

TEL: (512) 569-8006

2.02 DOOR CONSTRUCTION Sliding Wood Doors

A. Description

1. Type: Sliding Wood door 3' x7'

2. Finish: Stained wood finish

6. See drawings and elevations to see profiles and dimensions

PART 3—EXECUTION

3.01-INSTALLATION

1. General-Install doors in accordance with manufacturer' s instructions

2. Assemble and secure correctly

3.02-PROTECTION

1. Allow doors to be protected to prevent damages, but normal weathering may occur.

END SECTION 08 14 73.01

08 14 73.02 SLIDING WOOD DOORS

Part 1-GENERAL

1.01 SUMMARY

A. This section includes information about:

1. Sliding wood pocket door

1.02 RELATED SECTIONS

- A. 08 71 00: Door Hardware

1.03 SUBMITTALS

A. Indication of the following in Shop drawings:

1. Door number, Door Type, Door sizes, and Fire rating.

B. Hardware templates

C. Product Data

1.05 QUALITY ASSURANCE

A. Delivery, storage, and handling

1. Store products in a location that will protect it from being damaged from water, sunlight, and extreme temperature.

2. Handle doors with hand protection and do not drag along floors or other surfaces.

1.06. WARRANTY

A. Manufactures warranty.

PART 2—PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Door Outlet

3. 8701 Research Blvd.

Austin, TX 78750

TEL: (512) 569-8006

2.02 DOOR CONSTRUCTION Sliding Wood Pocket Door

A. Description

1. Type: Sliding Wood pocket door 2' 10" x7'
2. Finish: Stained wood finish
 7. See drawings and elevations to see profiles and dimensions

PART 3—EXECUTION

3.01-INSTALLATION

1. General-Install doors in accordance with manufacturer' s instructions
2. Assemble and secure correctly

3.02-PROTECTION

1. Allow doors to be protected to prevent damages, but normal weathering may occur.

END SECTION 08 14 73.02

08 13 16 ALUMINUM SWINGING GLASS DOORS

Part 1-GENERAL

1.01 SUMMARY

A. This section includes information about:

1. Aluminum Frame Swinging glass door

1.02 RELATED SECTIONS

- A. 08 71 00: Door Hardware

1.03 SUBMITTALS

A. Indication of the following in Shop drawings:

1. Door number, Door Type, Door sizes, and Fire rating.

B. Hardware templates

C. Product Data

1.05 QUALITY ASSURANCE

A. Delivery, storage, and handling

1. Store products in a location that will protect it from being damaged from water, sunlight, and extreme temperature.
2. Handle doors with hand protection and do not drag along floors or other surfaces.

1.06. WARRANTY

- ##### A. Manufactures warranty.

PART 2—PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: LaCantina Doors, Inc

4. 3817 Ocean Ranch Blvd. Suite 114

Oceanside, CA 92056

TEL: (888) 221-0141

FAX: (760) 760-1591

Website: www.lacantinadoors.com

2.02 DOOR CONSTRUCTION Glass Swinging Doors

A. Description

1. Type: LaCantina Door, Aluminum Thermally Controlled Swinging glass door – Entrance to Night Module - 3' x9'

2. Type: LaCantina Door, Aluminum Thermally Controlled Swinging glass door – Exterior Door in Bedroom - 3' x9'

2. Finish: Clear glass finish

8. See drawings and elevations to see profiles and dimensions

PART 3—EXECUTION

3.01-INSTALLATION

1. General-Install doors in accordance with manufacturer' s instructions

2. Assemble and secure correctly

3.02-PROTECTION

1. Allow doors to be protected to prevent damages, but normal weathering may occur.

END SECTION 08 13 16

08 32 19 - ALUMINIUM CLAD WOOD FRAMED FOLDING SYSTEM

PART 1 - GENERAL 1.01 SUMMARY

A. Section Includes: Engineered sliding/folding aluminum clad wood and glass door system, including aluminum clad wood frame, threshold, aluminum clad wood panels, sliding/folding and locking hardware, spines, weather stripping, glass and glazing; designed to provide an opening glass wall, with sizes and configurations as shown on drawings and specified herein, with NanaWall WA67, the Aluminum Clad Wood Framed Folding System as supplied by NANA WALL SYSTEMS, INC.

1.02 REFERENCES

5. American Architectural Manufacturers Association(AAMA):
 1. AAMA611, Voluntary Specification for Anodized Architectural Aluminum.
 2. AAMA 2603, Voluntary Specifications, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 3. AAMA1303.5, Voluntary Specifications for Forced Entry Resistant Aluminum Sliding Glass Doors.
6. American National Standards Institute(ANSI):
 1. ANSIZ97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used In Buildings.

7. American Society for Testing and Materials (ASTM):
 1. ASTM E 283, Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 2. ASTM E 330, Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
 3. ASTM E 547, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
8. Consumer Product Safety Commission (CPSC):
 1. CPSC 16 CFR-1201, Safety Standard for Architectural Glazing Materials.
9. National Fenestration Rating Council (NFRC):
 1. NFRC 100, Procedure for Determining Fenestration Product Thermal Materials.
 2. NFRC 200, Procedure for Determining Solar Heat Gain Coefficient.
10. AAMA/WDMA/CSA 101/I.S.2/A440, NAFS – North American Fenestration Standard / Specification for Windows, Doors, and Skylights.

1.03 SUBMITTALS

PART 1 - Detail Drawings: Indicate dimensioning, direction of swing, configuration, swing panels, typical head jamb, side jambs and sill details, type of glazing material and handle height.

PART 2 - Product Data: Manufacturer's literature including independently tested data listing performance criteria and Owner's Manual with installation instructions.

PART 3 - Contract Closeout Submittal: Submit Owner's Manual from manufacturer. Identify with project name, location and completion date,

type and size of unit installed.

1.04 QUALITY ASSURANCE

A. Manufacturer: Provide complete, precision built, engineered, pre-fitted unit by a single source manufacturer with at least 25 years experience in providing folding/sliding door systems for large openings in the North American market.

1. The manufacturer must have a quality management system registration to the ISO 9001: 2008 standard.

2. The manufacturer must have an environmental management system registration to the ISO 14001: 2005 standard.

B . Performance Requirements: Provide from manufacturer that has independently tested typical units per AAMA/ WDMA/CSA 101/I.S.2/A440, NAFS – North American Fenestration Standard. Testing results to include air infiltration in accordance with ASTM E 283, water penetration in accordance with ASTM E 331 and ASTM E 547, structural loading in accordance with ASTM E 330, and forced entry in accordance with AAMA 1304. SPECIFIER'S NOTE: Air infiltration and water penetration testing results can only be applicable if the unit matches the test unit in the direction of opening and the type of sill. Structural load testing results are only applicable for the test unit size and type of sill and locking used. (Comparative analysis charts published by manufacturer show which panel sizes (if any) would meet structural loading design

pressures specifically required for the project. Check for limitations on the use of these charts in the jurisdiction of the project). Forced entry testing results are only applicable for the test unit type of locking. See manufacturer' s latest published data.

B. Thermal Performance U-factor: Unit to be rated, certified and labeled in accordance with NFRC 100, shown in manufacturer' s latest published data for the glazing, sill and direction of opening specified.

A. Solar Heat Gain Coefficient: Unit to be rated, certified and labeled in accordance with NFRC 200, shown in manufacturer' s latest published data for the glazing, sill, and direction of opening specified. SPECIFIER NOTE: If desired, Energy Star values can be achieved by the use of proper glass with the unit. See NanaWall' s Performance data for details.

B. InstallerQualifications:Installerexperiencedintheinstallationofmanufacturer' s productsorothersimilarproducts for large openings. Installer to provide reference list of at least 3 projects of similar scale and complexity successfully completed in the last 3 years.

1.05 WARRANTY

A. Provide manufacturer' s standard warranty against defects in materials and workmanship. Warranty to be issued by the original manufacturer. No third party or other sub-supplier warranties will be accepted.

B. Warranty Period: Ten years for rollers. For all other components, one year (two years if unit is installed by manufacturer' s certified trained installer) from date of delivery by manufacturer.

1.06 SITE CONDITIONS, DELIVERY, STORAGE AND HANDLING

A. In addition to general delivery, storage and handling requirements specified in Section 01600, comply with the following:

1. Deliver materials to job site in sealed, unopened cartons or crates. Protect units from damage. Store material under cover, protected from weather and construction activities.

B. Condition wood components to average prevailing relative humidity before installation. C. Do not subject wood components to extreme or rapid changes in heat or humidity. D. Do not use forced heat to dry out building. E. Store flat in dry, well ventilated area out of direct sunlight.

PART 2 - PRODUCTS 2.01 SUPPLIER

A. NANAWALLSYSTEMS,INC.-WA67-
AluminumCladWoodFramedFoldingSystem

100 Meadow Creek Drive

Corte Madera, CA 94925

Toll Free: (800) 873-5673

Telephone: (415) 383-3148

Fax: (415) 383-0312

Website: www.nanawall.com

Email: info@nanawall.com

B. Other suppliers equal to the specified product must submit substitution request two weeks before bid for prior approval.

2.02 MATERIALS

A. Frame and Panels: From manufacturer' s standard profiles, provide head track, side jambs, panels with nominal 25/8" (66 mm) deep profiles for double glazing [OR 3 13/16" (97 mm) deep profiles for triple glazing] and glazing stops with dimensions shown on drawings. **Wider stiles and top rail will not be allowed.**

1.

Provide panels with:

Standard one lite

[OR with horizontal mullion(s) at specified height(s) from the bottom of the panel]

[OR with simulated divided lites in pattern as shown on drawings].

Provide standard 3 1/16" (78 mm) wide bottom rail [OR manufacturer' s standard higher bottom rail with height specified between 8" and 12"].

2. Type of Wood:Solid, three layer cross-grained, kilndried. **Veneered wood not allowed.**

[OR Sapeli Mahogany]

[OR Cherry]

[OR Maple]

[OR Laminated Bamboo]

[OR Wood as selected]

[OR selected FSC wood on request]

3. Construction of wood panels to include close tolerance mortise and tenon, glued and pinned corners. 4. Wood Finish: Finishes to be water based, open pored

Clear sanding sealer and one additional clear coat [OR base coat applied and one additional clear coat] [OR pigmented # 410 or # 510 with one additional clear coat]

SPECIFIER'S NOTE: Before installation, the unit must be field finished with at least two coats for a final protected finish.

5. Aluminum Extrusion: Extrusions with nominal thickness of .078" (2.0 mm). Alloy specified as AlMgSi0.5 with strength rated as 6063-T5 or F-22 (European standard). Anodized conforming to AAMA 611 or powder coated conforming to AAMA 2604.

6. Aluminum Finish:

Select from NanaWall Powder Coating Finish Chart [OR clear anodized] [OR dark bronze anodized] [OR select from range of RAL high gloss powder coated finishes available from manufacturer] [OR select from range of RAL matte powder coated finishes available from manufacturer] [OR custom finish].

7. Exterior aluminum extrusion to be attached to interior wood with manufacturer' s thermal isolating polyamide connectors to protect and isolate wood from aluminum by use of the back ventilated, rain screen principle.

Direct connection of aluminum to wood not allowed.

B. Glass:

A. 1. Provide manufacturer' s standard glass and dry glazing with EPDM gaskets and glass stops on the inside only, which are fixed with hidden nails. Glass to comply with safety glazing requirements of ANSI Z97.1 and CPSC 16CFR 1201.

B. [OR 1" (26 mm) insulating argon filled Low-E safety]

C. [OR other glass available from manufacturer].

2. Provide manufacturer' s standard gray [OR dark bronze] glass spacers. Provide without capillary tubes [OR with capillary tubes].

C. Locking Hardware and Handles: 1. Main entry panel function:

On the main entry panel for models with a pair of swing panels, provide manufacturer' s standard lever handles on the inside and outside, a Schlage compatible lock set with lockable latch, multi-point locking with a dead bolt and rods at the top and bottom on primary panel. Rods to be concealed and not edge mounted. After turn of key or thumb turn, depression of handles withdraws latch. Lifting of handles engages rods and turn of key or thumb turn engages deadbolt and operates lock. On the secondary swing panel, provide matching dummy lever handles on both sides and concealed flush bolts that operate the rods at the top and the bottom for the secondary swing panel.

Stainless steel lever handles in a brushed satin finish [OR stainless steel lever handles in a black titanium finish] [OR oil rubbed bronze solid brass lever handles] [OR satin nickel solid brass lever handles]

[OR on the main entry panel for models with a swing panel, provide manufacturer' s standard lever handles on the inside and outside, a Schlage compatible lock set with lockable latch, multi-point locking with a dead bolt and rods at the top and bottom on primary panel only. Rods to be concealed and not edge mounted. After turn of key or thumb turn, depression of handles withdraws latch. Lifting of handles engages rods and turn of key or thumb turn engages deadbolt and operates lock. If there is a secondary swing panel, provide two point locking with flat handles on inside only for the secondary swing panel.

Stainless steel lever handles in a brushed satin finish [OR stainless steel lever handles in a titanium black finish] [OR oil rubbed bronze solid brass lever handles] [OR satin nickel solid brass lever handles]]

[OR on the main entry panel for models with a swing panel, provide manufacturer' s push/pull handles with separate lock set and dead bolt.

Push-pull handles in brushed stainless steel [OR push-pull handles in a brown nylon finish]

[OR push-pull handles in a gray nylon finish]

SPECIFIER' S NOTE: This option is recommended with a door closer, but note that in order to slide the swing panel, the door closer will need to be disengaged if the swing panel is not attached to a side jamb.]

[OR on the main entry panel for models with a swing panel, no hardware or locking to be provided by the manufacturer, but with field installed panic device by others.]

[OR on both entry panels for models with a pair of swing panels, no hardware or locking to be provided by the manufacturer, but with field installed panic devices on both panels by others.]

[OR on main entry pair of panels on inswing models without a swing panel, provide manufacturer' s standard L-shaped handle on the inside, flat handle on the outside and lock set with profile cylinder. Operation of lock set is by turn of key from the outside and with a thumb turn from the inside with a two point locking hardware operated by 180o turn of the handle.

Stainless steel L-shaped handles in a brushed satin finish [OR stainless steel L-shaped handles in a titanium black finish] [OR L-shaped handles in a brown nylon finish] [OR L-shaped handles in a gray nylon finish]]

[OR on main entry pair of panels on outswing models without a swing panel, provide manufacturer' s standard flat handle on the inside and on the outside and a lock set with a profile cylinder. Operation of lock set is by turn of key from the outside and from the inside with a two point locking hardware operated by 180o turn of the handle.

SPECIFIER' S NOTE: Key operation from the inside may not meet egress requirements.]

[OR on main entry panel, provide manufacturer' s standard flat handle on inside only with concealed two point locking hardware operated by 180 degree

turn of handle.

SPECIFIER' S NOTE: Note that with this option, the main entry panel is operable from inside only and that there is no latch.]

SPECIFIER' S NOTE: Note that other compatible lever, L-shaped and push-pull handle styles and finishes are available from other suppliers.

3. On all other secondary swing panels and pairs of folding panels, provide manufacturer' s standard flat handles [OR removable custodial handles] and concealed two point locking hardware operated by 180 degree turn of handle between each pair. **Face applied flush bolt locking will not be allowed.**

4. Flat handle finish: Stainless steel in a brushed satin finish [OR stainless steel in a titanium black finish] [OR dark brown powder coated] [OR silver gray powder coated]

5. Provide handle height centered at 41 3/8" [OR as specified] from bottom of panel.

6. Aluminum locking rods with fiber glass reinforced polyamide end caps at top and bottom. Rods to have a stroke of 15/16" (24 mm).

7. If there are more than one unit, keyed alike [OR keyed differently].

D. Sliding/Folding Hardware: Provide manufacturer' s standard combination sliding and folding hardware with top, bottom tracks and threshold. All running carriages to be with sealed, self-lubrication, ball bearing multi-rollers. **Surface mounted hinges and running carriages will not be allowed.**

1. For each pair of folding panels:

For top-hung system WA67/o, provide cardanic, independently suspended, four wheeled coated with fiber glass reinforced polyamide upper running carriage and lower guide carriage. [OR for floor mounted system WA67/u, provide upper guide carriage and lower running carriage with four vertical stainless steel wheels and two horizontal wheels. The vertical wheels to ride on stainless steel guide track covers over the full length of the sill track. Carrying capacity of running carriage to be at least 150 lbs (70 kgs)]

2. Threshold: Provide thermally broken with polyamide Clear anodized Raised Sill (higher weather performance sill) [OR dark bronze anodized Raised Sill (higher weather performance sill)] [OR clear anodized flush sill] * [OR dark bronze anodized flush sill] * [OR clear anodized low profile saddle sill] * ** [OR dark bronze anodized low profile saddle sill].* ** [OR alternate aluminum clear anodized flush sill (not thermally broken)] * ** [OR alternate aluminum dark anodized flush sill (not thermally broken)] * **

SPECIFIER' S NOTE: *Note that this option is not available with 3 13/16" (97 mm) deep profiles. ** Note that this option is not available with the floor mounted WA67/u.

Cover plate over the sill will not be allowed.

3. For ADA compliance in commercial projects, provide gasket to cover the channel in the sill at swing doors.

4. Provide manufacturer' s standard clear anodized [OR dark bronze anodized] aluminum hinges and spine on edge of panel. For structural strength, hinges to

be connected to spine and not directly into wood. Provide stainless steel security hinge pins with set screws.

5. Adjustment: Provide sliding/folding hardware capable of specified amount of compensation and adjustments without needing to remove panels from tracks, in width, 1/8" (3 mm) per hinge and in height, 1/8" (3 mm) up and down.

D. Weather stripping: For 25/8" (66mm) deep profile, provide manufacturer's standard double layer EPD Morbrush seals with a two layer polyamide fin at both the inner and outer edge of door panels or on frame for sealing between panels and between panel and frame. **Single layer weather stripping will not be allowed.** For 3 13/16" (97 mm) deep profile, provide manufacturer's standard triple layer EPDM.

2.03 FABRICATION

A. Use solid, three layer, cross grained frame and panel profiles connected to exterior aluminum extrusion, hinges and spines, sliding and folding hardware, locking hardware and handles, threshold and track, glass and glazing and weather stripping as specified herein to make a folding glass wall. Factory pre-assemble as is standard for manufacturer and ship with all components and installation instructions.

B. Sizes and Configurations: See drawings for selected custom dimensions within maximum frame sizes possible as indicated in manufacturer's literature. See drawings for selected number of panels and configuration. Swing/stacking direction: Inward [OR outward] opening unit. On configurations with a pair of swing panels or with even pairs stacking to both sides, looking from inside, panel(s) on the left [OR right] to open first

2.04 ACCESSORIES (Edit for project requirements) A. Provide the Nana Screen TMClassic, a series of vertical, collapsible, pleated screen panels. Provide pleated screen material with floor tracking chain with 1/4" (5 mm) floor track. See drawings for selected number of panels and configuration. Provide aluminum top track, side jambs, and vertical struts: White powder coated [OR clear anodized] [OR dark bronze anodized] [OR powder coated select from range of RAL powder coated finishes available from manufacturer]. NanaScreenTM Classic installation within opening [OR extended beyond opening]

[OR provide NanaScreen One with non-pleated screening material. See drawings for selected number of panels and configurations.

Provide aluminum top track, side jamb and vertical struts. White powder coated [OR clear anodized] [OR black powder coated]]

B. Provide other side lites, transoms, or single or double doors as per drawings provided.

2.05 REQUIREMENTS FOR INDIVIDUAL WINDOWS

A. DOOR 1 (I-3L): Dining (1 pcs.)

1. Basis-of-Design Product: Product indicated in lighting schedule for comparable product subject to approval

1. NANAWALL SYSTEMS, INC, 100 Meadow Creek Drive, Corte Madera, CA 94925

2. NanaWall WA67, Aluminium Clad Wood Framed Folding System

3. Profiles with 3 13/16 " (97mm) thickness
4. Model I – 3L (rough opening: (WxH) 9' x9')
5. Finish body: Exterior: Aluminium clad, powder coating finish (RAL); Interior: selected FSC Wood, finish water based, opened pored

C. DOOR 2 (I-3R): Living / Studio (2 pcs.)

1. Basis-of-Design Product: Product indicated in lighting schedule for comparable product subject to approval
1. NANAWALL SYSTEMS, INC, 100 Meadow Creek Drive, Corte Madera, CA 94925
2. NanaWall WA67, Aluminium Clad Wood Framed Folding System
3. Profiles with 3 13/16 " (97mm) thickness
4. Model I – 3R (rough opening: (WxH) 9' x9')
5. Finish body: Exterior: Aluminium clad, powder coating finish (RAL); Interior: selected FSC Wood, finish water based, opened pored

D. DOOR 3 (I-2L): Bedroom (2 pcs.)

1. Basis-of-Design Product: Product indicated in lighting schedule for comparable product subject to approval
1. NANAWALL SYSTEMS, INC, 100 Meadow Creek Drive, Corte Madera, CA 94925
2. NanaWall WA67, Aluminium Clad Wood Framed Folding System

3. Profiles with 3 13/16 " (97mm) thickness
4. Model I – 2L (rough opening: (WxH) 9' x9')
5. Finish body: Exterior: Aluminium clad, powder coating finish (RAL); Interior: selected FSC Wood, finish water based, opened pored

PART 3 - EXECUTION

3.01 ERECTION

A. Because of the large dimensions involved and the weight and movement of the panels, verify the structural integrity of the header such that the maximum deflection with the live load is limited to be the lesser of L/720 of the span and 1/4" (6 mm). Structural support for lateral loads (both wind load and eccentric load when the panels are stacked open) must be provided.

It is recommended that all building dead loads be applied to the header prior to installing the NanaWall. If so and if a reasonable amount of time has been allowed for the effect of this dead load on the header, then only the building's live load can be used to meet the above requirements of L/720 or 1/4" (6 mm). If not, both the dead and live loads need to be considered.

- C. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.
- D. Installation of units constitutes acceptance of existing conditions.

3.02 INSTALLATION

- A. Install frame in accordance with manufacturer' s recommendations and installation instructions. Properly flash and waterproof around the perimeter of the opening.
- B. Installer to provide appropriate anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.
- C. If necessary, provide drain connections from lower track.
- D. Install panels, handles and lock set in accordance with manufacturer' s recommendations and installation instructions.
- E.If necessary, adjust hardware for proper operation.
- F. Finishing: Field finish under Section 09900 -Painting; seal and finish promptly after installation and prior to exposure to weather in accordance with manufacturer recommendations.
- G. Accessories: Screens; install in accordance with screen manufacturer' s recommendation sand installation instructions.

END OF SECTION 08 32 19

08 51 13 ALUMINUM WINDOW

Part 1-GENERAL

1.01 SUMMARY

A. This section includes information about:

1. Aluminum Fixed Glass Window

1.02 RELATED SECTIONS

- A. 08 71 00: Door Hardware

1.03 SUBMITTALS

A. Indication of the following in Shop drawings:

1. Door number, Door Type, Door sizes, and Fire rating.

B. Hardware templates

C. Product Data

1.05 QUALITY ASSURANCE

A. Delivery, storage, and handling

1. Store products in a location that will protect it from being damaged from water, sunlight, and extreme temperature.

2. Handle doors with hand protection and do not drag along floors or other surfaces.

1.06. WARRANTY

A. Manufactures warranty.

PART 2—PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Western Window Systems

1. 5621 South 25th Street

Phoenix, AZ 85040

TEL: (877) 268-1300

Website: www.westernwindowssystemss.com

2.02 DOOR CONSTRUCTION Glass Swinging Doors

A. Description

1. Type: Western Window, Series 600 Window Wall – Bathroom - 3' x9'

2. Type: Western Window, Series 600 Sliding Window – Kitchen –
7' 6" x2' 6"

2. Finish: Clear glass finish

5. See drawings and elevations to see profiles and dimensions

PART 3—EXECUTION

3.01-INSTALLATION

1. General-Install doors in accordance with manufacturer' s instructions

2. Assemble and secure correctly

3.02-PROTECTION

1. Allow doors to be protected to prevent damages, but normal weathering may occur.

series 600 window wall



specifications

general

- ▶ Conforms to AAMA/WDMA/CSA 101/ I.S.2-A440 Specifications, CW PG50
- ▶ Conforms to NFRC 100 for U-factor and NFRC 200 for Solar Heat Gain Coefficient (SHGC)

material

- ▶ Commercial quality 6063-T5 alloy and temper extruded aluminum
- ▶ Component parts and accessories shall be made of aluminum alloy, plated steel, stainless steel, or nonmetallic materials to resist deterioration and corrosion
- ▶ Thermally broken frames available

construction

- ▶ All frame members are neatly fitted and mechanically joined at the corners with stainless steel screws
- ▶ Window glazing held in place with extruded aluminum snap-in stops removable for re-glazing
- ▶ Stops in arches are applied with exposed screws

finish

- ▶ Extruded aluminum members furnished from stock inventory available in dark bronze anodized and satin anodized
- ▶ Custom colors are available in both painted and anodized finishes
- ▶ Unless otherwise specified, painted finishes on extruded aluminum members shall conform to a minimum of AAMA 2605, Specification for High Performance Organic Coatings on Aluminum Extrusions and Panels
- ▶ Anodized finishes shall be Class 1 on dark bronze and satin anodized

specifications

glazing

- ▶ Insulating glass conforms to ASTM E774 specification for Sealed Insulating Glass
- ▶ Units shall have a dual seal of Thermo Plastic Spacer (TPS) and silicone
- ▶ Insulating glass manufactured using 3mm (1/8") thick glass up to 20 square feet, 5mm (3/16") thick glass over 20 to 40 square feet, and 6mm (1/4") thick glass over 40 square feet, all with a minimum air gap of .50"
- ▶ When specified, single-pane glass shall be supplied in 5 mm (3/16") thick glass up to 32 square feet and 6mm (1/4") thick glass over 32 square feet
- ▶ Insulating and single-pane glass conforms to ASTM Specification C1036, Standard Specification for Flat Glass

weather stripping

- ▶ Glazing is accomplished using black closed cell foam tape on the interior and a black, non-stretch extruded vinyl on the exterior

installation

- ▶ Installation shall be in accordance with published instructions by Western Window Systems

END SECTION 08 51 13

08 71 00 - DOOR HARDWARE

PART 1 – GENERAL

1.01 SUMMARY

A. This section includes information about hinges, doorknobs, locks and other door hardware.

1.02 SUBMITTALS

A. Manufacturer's data sheets on each product must be submitted, including:

1. Preparation instructions and recommendations.
2. Storage and handling instructions.
3. Installation methods.
4. Certified test reports.
5. Shop Drawings

1.03 DELIVERY, STORAGE, AND HANDLING

Store products in manufacturer's unopened packaging until ready for installation.

Make special safety arrangements for shipping. Protect against damage if transported as an installed part of the unit.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install products in compliance with the manufacturer's recommendations.

3.02 PROTECTION

A. Protect installed products until the project is fully completed.

END OF SECTION 08 71 00

08 81 00 GLAZING

1. GENERAL

1. SECTION INCLUDES

Glass types including the following:

Laminated glass units.

Insulating glass units without solar control coatings.

Solar control insulating glass units.

Tinted solar control insulating glass units.

Laminated solar control insulating glass units.

Fire-rated/temperature-rise glass and framing system

Fire and safety rated glazing materials

2. RELATED SECTIONS

Division 08 00 00 Openings

3. REFERENCES

ASTM E 119 - Fire Tests of Building Construction Materials.

ASTM E 2010 - Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.

ASTM E 2074 - Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.

ASTM F 1915 - Standard Test Methods for Glazing for Detention Facilities

CSFM - Fire Tests for Doors and Window Assemblies.

GANAL - Glazing Manual.

GANAL - Sealant Manual.

GANAL PCR for Flat Glass: UN CPC 3711 Product Category Rule for Environmental Product Declarations.

ISO 14025 Environmental labels and declarations, -Type III environmental declarations - principles and procedures.

ISO 21930 Buildings and constructed assets, -Sustainability in building construction - Environmental declaration of building products.

ISO 14040 series of standards, Environmental management - Life cycle assessment.

ISO 15686-1 Buildings and constructed assets - Service life planning - Part 1: General principle.

ISO/DIS 15686-8 Buildings and constructed assets - Service life planning - Part 8: Reference service life.

NFPA 80 - Fire Doors and Windows.

NFPA 251 - Fire Test for Fire Endurance of Building Construction and Materials.

NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies.

UL 9 - Fire Tests of Window Assemblies.

UL 10C - Positive Pressure Fire Tests of Door Assemblies.

UL 10B - Fire Tests of Door Assemblies.

UL 263 - Fire Resistance Ratings.

UL 752 - The Standard of Safety for Bullet-Resisting Equipment.

UL 972 - Burglary Resisting Glazing Material.

BOCA Building Code.

CAN4-S104-M - Fire Tests of Door Assemblies.

CAN4-S106-M - Standard Method for Fire Tests of Window and Glass Block Assemblies.

4. SUBMITTALS

Submit under provisions of Section 01 30 00 - Administrative Requirements.

Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.

Product Data: Manufacturer's data sheets for each product specified, including but not limited to:

- Performance characteristics.

- Preparation instructions and recommendations.

- Storage and handling requirements and recommendations.

- Installation methods.

- Cleaning methods.

Fabricator's Certification: Submit fabricator's certification acceptable to manufacturer.

LEED Submittals: Product Data for Credit EQ 4.1; for adhesives and sealants used inside of the weatherproofing system, including printed statement of VOC content.

Selection Samples: For each glass product specified, except clear uncoated glass, two complete sets of samples representing manufacturer's full range of available products types, thicknesses and coatings.

Verification Samples: For each glass product specified except clear uncoated glass, two samples representing actual product types, thicknesses and coatings specified.

5. QUALITY ASSURANCE

Manufacturer's Qualifications: Minimum of 5 years experience manufacturing solar control coated glass.

Fabricator's Qualifications: Certified by AGC Glass Company to fabricate solar control coated glass products.

Minimum of 5 years experience manufacturing sealed insulating glass units meeting ASTM E 2190, Class CBA.

Minimum of 5 years experience manufacturing laminated glass units meeting ASTM C 1172 and CPSC 16 CFR-1201.

Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants. Data based on previous testing of current sealant products, and glazing materials matching those specified is acceptable.

Mock-Up: Provide a mock-up for evaluation of glazing unit fabrication and installation workmanship.

Install in locations designated by Architect.

Do not proceed with remaining work until workmanship is approved by Architect.

Rework mock-up area as required to produce acceptable work.

6. DELIVERY, STORAGE AND HANDLING

Delivery: Deliver glass in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer.

Storage: Store glass in accordance with manufacturer's instructions.

Store glass in manufacturer's or fabricator's original containers and packaging, with labels clearly identifying product name and manufacturer. Protect from damage.

Store products in manufacturer's labeled packaging until ready for installation.

Store glass in clean, dry area indoors.

Protect from exposure to direct sunlight and freezing temperatures.

Apply temporary coverings loosely to allow adequate ventilation.

Protect from contact with corrosive chemicals.

Avoid placement of glass edge on concrete, metal, and other hard objects.
Rest glass on clean, cushioned pads at 1/4-points.

Handling: Handle glass in accordance with manufacturer's instructions.
Protect glass from damage during handling and installation.
Do not slide one lite of glass against another.
Do not use sharp objects near unprotected glass.

7. PROJECT CONDITIONS

Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

8. SEQUENCING AND SCHEDULING

Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

9. WARRANTY

Manufacturer's Special Warranty on Coated Glass:

Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated glass units that deteriorate within specified warranty period.
Deterioration of coated glass is defined as failure of coating, including discoloration or de-lamination, under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions.

Manufacturer's Special Warranty on Insulating Glass:

Manufacturer's standard form in which insulating glass manufacturer agrees to replace insulating glass units that deteriorate within specified warranty period.
Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions.
Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

Manufacturer's Special Warranty on Laminated Glass:

Manufacturer's standard form in which laminated glass manufacturer agrees to replace laminated glass units that deteriorate within specified warranty period.
Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions.
Defects include edge separation, de-lamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated glass standard.

2. PRODUCTS

1. MANUFACTURERS

Acceptable Manufacturer: EXCLUSIVE - Windows & Doors of Austin, LLC _ 9324 Neils
Thompson #113 Austin, TX 78758 _ PH: (512)341-9282 FAX: (512)341-7043

Acceptable Manufacturer: NanaWall – 100 Meadowcreek Drive #250, Corte Madera, CA 94925
PH: (888)411-6262 PH: (415)383-3148 FAX: (415)383-0312

Acceptable Manufacturer: Western Window Systems – 5621 S. 25th St. Pheonix, AZ 85040
PH: (877)268-1300

Acceptable Manufacturer: LaCantina Doors, Inc _ 3817 Ocean Ranch Blvd. Suite 114,
Oceanside, CA 92056 _ PH: 888-221-0141 TEL: 760 734 1590 FAX: 760 734 1591

Substitutions: Requests for substitutions will be considered in accordance with provisions of
Section 01 60 00 - Product Requirements.

2. PERFORMANCE REQUIREMENTS

General Performance: Installed glazing systems shall withstand normal thermal movement
and impact loads (where applicable) without failure, including loss or glass breakage
attributable to the following: defective manufacture, fabrication, or installation;
deterioration of glazing materials; or other defects in construction.

Safety Glazing: Where safety glazing is indicated, comply with testing requirements in 16 CFR
1201 for Category II materials.

Delegated Design: Design glass installed adjacent to walking surfaces, including
comprehensive engineering analysis by a qualified professional engineer, using
performance requirements and design criteria indicated.

Differential deflection of adjacent unsupported edges shall not exceed glass thickness
when subjected to 50 lbf/ft (730 n/m) applied horizontally to one panel at any point
up to 42 inches (1067 mm) above the adjacent walking surface.

Base design on thickness at thinnest part of the glass.

3. GLASS PRODUCTS

Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in
thicknesses as needed to comply with requirements indicated.

Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated
float glass, or Kind FT heat-treated float glass as needed to comply with requirements
indicated. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float
glass or Kind FT heat-treated float glass as needed to comply with requirements
indicated. Where fully tempered glass is indicated, provide Kind FT heat-treated float
glass.

4. MATERIALS

Glass Fabrication - General:

Edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications; and to comply with system performance requirements.

Free of foreign substances and air or glass pockets.

Glass: Tinted float.

5. LAMINATED GLASS

Fabricators: Subject to compliance with requirements, provide laminated glass by AGC Glass approved fabricators.

Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written recommendations.

Construction: Laminate glass with ionoplast interlayer to comply with interlayer manufacturer's written recommendations.

Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.

Interlayer Color: Clear unless otherwise indicated.

Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172 and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.

Construction: Laminate glass with the following to comply with interlayer manufacturer's written recommendations:

Polyvinyl butyral interlayer.

Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.

Ionoplast interlayer.

Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.

Interlayer Color: Clear unless otherwise indicated.

6. GLAZING SEALANTS

General:

Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of service and application,

as demonstrated by sealant manufacturer based on testing and field experience.

Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.

Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

7. MISCELLANEOUS GLAZING MATERIALS

General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

3. EXECUTION

1. EXAMINATION

Examine areas to receive glass.

Verify glazing openings are correct size and within tolerance.

Verify glazing channels, recesses, and weeps are clean and free of obstructions.

Field Quality Control:

Coated glass, when viewed from minimum of 10 feet (3 m), exhibiting slightly different hue or color not apparent in hand samples, will not be cause of rejection of glass units, as determined by Architect.

Verify glass is free of chips, cracks, and other inclusions that could inhibit structural or aesthetic integrity.

2. PREPARATION

Prepare openings and substrates using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

Do not proceed with installation until openings and substrates have been prepared using the methods recommended by the manufacturer and deviations from manufacturer's recommended tolerances are corrected.

If preparation is the responsibility of another installer, notify Architect in writing of deviations from manufacturer's recommended installation tolerances and conditions.

3. INSTALLATION

Install glass in accordance with manufacturer's instructions and approved submittals, except where local codes or GANA Glazing Manual indicate more stringent requirements.

4. CLEANING

Clean glass promptly after installation in accordance with manufacturer's instructions.

Remove labels from glass surface.

Do not use harsh cleaning materials or methods that would damage glass.

5. PROTECTION

Protect installed glass from damage during construction.

Protect installed glass from contact with contaminating substances resulting from construction operations.

Touch-up, repair or replace damaged products before Substantial Completion. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

END OF SECTION 08 81 00



EXCLUSIVE
Windows & Doors of Austin, LLC
"Committed to Excellence"

9324 NEILS THOMPSON #113
AUSTIN, TEXAS 78758
PH: (512) 341-9282
FAX: (512) 341-7043

To: Andrew Stephen Horne

3/19/2015

From: Chris Brown
Exclusive Windows & Doors of Austin
Re: **Solar Decathlon**

We Are Pleased To Quote The Following:

	Standard Builder Pricing	Preferred Builder Special Project Pricing
HERITAGE WINDOWS per quote 1	\$4,476.00	\$3,715.00
<ul style="list-style-type: none"> • [W1] Kitchen Window (2-panel slider) R.O.: 7'-6" x 2'-6" • [W3] Bathroom (fixed) R.O.: 3'-1/2" x 9'-0" • Clear Anodized Extruded Aluminum Interior & Exterior • Low E 366 Insulated Glass with Argon (Tempered as Required) • Flush-Mount Multipoint Hardware 		
LA CANTINA DOORS per quote 469623	\$53,722.52	\$44,590.00
<ul style="list-style-type: none"> • Bronze Aluminum Exterior • Douglas Fir Interior • LoE 366 Insulated Glass (Tempered) • Bronze Multi-point Door Hardware, Track and Sill • <i>EWDA Assembly & Installation *</i> 		
	\$58,198.52	Your Total = \$48,305.00

*** EWDA assembly & installation includes frame assembly, plumb, level, square and nail fin caulking into properly prepared rough opening, and panel installation. Installation does not include flashing, waterproofing, rough opening preparation, substrate preparation, interior or exterior trim or finishing.**

Your Total Includes: Sales Tax, Delivery, Temporary Storage of miscellaneous Screens & Hardware, Post-Installation Inspection, and **Exclusive's Preferred Builder Special Project Discount (-\$9,893.52).**

I have reviewed this cover letter & accept the quantities, specifications & accessories in the above-referenced quotes. By my signature, I acknowledge & accept the above-referenced quotes as a custom order & agree to pay the total price shown in full to Exclusive Windows & Doors of Austin upon invoice in accordance with Exclusive's Terms of Sale. Pricing valid for 30 days.

Accepted By: _____

Date: _____

Thank You for this Opportunity,

Chris Brown
512-656-6677
chris@exclusivewindowsanddoors.com

<http://exclusivewindowsanddoors.com>

DEALER QUOTE



3817 OCEAN RANCH BLVD., SUITE 114
OCEANSIDE, CA 92056
T: 760.734.1590
F: 760.734.1591

ORDER #: 469623

TIME/DATE: 3/19/2015 10:36 AM

PREPARED FOR: Exclusive Windows and Doors of Austin

PAGE: 1 of 6

DEALER REP: John Gonzalez

SHIP TO ADDRESS: 9324 Neils Thompson, Suite 113, Austin, TX 78758

PROJECT NAME: Solar Decathlon

LOCATION: 101A/102A/103A

A 469623



Aluminum TC (Thermally Controlled)

CLEAR OPENING IS LESS HEAD, SILL, JAMBS AND PANEL STACK; PER CONFIGURATION

0 PANEL(S) FOLDING LEFT

AS VIEWED FROM THE EXTERIOR

3 PANEL(S) FOLDING RIGHT

PRODUCT TYPE: Folding Doors

PANEL TYPE: Custom Size

SYSTEM TYPE: Aluminum TC. (Thermally Controlled)

DAILY PASSAGE DOOR: Yes

QUANTITY: 3

ALUMINUM COLOR: Bronze Anodized (Stock Anodized)

CONFIGURATION: OL3R (viewed from outside)

HARDWARE FINISH: Bronze

REC'D RO WIDTH: 108"

HEAD TRACK FINISH: Bronze Anodized

REC'D RO HEIGHT: 108"

SILL FINISH: Bronze Anodized

NET FRAME WIDTH: 107"

GLASS TYPE: LoE 366 / i89

NET FRAME HEIGHT: 107 1/4"

SPACER: Stainless Steel

NET PANEL WIDTH: 34 1/2"

GLASS WIDTH (DLO): 28 5/8"

NET PANEL HEIGHT: 103 1/2"

GLASS HEIGHT (DLO): 97 5/8"

SWING DIRECTION: OutSwing

SILL TYPE: Standard Engineered Sill

HANDLE TYPE: Interlock - Aria

HANDLE HEIGHT: 36"

JAMB WIDTH: 4 9/16" (5 5/8" Overall)

BOTTOM RAIL: 2 15/16"

TOP RAIL & STILES: 2 15/16"

NOTES:

This quote is valid for 30 days. To submit this order, please "PROCEED WITH ORDERING" and print your "Dealer Order" form using the LaCantina Doors Space Program. The Dealer Order form must be signed and returned to LaCantina Doors and proper form of payment must be received to complete your order.

150309

DEALER QUOTE



3817 OCEAN RANCH BLVD., SUITE 114
OCEANSIDE, CA 92056
T: 760.734.1590
F: 760.734.1591

ORDER #: 469623

TIME/DATE: 3/19/2015 10:36 AM

PREPARED FOR: Exclusive Windows and Doors of Austin

PAGE: 2 of 6

DEALER REP: John Gonzalez

SHIP TO ADDRESS: 9324 Neils Thompson, Suite 113, Austin, TX 78758

PROJECT NAME: Solar Decathlon

LOCATION: 105A

B 469623



Aluminum TC (Thermally Controlled)

CLEAR OPENING IS LESS HEAD, SILL, JAMBS AND PANEL STACK; PER CONFIGURATION

1 PANEL(S) FOLDING LEFT

AS VIEWED FROM THE EXTERIOR

0 PANEL(S) FOLDING RIGHT

PRODUCT TYPE: Swing Doors

PANEL TYPE: Custom Size

SYSTEM TYPE: Aluminum TC (Thermally Controlled)

DAILY PASSAGE DOOR: Yes

QUANTITY: 1

ALUMINUM COLOR: Bronze Anodized (Stock Anodized)

CONFIGURATION: 1LOR (viewed from outside)

HARDWARE FINISH: Bronze

REC'D RO WIDTH: 36 1/2"

HEAD TRACK FINISH: N/A

REC'D RO HEIGHT: 108"

SILL FINISH: Bronze Anodized

NET FRAME WIDTH: 35 1/2"

GLASS TYPE: LoE 366 / i89

NET FRAME HEIGHT: 107 1/2"

SPACER: Stainless Steel

NET PANEL WIDTH: 32 7/16"

GLASS WIDTH (DLO): 26 1/2"

NET PANEL HEIGHT: 104 13/16"

GLASS HEIGHT (DLO): 98 15/16"

SWING DIRECTION: OutSwing

SILL TYPE: Outswing Weather Resistant Sill

HANDLE TYPE: Interlock - Aria

HANDLE HEIGHT: 36"

JAMB WIDTH: 4 9/16" (5 5/8" Overall)

BOTTOM RAIL: 2 15/16"

TOP RAIL & STILES: 2 15/16"

CUSTOM OPTIONS: 4 HingeSet Apply

NOTES:

This quote is valid for 30 days. To submit this order, please "PROCEED WITH ORDERING" and print your "Dealer Order" form using the LaCantina Doors Space Program. The Dealer Order form must be signed and returned to LaCantina Doors and proper form of payment must be received to complete your order.

150309

DEALER QUOTE



3817 OCEAN RANCH BLVD., SUITE 114
OCEANSIDE, CA 92056
T: 760.734.1590
F: 760.734.1591

ORDER #: 469623

TIME/DATE: 3/19/2015 10:36 AM

PREPARED FOR: Exclusive Windows and Doors of Austin

PAGE: 3 of 6

DEALER REP: John Gonzalez

SHIP TO ADDRESS: 9324 Neils Thompson, Suite 113, Austin, TX 78758

PROJECT NAME: Solar Decathlon

LOCATION: Master Bedroom

C 469623



Aluminum TC (Thermally Controlled)

CLEAR OPENING IS LESS HEAD, SILL, JAMBS AND PANEL STACK; PER CONFIGURATION

1 PANEL(S) FOLDING LEFT

AS VIEWED FROM THE EXTERIOR

0 PANEL(S) FOLDING RIGHT

PRODUCT TYPE: Swing Doors

PANEL TYPE: Custom Size

SYSTEM TYPE: Aluminum TC (Thermally Controlled)

DAILY PASSAGE DOOR: Yes

QUANTITY: 1

ALUMINUM COLOR: Bronze Anodized (Stock Anodized)

CONFIGURATION: 1LOR (viewed from outside)

HARDWARE FINISH: Bronze

REC'D RO WIDTH: 45"

HEAD TRACK FINISH: N/A

REC'D RO HEIGHT: 108"

SILL FINISH: Bronze Anodized

NET FRAME WIDTH: 44"

GLASS TYPE: LoE 366 / i89

NET FRAME HEIGHT: 107 1/2"

SPACER: Stainless Steel

NET PANEL WIDTH: 40 15/16"

GLASS WIDTH (DLO): 35"

NET PANEL HEIGHT: 104 13/16"

GLASS HEIGHT (DLO): 98 15/16"

SWING DIRECTION: OutSwing

SILL TYPE: Outswing Weather Resistant Sill

HANDLE TYPE: Interlock - Aria

HANDLE HEIGHT: 36"

JAMB WIDTH: 4 9/16" (5 5/8" Overall)

BOTTOM RAIL: 2 15/16"

TOP RAIL & STILES: 2 15/16"

CUSTOM OPTIONS: 4 HingeSet Apply

NOTES:

This quote is valid for 30 days. To submit this order, please "PROCEED WITH ORDERING" and print your "Dealer Order" form using the LaCantina Doors Space Program. The Dealer Order form must be signed and returned to LaCantina Doors and proper form of payment must be received to complete your order.

150309

Order Number: Y5407602 Page 2 of 6 Initials: _____

Item	Qty	Product Code	Rough Opening Width x Height (Inches)	Oper	Sym	Location	Glaze Options	Lite or Grille Pattern	Hardware	Exterior Trim	Jam Size (Inches)	Additional Options	Unit Price	Item Total
1	1	C-WS-9630-1 Slider Drawing Required U-fac: 0.3 SHGC: 0.21 Vt: 0.47 CR: 59	96 3/4"x30 3/4"	XO	W1		Insulated Clear LoE ⁺ -366 Argon Colni Bead	1 Lite	Matte Black - Hardware TW Black Ext.-Screen	No Brickmould No Sill Nose	4 9/16"	Coating: 2605 Clad: 061 TW Black Doug Fir Clear Int.	\$1,106.64	\$1,106.64
2	1	C-PS-060108-2 Patio Slider U-fac: 0.29 SHGC: 0.19 Vt: 0.44 CR: 57	59 15/16"x110 1/4"	XO	W2		Insulated Clear Tempered LoE ⁺ -366 Argon Cntmp Bead Head:4 5/8" Sille:4 5/8" Kick:6 13/16"	1 Lite	Verona/2170 - Hardware TW Black - Screen 1580 Screen	No Brickmould	4 9/16"	Coating: 2605 Clad: 061 TW Black Doug Fir Clear Int.	\$2,715.56	\$2,715.56
3	1	C-DG-036108-1 Direct Glaze U-fac: 0.27 SHGC: 0.25 Vt: 0.58 CR: 55	36 3/4"x108 3/4"	O	W3		Insulated Clear Tempered LoE ⁺ -366 Argon Colni Bead	1 Lite	No Hardware No Screen	No Brickmould No Sill Nose	4 9/16"	Coating: 2605 Clad: 061 TW Black Doug Fir Clear Int. Cntmp Profile	\$1,159.42	\$1,159.42
4	1	C-OBD3-036108-3 Bifold Outswing Door - E3 Drawing Required Limited Warranty U-fac: 0.3 SHGC: 0.17 Vt: 0.38 CR: 58	111 5/8"x112 5/8"	LLY	101A		Insulated Clear Tempered LoE ⁺ -366 Argon Cntmp Bead Head:4 5/8" Sille:4 5/8" Kick:6 13/16"	1 Lite	Verona/216 Matte Black - Trim Set Bronze - Hinges Bronze - Track Oak Sill Top Fishbit Brown - Qlon	No Brickmould	6 9/16"	Coating: 2605 Clad: 061 TW Black Doug Fir Clear Int.	\$9,439.50	\$9,439.50
Top Fishbit: 16"														
5	1	C-OBD3-036108-3 Bifold Outswing Door - E3 Drawing Required Limited Warranty U-fac: 0.3 SHGC: 0.17 Vt: 0.38 CR: 58	111 5/8"x112 5/8"	LLY	102A		Insulated Clear Tempered LoE ⁺ -366 Argon Cntmp Bead Head:4 5/8" Sille:4 5/8" Kick:6 13/16"	1 Lite	Verona/216 Matte Black - Trim Set Bronze - Hinges Bronze - Track Oak Sill Top Fishbit Brown - Qlon	No Brickmould	6 9/16"	Coating: 2605 Clad: 061 TW Black Doug Fir Clear Int.	\$9,439.50	\$9,439.50
Top Fishbit: 16"														
6	1	C-OBD3-036108-3 Bifold Outswing Door - E3 Drawing Required Limited Warranty U-fac: 0.3 SHGC: 0.17 Vt: 0.38 CR: 58	111 5/8"x112 5/8"	LLY	103A		Insulated Clear Tempered LoE ⁺ -366 Argon Cntmp Bead Head:4 5/8" Sille:4 5/8" Kick:6 13/16"	1 Lite	Verona/216 Matte Black - Trim Set Bronze - Hinges Bronze - Track Oak Sill Top Fishbit Brown - Qlon	No Brickmould	6 9/16"	Coating: 2605 Clad: 061 TW Black Doug Fir Clear Int.	\$9,439.50	\$9,439.50
Top Fishbit: 16"														

08 87 13 SOLAR CONTROL FILMS

Part 1-GENERAL

1.01 SUMMARY

A. This section includes information about:

1. Solar Control Film

1.03 SUBMITTALS

A. Indication of the following in Shop drawings:

1. Film number, Film Type, Film sizes

B. Hardware templates

C. Product Data

1.05 QUALITY ASSURANCE

A. Delivery, storage, and handling

1.06. WARRANTY

A. Manufactures warranty.

PART 2—PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Smart tint, Inc

1. www.smarttint.com

TEL: 1 866 986 9299

2.02 Smart film assembly

A. Description

1. Type: Non-Adhesive smart tint custom, 21 sq pre-wired

2. Finish: White tint finish

PART 3—EXECUTION

3.01-INSTALLATION

1. General-Install films in accordance with manufacturer' s instructions
2. Assemble and secure correctly

3.02-PROTECTION

1. Allow film to be protected to prevent damages, but normal weathering may occur.

END SECTION 08 87 13

08 91 16 OPERABLE WALL LOUVERS

PART 1 – GENERAL

1.01 SUMMARY

Colt Ellisse is a louvred hinged or slideable solar shading panel system that offers architects and contractors a versatile and practical solution to managing solar radiation and aiding privacy, whilst adding a modern architectural aesthetic. It consists of panels built into frames which can slide.

The sliding panels will be made of a metal frame and 2x2" vertical western sinker cypress slats spaced by 2" from each other.

1.02 RELATED SECTIONS

1. Section 06 42 13 WOOD BOARD PANELING
2. Section 07 46 23 WOOD SIDING

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for specified products.
- B. Shop Drawings: Submit shop drawings showing layout, profiles and product components, including edge conditions, panel joints, fixture location, anchorage, accessories, finish colors, patterns and textures.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
- B. Storage: Store materials in an upright position, off ground, under cover, and protected from weather, direct sunlight, and construction activities.
- C. Handling: Protect materials and finish during handling and installation to prevent damage.

PART 2 – PRODUCTS

2.01 MATERIALS

COLT ELLISSE

a. Dimensions

Maximum 1350mm wide x 3160mm high for panels with wooden louvres.

b. Louvre Types

Wooden louvres are manufactured from Western sinker cypress and can be either elliptical or oblong in shape.

c. Controls

The panels can be moved either manually or by electric controls. The controls mechanisms are integrated into the mullions.

COLT ELLISSE SLIDING PANELS

Ellisse sliding panel systems contain louvres which can either rotate or stay fixed. The louvres inside the frames are able to be turned to a maximum of 85° by hand.

The frames can be given a 75µ polyester powder coating in a standard RAL colour. These frames are suspended from an upper profile track.

SHADOTIMBER

Shadotimber are fixed or operable exterior solar shading louver systems that incorporate a unique, alternate solar shading solution. It consists of timber wood louvers, usually western sinker cypress which, if left untreated, ages to a silvery grey tone. The louvers can be installed either horizontally or vertically on the building's façade.

Alternatively, a simulated wood appearance can be provided on shadometal louvers through a desublimation process which will remain colorfast at the original appearance.

This type of system is generally intended for shorter spans without the need for additional supporting framework.

PART 3 – EXECUTION

COMMISSIONING

Proper commissioning of movable Solar Shading Systems by experts is essential. Is recommended to contact a staff of specialists and to certify the system.

COLT SERVICE

Part of the Colt Group of companies, Colt Service offers a comprehensive range of maintenance packages incorporating the maintenance and repair of all building services equipment including non Colt products.

INSTALLATION

A. A wide variety of mounting options are possible including mounting the shading louvers directly to the curtain wall mullions or to the building structure. The method to be used for each project requires structural analysis and engineering to account for the dead weight, wind, snow and ice loads.

B. Proper alignment of the mullions is key to a smooth installation. In some cases the louvers can be factory pre-assembled or “unitized” to reduce installation time. In either case, the operating mechanisms such as bearings, rods and levers are typically factory installed and aligned in the mullions. After commissioning , a capping piece will be installed on the mullions to protect these mechanisms from the elements.

MAINTENANCE & TESTING

a. Colt solar shading systems require virtually no maintenance.

b.All components of any moveable system should be serviced at least once a year and tested monthly.

c.The actuators linkages and non-lubricated bearings are free from routine maintenance. An annual visual inspection of the shading louvers should be sufficient.

d.The actuators are tested to 10,000 cycles in each direction (20,000 total).

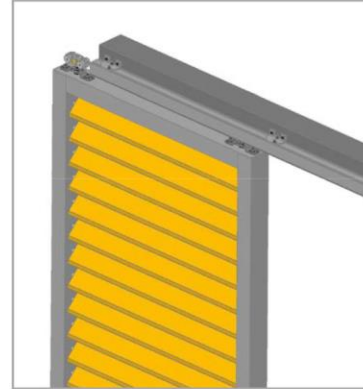
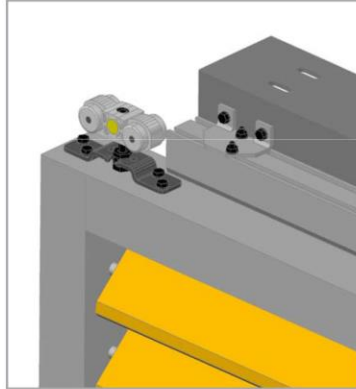
e.Should a louver or window behind the louver need replacement, Colt typically employs a spring-bolt mounting design which allows for the removal of each individual louver independently avoiding the need to remove all the preceding louvers within the row.

Colt Ellisse - Sliding Panels

COLT ELLISSE SLIDING PANELS

Ellisse sliding panel systems contain louvres which can either rotate or stay fixed. The louvres inside the frames are able to be turned to a maximum of 85° by hand.

The frames can be given a 75µ polyester powder coating in a standard RAL colour. These frames are suspended from an upper profile track.



Louver Materials & Finishes

SHADOTIMBER

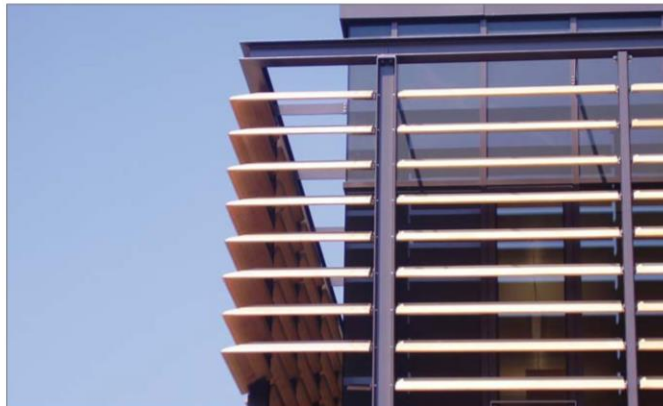
Shadotimber are fixed or operable exterior solar shading louver systems that incorporate a unique, alternate solar shading solution. It consists of timber wood louvers, usually western red cedar which, if left untreated, ages to a silvery-grey tone. The louvers can be installed either horizontally or vertically on the building's façade.

Alternatively, a simulated wood appearance can be provided on shadometal louvers through a dye-sublimation process which will remain colorfast at the original appearance.

This type of system is generally intended for shorter spans without the need for additional supporting framework.

Features and benefits

- Although normally western red cedar, other types of timber wood can be provided.
- Ideal for shorter spans and thinner louvers.
- All principal support components are manufactured from corrosion-resistant extruded aluminum alloy with stainless steel fixings.
- Fully operable or fixed.



PART 18 - DIVISION 09 – FINISHES

09 29 82 FIREPROOF GYPSUM PLASTERING

Part 1-GENERAL

1.01. SUMMARY

A. Section Includes: Gypsum board

B. Related Sections: Section(s) related to this section include:

1. Section 06 11 00: Wood Framing.
2. Section 06 16 00: Rough Carpentry.
3. Section 09 91 23: Interior Painting.

C. System Description

1. 5/8 inch thick gypsum core type x, laminated on front and back sides by 100% recycled paper. Applied on Wall and Ceiling

1.02. REFERENCES

A. ASTM C840-11: Standard Specification for Application and Finishing of Gypsum Board

B. ASTM C475/C475M-02 Joint Compound and Joint Tape for Finishing Gypsum Board

C. ASTM C1396/C1396M-11 Standard Specification for Gypsum Board

D. ASTM C1629/1629M-06(2011) Standard Classification for Abuse-Resistant Standard

Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels

E. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of

Interior Coatings in an Environmental Chamber

F. GA-216-07 Application and Finishing of Gypsum Panel Products: Gypsum Association

G. GA-600-12: Fire Resistance Design Manual: Gypsum Association

1.03. QUALITY ASSURANCE

- A. Provide gypsum board which has been manufactured, fabricated and installed to withstand loads as specified in design documents and ASCE guidelines for high seismic codes and to maintain performance criteria stated by manufacturer without defects, damage or failure.
- B. Installer Qualifications: Installer should be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.
- C. Source Limitations: Obtain all gypsum board through one source.
- D. Compliance: Comply with manufacturer' s ICC ES report, Load Design Charts, Construction Manual, Shop Drawings, and product data, including product technical bulletins, for installation
- E. Plans shall be reviewed by a qualified architect/engineer and shall be signed and/or sealed.
Deviations from standard detail and load design values shall be calculated and signed and/or sealed by a qualified architect/engineer.

1.04. DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials from gypsum board manufacturer with identification labels or markings intact.
- B. Off-load gypsum board from truck and handle using fork lift or other means to prevent

damage to board.

C. Gypsum board shall be fully supported in storage and prevented from contact with the ground. Stack gypsum board horizontally on pallets or in vertical stacks against wall.

D. Gypsum board shall be fully protected from weather. Protect against exposure to rain, water, dirt, mud that could compromise the quality or structural integrity of the gypsum board. Cover stored gypsum board with breathable protective wraps. Gypsum board shall be stored in a protected area: with 360 degree wall enclosure and roof coverage.

1.05. WARRANTY

A. Manufacturer' s Warranty: Submit gypsum board manufacturer' s standard warranty document certifying warranty from 15 years from date of purchase. Manufacturer warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

PART 2 PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturers:

1. Georgia-Pacific Corporation 133 Peachtree Street NE, Atlanta, GA 30303. Phone: (404) 652-4000.

2. California Drywall 2290 So. 10th St., San Jose, CA 95112. Phone: (408) 292 7500

B. Materials

1. Densglass Exterior Rated Type X Gypsum Sheathing
2. Gypsum board for bathroom walls exposed to significant moisture levels consisting of:
 - a. 100% recycled moisture and mold resistant light violet colored face paper and bronze back paper
 - b. Lightweight gypsum core that complies with ASTM D 3273 test method for resistance to growth of mold
- c. Fiberglass reinforcement to resist hard impacts
 3. Gypsum board for all walls except bathroom walls consists of the following:
 - a. 100% recycled paper facing on each side of the gypsum core.
 - b. Lightweight gypsum core
 - c. Fiberglass reinforcement designed to resist hard impacts

C. Fabrication

1. Sizes: ProRoc and AirRenew gypsum board
 - a. 10' (3050 mm) length
 - b. 4' (1220 mm) width
 - c. ½" (12.7 mm) thickness
2. Fire Performance Rating: TBD, In accordance with GA-600-12: Fire Resistance Design Manual (Gypsum Association).

2.02. PRODUCT SUBSTITUTIONS

- A. No substitutions permitted without fourteen day (14) prior approval

B. Substitutions should maintain thermal performance and dimensions provided in existing gypsum board plan.

PART 3 EXECUTION

3.01. INSTALLERS

A. Gypsum board panels will be installed by a qualified installer, trained by a drywall contractor in the proper installation process.

3.02. EXAMINATION

A. Verification of Conditions: Verify wall structures are ready for product installation in accordance with manufacturer' s instructions.

B. Production Verification of Conditions: Verify quality of paper coating of gypsum core and gypsum core visually to ensure product is acceptable for installation. Ensure that paper barrier is not broken or that product was not damaged visibly during shipping.

3.03. INSTALLATION

A. Gypsum Board Installation:

1. Gypsum Board Fastening: Apply gypsum board with selected drywall nails as indicated in drawings. Cover exposed nail heads with plaster or other sealing material to prevent compromise of paper barrier.
2. Thermal Barriers: Gypsum wallboard shall be finished with a polymer thermal barrier

and nominal 1" (25 mm) interior wood paneling, or other selected materials. Apply code approved thermal barriers according to gypsum board manufacturer's recommendations.

3. Restrictions: Do not fasten gypsum board to wall surfaces with nails other than approved drywall nails. Do not leave paper barrier compromised (seal after nailing) to prevent mold or mildew penetration to the gypsum core.

4. Remove and replace gypsum board or damaged before proceeding with installation of additional drywall.

5. Protection: Protect installed product and finish surfaces from damage during construction.

B. Before interior facing is applied, cover installed gypsum board with a plastic sheathing to prevent contamination of indoor air with drywall particulate matter.

3.04. RELOCATION CONSIDERATIONS

A. Repair:

1. Boards with damaged paper facing will be set aside and considered for application at the end of wall sections where gypsum board will be cut to size.

2. Boards with crushed or otherwise structurally compromised gypsum cores will be set aside in a similar manner.

B. Replacement:

1. Should replacement be necessary (i.e. if the paper barrier is significantly damaged or perforated), only gypsum board from selected manufacturer will be used. Replacement boards should have the identical configuration.

3.05. SITE QUALITY CONTROL

A. Site Visits: Site superintendent, set crew superintendent, and project manager shall review attachment of gypsum board to existing wall structure to ensure quality.

3.06. COMMISSIONING

A. A blower door test shall be used to test infiltration and air tightness of the envelope.

Infiltration shall not exceed 0.3 ACH. Test will be conducted after the installation of all wall structures and finishes.

END SECTION 09 29 00

09 30 13 CERAMIC TILING

PART 1 GENERAL

1.01. SUMMARY

A. Section Includes: Ceramic Tiling

B. Related Sections: Section(s) related to this section include:

1. 06 12 00 Structural Insulated Panels
2. 09 64 29 Wood Strip and Plank Flooring

1.02. REFERENCES

A. Tile Manufacturing Standard: Comply with the requirements of ANSI
"American National

Standard Specification for Ceramic Tile" (ANSI A137.1)

B. Installation Standards: Comply with the requirements of ANSI [ANSI A108, A118, A136, A137.1(2008)], and correlated Tile Council of America (TCA) details except where otherwise specified.

1.03. QUALITY ASSURANCE

A. Manufacturer: Procure all tile products for installation from a single manufacturer from a single production run to ensure consistent quality and aesthetic of product.

B. Certifications:

1. Provide manufacturer's Master Grade Certification for each shipment of tile

C. Installer Qualifications: Installer should be experienced in performing work of this section and should have specialized in installation of work similar to that required for this project.

D. Source Limitations: Obtain all tiles through one source. All accessories to be as furnished

or recommended by the tile manufacturer

E. Compliance: Comply with manufacturer' s instructions for installation.

F. Plans shall be reviewed by a qualified architect/engineer and shall be signed and/or sealed.

Deviations from standard detail shall be signed and/or sealed by a qualified architect/engineer.

1.04. DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver tiles in original packages with seal unbroken and original labeling intact.

B. Prevent damage to materials from water, freezing, or foreign materials. Inspect tile upon delivery to ensure that products were not significantly damaged during transport.

1.05. WARRANTY

A. Manufacturer' s Warranty: Submit tile manufacturer' s standard warranty document.

Manufacturer warranty is in addition to, and not a limitation of, other rights Owner may have under Contract Documents.

PART 2 PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturers:

1. Royal Mosa
Meerssenerweg 358
6224 AL Maastricht
P.O. Box 1026 6201
BA Maastricht
The Netherlands
telephone +31 (0)43 368 94 44

fax +31 (0)43 368 93 56

email info@mosa.nl

B. Materials:

1. Royal Mosa: porcelain tile

color number: 200_Cool Porcelain White

product code V

surface: pattern matt

glazed no

frost proof yes

slip-resistance R9

light reflectance value 67 %

inch rectified yes

pieces/m² 16.7

pieces/box 12

boxes/pallet 56

pieces/pallet 672

m²/pallet 40

kg/m² 27.2

kg/pallet 1088

a. Size 13% /m² 5 x 60 cm / 2 x 24 inch

b. 35% /m² 10 x 60 cm / 4 x 24 inch

c. 52% /m² 15 x 60 cm / 6 x 24 inch

2.02. ACCESSORIES

A. Setting Materials:

1. Portland cement mortar: complying with ANSI A 108.1, or ANSI A 108.5 in combination with ANSI A108.1

a. Portland cement, ASTM C150, Type 1

b. Sand, ASTM C 144

c. Hydrated Lime: ASTM C 206 or ASTM C 207, Type S

d. Water: clean and potable

e. Reinforcement

2. Floors: ¼" Hardee Backer.

3. Waterproofing/Anti Fracture Membrane: Select per ANSI A118.10-1999 as required.

4. Grouting Materials: Select liquid latex grout per ANSI A118.3, A118.5, A118.6, A118.7 or A118.8-1999.

5. Provide grout in colors selected by the Architect from standard colors available from the approved manufacturers.

6. Dry-set mortar: Complying with ANSI A 118.1, and meeting the requirements for setting the particular type of tile selected.

7. Epoxy mortar: Complying with ANSI 118.3, chemical resistant, and water cleanable before setting

8. Epoxy adhesive: Complying with ANSI 118.3, and water cleanable before setting

9. Primer: as recommended by mortar manufacturer.

B. Grouting Materials:

1. Dry-Set Grout: Compound of portland cement and additives, factory blended for the type of tile to be grouted, and complying with ANSI A 118.6

2. Epoxy Grout: Two or three component epoxy resin and hardener, filler, blended for chemical resistance and the type of tile to be grouted and complying with ANSI A 118.3.

3. Single component, non-slumping, elastomeric rubber resistant to staining, moisture,

mildew, cracking and shrinking, and complying with ANSI A 118.6

C. Waterproofing:

1. In compliance with the flooring manufacturer' s recommendations, an
electromeric
rubber membrane, a neoprene or urethane, or 1or 2 component liquid
formation.

D. Edging

1. Manufacturer provided metal band.

2.03. SOURCE QUALITY CONTROL

A. Source Quality Assurance: Each SIP component required shall be supplied by
SIP

manufacturer and shall be obtained from selected SIP manufacturer or its
approved
supplier.

1. Provide tiles with polyurethane or polysulfide sealant to prevent water
damage and/or
requisite mildew buildup.

B. Source Quality: Obtain tiles from a single manufacturer.

2.04. PRODUCT SUBSTITUTIONS

A. No substitutions permitted without fourteen day (14) prior approval.

PART 3 EXECUTION

3.01. INSTALLERS

A. Tiling will be installed by a trained, qualified installer. If student labor is used,
it will be
trained and overseen by an experienced tiler.

3.02. EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions are suitable of tile
installation. Where ground is not level, a patching compound that can be
troweled on and

patted flat should be applied to any cracks and holes. Any protrusions can and should be

removed by sanding the surface to which stile will be applied.

B. Before tiling, verify that all surfaces to be tiled are structurally sound true to plane, and fall

within maximum variation of $\frac{1}{4}$ " in 10' .

C. Before tiling, all surfaces must be free of curing compounds, oil, grease, wax, dirt, dust,

form releases or other substances that would interfere with proper bond of setting materials.

If tile is installed by the thin-set method, concrete slabs shall be steel trowel or light broom finish.

3.03. INSTALLATION

A. Install tile in accordance with ANSI A 108.1 through 108.7, as applicable for type of tile

and method of installation

1. Neutralize and seal substrate according to mortar/adhesive manufacturer' s recommendations.

2. Mix and apply grouting materials in accordance with manufacturer' s instructions

3. Protection: Protect installed product and finish surfaces from damage during construction.

B. Setting Methods:

1. Comply with appropriate ANSI A108-1999 specification and current Tile Council of

America Handbook for appropriate method of installation for each specification. For

thin set adhesive mortar application use following technique: with the flat side of

trowel, key mortar into substrate. Using the appropriate size trowel, comb mortar in one direction with notched side of the trowel. Set tile with a sliding motion, perpendicular to the mortar ridges. Obtain as near 100% coverage as possible of mortar to tile. Mortar coverage shall be no less than 85% and shall be sufficiently distributed to give full support under all corners and edges of the tile. Note: 95-100% coverage is mandatory for wet and exterior areas. Periodically, remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications.

2. Ensure there is a minimum 1/8" of mortar between tile and substrate after proper bedding. Installer must periodically remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications. If coverage is found to be insufficient, use a larger size notch trowel.

C. Expansion Joints:

1. Install architecturally designed expansion joints as per current TCA Detail EJ171.

Prefabricated expansion joint strips can also be used when suitable.

D. Grouting Methods:

1. Follow exactly grout manufacturer's instructions and comply with appropriate ANSI A108-1999 specification depending on type of grout selected. Grouting is not complete until all grout haze and residues are removed from the surface of the tile.

E. Cleaning and Protection:

1. Leave finished installation free of cracked, chipped, broken, unbonded or otherwise defective tile work.
2. Protect all floor tile installations with clean construction paper or other heavy covering during construction period to prevent staining or damage.
3. No foot or wheel traffic permitted on floor for at least 3 days after grouting.

3.04. RELOCATION CONSIDERATIONS

A. Product shall remain in place during transportation.

B. Repair:

1. Cracked grouting can be repaired by an installer with a topcoat and proper curing time.

C. Replacement:

1. Cracked tiles shall be removed and replaced with identical tiles. The installation shall then be regouted.

3.05. SITE QUALITY CONTROL

A. Site superintendent shall check the level of the finish floor and verify that tiling and grouting has been completed competently.



209V



200V



203V / 203VV



210V



230V

Ruim spectrum van kleuren

Terra Maestricht is leverbaar in een ruim spectrum van kleuren en tinten. Van koel tot warm. De unieke en natuurlijke kleurschakeringen dankt Terra Maestricht aan Mosa's unieke technologische pigmentprocedé. Bij de ene kleur geprononceerder dan bij de andere.

Large spectre de couleurs

La ligne Terra Maestricht est proposée dans un large spectre de couleurs et de teintes. Des plus chaudes aux plus froides. Les variations des couleurs uniques et naturelles de la ligne Terra Maestricht sont le résultat du procédé de pigmentation unique utilisé par Mosa. Un procédé dont les effets sont plus prononcés sur certains carreaux que sur d'autres.

Großes Spektrum an Farben

Terra Maestricht ist in einem großen Spektrum an Farben und Tönen erhältlich. Von 'kalt' bis 'warm'. Die wunderbar natürlichen Farb-abstufungen, mal ausgeprägter, mal zurückhaltender, verdankt Terra Maestricht dem einzigartigen Pigmentverfahren des Herstellers Mosa.

A wide range of colours

Terra Maestricht is available in a wide range of colours and shades, from cool to warm. The unique, natural colour gradations of Terra Maestricht are the result of Mosa's unique technological pigment process, with one colour more pronounced than the other.

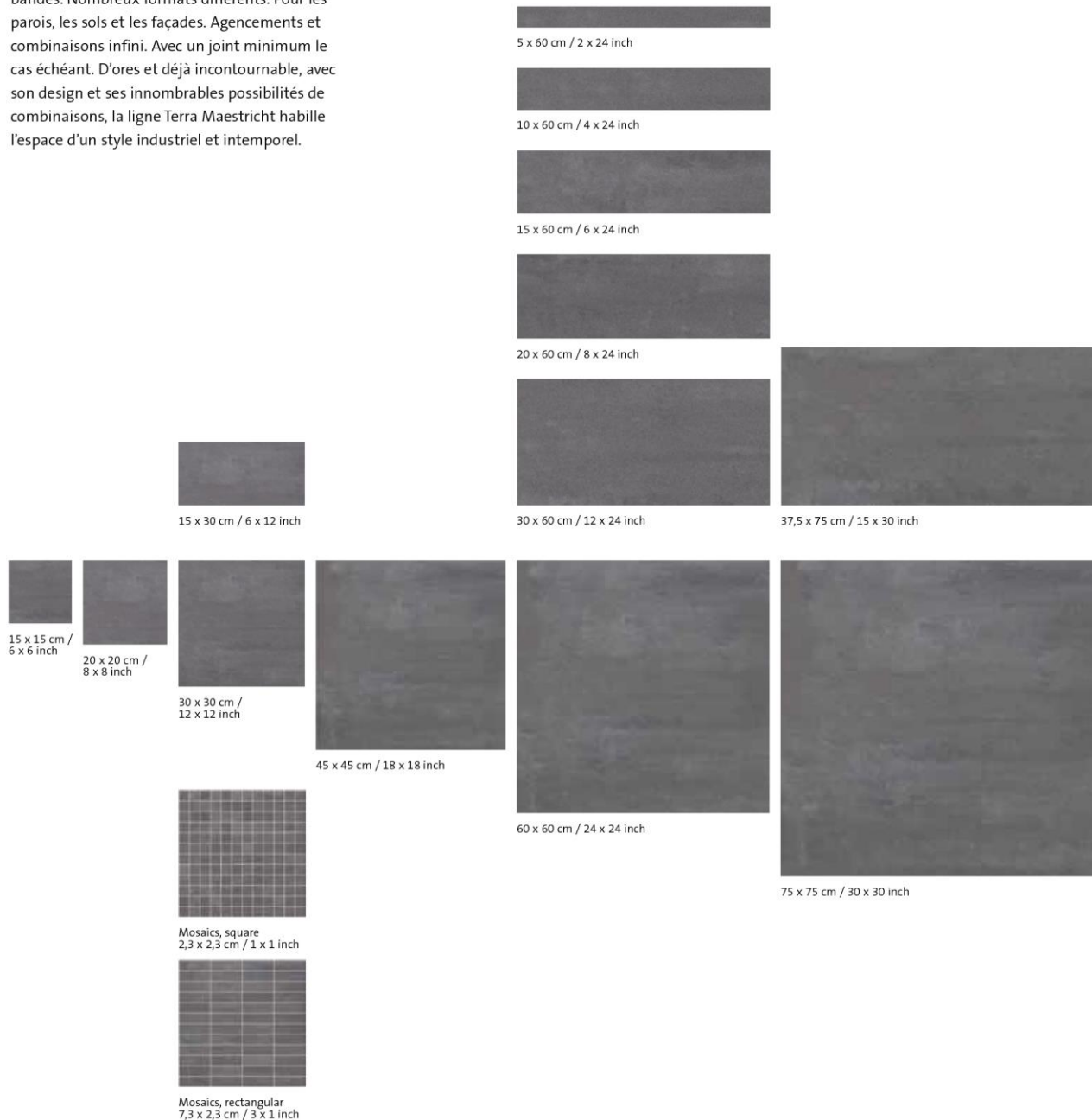
Voor standaard beschikbare formaten en kleuren zie de matrix verderop in deze brochure of raadpleeg onze website www.mosa.nl.
Pour les formats et couleurs standard disponibles, regardez la matrice plus loin dans cette brochure ou consultez notre site web www.mosa.nl.
Wenn Sie Informationen zu den Größen und Farben aus unserem Standardangebot wünschen, finden Sie diese in der Matrix weiter hinten in dieser Broschüre oder auf unserer Webseite www.mosa.nl.
For standard sizes and colours available, see the matrix furtheron in this brochure or consult our website www.mosa.nl.

Modulaire formaten

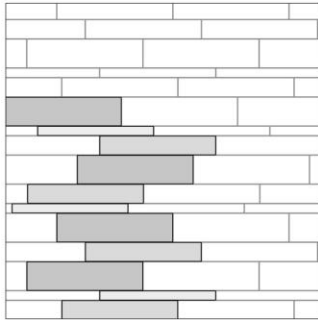
Terra Maestricht is er van XXS (mozaïek) tot XXL. Vierkant, rechthoekig of in stroken. In veel verschillende formaten. Voor wand, vloer en gevel. In oneindig veel verbanden en combinaties te leggen. Indien gewenst met minimale voeg. Terra Maestricht is met zijn uitstraling en mogelijkheden nu al een tegelklassieker die zorgt voor een tijdloos en industrieel beeld in de ruimte.

Formats modulaires

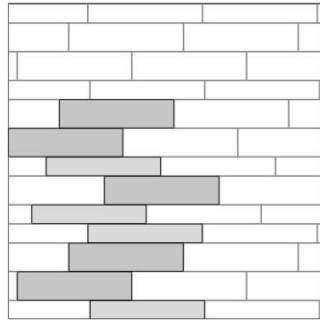
Les carreaux Terra Maestricht sont disponibles dans plusieurs formats, allant de XXS (mosaïque) à XXL. Des modèles carrés, rectangulaires ou en bandes. Nombreux formats différents. Pour les parois, les sols et les façades. Agencements et combinaisons infini. Avec un joint minimum le cas échéant. D'ores et déjà incontournable, avec son design et ses innombrables possibilités de combinaisons, la ligne Terra Maestricht habille l'espace d'un style industriel et intemporel.



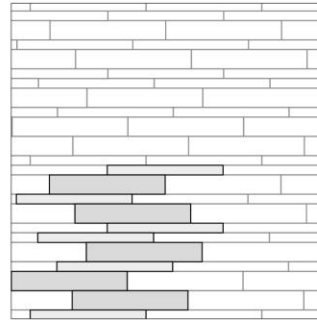
Tegelpatronen Terra Maestricht stroken 60 cm / motifs de carreaux Terra Maestricht listels 60 cm /
Verlegemuster Terra Maestricht Streifen 60 cm / tile patterns Terra Maestricht planks 60 cm - 24 inch



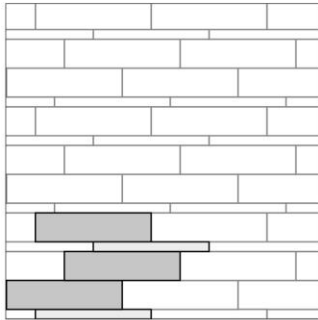
TS-1
13% /m² 5 x 60 cm / 2 x 24 inch
35% /m² 10 x 60 cm / 4 x 24 inch
52% /m² 15 x 60 cm / 6 x 24 inch



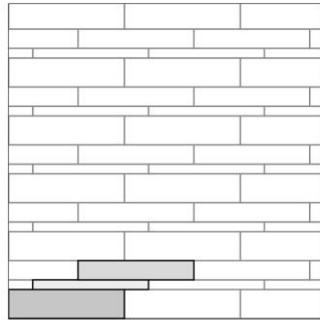
TS-2
35% /m² 10 x 60 cm / 4 x 24 inch
65% /m² 15 x 60 cm / 6 x 24 inch



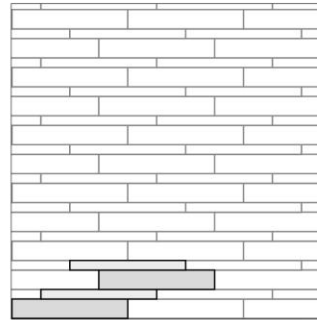
TS-3
38% /m² 5 x 60 cm / 2 x 24 inch
62% /m² 10 x 60 cm / 4 x 24 inch



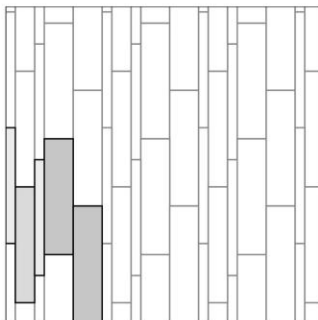
TS-4
18% /m² 5 x 60 cm / 2 x 24 inch
82% /m² 15 x 60 cm / 6 x 24 inch



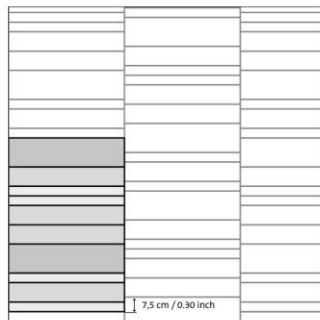
TS-5
17% /m² 5 x 60 cm / 2 x 24 inch
33% /m² 10 x 60 cm / 4 x 24 inch
50% /m² 15 x 60 cm / 6 x 24 inch



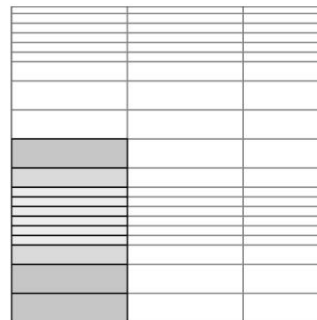
TS-6
33% /m² 5 x 60 cm / 2 x 24 inch
67% /m² 10 x 60 cm / 4 x 24 inch



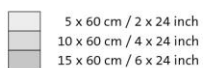
TS-7
20% /m² 5 x 60 cm / 2 x 24 inch
20% /m² 10 x 60 cm / 4 x 24 inch
60% /m² 15 x 60 cm / 6 x 24 inch



TS-8
23% /m² 5 x 60 cm / 2 x 24 inch
43% /m² 10 x 60 cm / 4 x 24 inch
34% /m² 15 x 60 cm / 6 x 24 inch



TS-9
28% /m² 5 x 60 cm / 2 x 24 inch
23% /m² 10 x 60 cm / 4 x 24 inch
49% /m² 15 x 60 cm / 6 x 24 inch



Meerdere tegelpatronen zijn mogelijk.
Plusieurs motifs de carreaux sont possibles.
Mehrere Verlegemuster sind möglich.
Multiple tile patterns are possible.

Formaten / formats / Formate / sizes

Terra Maestricht / Terra XXL / Mosa XXS / Terra LED

no.	Mosaics, square	Mosaics, rectangular	15 x 15 cm / 6 x 6 inch	15 x 15 cm / 6 x 6 inch	15 x 15 cm / 6 x 6 inch	15 x 15 cm / 6 x 6 inch	15 x 30 cm / 6 x 12 inch	15 x 30 cm / 6 x 12 inch	20 x 20 cm / 8 x 8 inch	20 x 20 cm / 8 x 8 inch	30 x 30 cm / 12 x 12 inch	30 x 30 cm / 12 x 12 inch	30 x 60 cm / 12 x 24 inch	30 x 60 cm / 12 x 24 inch	37,5 x 75 cm / 15 x 30 inch	45 x 45 cm / 18 x 18 inch	45 x 45 cm / 18 x 18 inch	45 x 45 cm / 18 x 18 inch	45 x 45 cm / 18 x 18 inch	60 x 60 cm / 24 x 24 inch	60 x 60 cm / 24 x 24 inch	60 x 60 cm / 24 x 24 inch	60 x 120 cm / 24 x 48 inch	60 x 120 cm / 24 x 48 inch	75 x 75 cm / 30 x 30 inch	90 x 90 cm / 36 x 36 inch	90 x 90 cm / 36 x 36 inch	100 x 100 cm / 40 x 40 inch	5 x 60 cm / 2 x 24 inch	5 x 60 cm / 2 x 24 inch	10 x 60 cm / 4 x 24 inch	10 x 60 cm / 4 x 24 inch	15 x 60 cm / 6 x 24 inch	15 x 60 cm / 6 x 24 inch	20 x 60 cm / 8 x 24 inch	20 x 120 cm / 8 x 48 inch	30 x 120 cm / 12 x 48 inch	40 x 120 cm / 16 x 48 inch					
	MZVV	MZVR	VV	RM*	V	RL	V	RM*	V	RM*	V	RL	V	RL	V	V	VE	RL	LD	V	RL	LD	V	RL	V	V	V	V	V	V	RL	V	RL	V	RL	V	V	V	V	V			
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Accessoires / accessoires / Formteile / accessories

no.	30 x 9,5 cm / 12 x 3,8 inch	45 x 9,5 cm / 18 x 3,8 inch	60 x 9,5 cm / 24 x 3,8 inch	75 x 9,5 cm / 30 x 3,8 inch	90 x 9,5 cm / 36 x 3,8 inch	120 x 9,5 cm / 48 x 3,8 inch	15 x 15 cm / 6 x 6 inch	15 x 15 cm / 6 x 6 inch	30 x 30 cm / 12 x 12 inch	30 x 120 cm / 12 x 48 inch	30 x 120 cm / 12 x 48 inch	30 x 120 cm / 12 x 48 inch	15 x 90 cm / 6 x 36 inch	15 x 90 cm / 6 x 36 inch
	BP	BP	BP	BP	BP	BP	VM**	HM**	T	TVG	TV	HV	SV	SRL
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201	•	•	•	•	•	•								
202	•	•	•	•	•	•								
203	•	•	•	•	•	•								
204	•	•	•	•	•	•								
205	•	•	•	•	•	•								
206	•	•	•	•	•	•								
207	•	•	•	•	•	•								
208	•	•	•	•	•	•								
209	•	•	•	•	•	•								
210	•	•	•	•	•	•								
211	•	•	•	•	•	•								
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229	•	•	•	•	•	•								
230	•	•	•	•	•	•								
262	•	•	•	•	•	•								
264	•	•	•	•	•	•								
265	•	•	•	•	•	•								
266	•	•	•	•	•	•								

o Deze artikelen zijn op aanvraag leverbaar, rekening houdend met levertijd.
Ces articles sont disponibles sur demande, compte tenu du délai de livraison.
Diese Artikel sind auf Anfrage, unter Berücksichtigung der Lieferzeit, lieferbar.
These articles are available on request. Please take delivery time into consideration.

* Antislip / antidérapant / trittsicher / non-slip

** De artikelnummers van VM en HM zijn 103, 104, 116, 125, 126, 164 en 166 en zijn combineerbaar met de respectievelijke 200-artikelnummers.
Les numéros d'article de VM et HM, à savoir le 103, 104, 116, 125, 126, 164 et 166, peuvent être combinés avec les numéros d'article 200 respectifs.
VM and HM besitzen die Artikelnummern 103, 104, 116, 125, 126, 164 und 166 und lassen sich mit den entsprechenden 200er-Artikelnummern kombinieren.
The VM and HM article numbers are 103, 104, 116, 125, 126, 164 and 166 and can be combined with the respective 200 article numbers.

BP
Plint / plinthe droite / Stehsockel / skirting



30 x 9,5 cm / 12 x 3,8 inch
45 x 9,5 cm / 18 x 3,8 inch
60 x 9,5 cm / 24 x 3,8 inch
75 x 9,5 cm / 30 x 3,8 inch
90 x 9,5 cm / 36 x 3,8 inch
120 x 9,5 cm / 48 x 3,8 inch

VM
Douchebakplint
pièce courante
Gefälleformstück
sloping shower edge tile



15 x 15 cm / 6 x 6 inch

HM
Douchebakhoekplint
angle rentrant
Eckformstück
sloping shower corner piece



15 x 15 cm / 6 x 6 inch

Terra Tones

30 x 60 cm / 12 x 24 inch	60 x 60 cm / 24 x 24 inch	60 x 120 cm / 24 x 48 inch	90 x 90 cm / 36 x 36 inch	5 x 60 cm / 2 x 24 inch	10 x 60 cm / 4 x 24 inch	15 x 60 cm / 6 x 24 inch	45 x 90 cm / 18 x 36 inch	20 x 120 cm / 8 x 48 inch	30 x 120 cm / 12 x 48 inch	40 x 120 cm / 16 x 48 inch	no.	kleur couleur Farbe colour
V	V	V	V	V	V	V	V	V	V	V	200	koel porseleinwit / blanc porcelaine frais / kühl porzellanweiß / cool porcelain white
											201	wit / blanc / weiß / white
•	•	•	•	•	•	•	•	•	•	•	202	lichtgrijs / gris clair / hellgrau / light grey
											203	koel zwart / noir frais / kühl schwarz / cool black
											204	agaatgrijs / gris d'agate / achatgrau / agate grey
•	•	•	•	•	•	•	•	•	•	•	205	donkerbruin / brun foncé / dunkelbraun / dark brown
											206	middengrijs / gris moyen / mittelgrau / mid grey
											207	karamel / caramel / karamel / caramel
											208	roestbruin / brun de rouille / rostbraun / rust-brown
											209	zwart-blauw / noir-bleu / schwarz-blau / black-blue
											210	warm porseleinwit / blanc porcelaine chaleureux / warm porzellanweiß / warm porcelain white
											211	avalon beige / avalon beige / avalon beige / avalon beige
•	•			•	•	•					215	grijsgroen / gris-vert / graugrün / grey green
•	•	•	•	•	•	•	•	•	•	•	216	antraciet / anthracite / anthrazit / anthracite
											217	beige / beige / beige / beige
											218	cotto / cotto / cotto / cotto
											225	licht koel grijs / gris frais clair / hell kühl grau / light cool grey
											226	midden koel grijs / gris frais moyen / mittel kühl grau / mid cool grey
											227	donker koel grijs / gris frais foncé / dunkel kühl grau / dark cool grey
											229	donker warm grijs / gris chaleureux foncé / dunkel warm grau / dark warm grey
											230	warm zwart / noir chaleureux / warm schwarz / warm black
											262	licht grijsbeige / gris-beige clair / hell graubeige / light grey beige
											264	grijsbruin / gris-brun / graubraun / grey brown
											265	donker grijsbruin / gris-brun foncé / dunkel graubraun / dark grey brown
											266	lichtbeige / beige clair / hellbeige / light beige

Terra Tones

Per kleurgroep worden, per formaat, uitsluitend drie gelijke hoeveelheden van X, Y en Z geleverd.
Trois quantités équivalentes de X, Y et Z sont fournies par format et par groupe de couleur.
Pro Farbgruppe sind pro Format immer nur drei gleiche Mengen von X, Y und Z erhältlich.
For each colour group and size, three equal quantities of X, Y and Z are supplied only.

Alle tegels zijn voorzien van geslepen kanten, met uitzondering van de formaten 15 x 15 cm (VV/RM), 15 x 30 cm, 20 x 20 cm en 30 x 30 cm (V/RL).
Tous les carreaux sont rectifiés à l'exception des formats 15 x 15 cm (VV/RM), 15 x 30 cm, 20 x 20 cm et 30 x 30 cm (V/RL).
Alle Fliesen sind maßhaltig geschliffen, mit Ausnahme der Formate 15 x 15 cm (VV/RM), 15 x 30 cm, 20 x 20 cm und 30 x 30 cm (V/RL).
All tiles are rectified, except the sizes 15 x 15 cm / 6 x 6 inch (VV/RM), 15 x 30 cm / 6 x 12 inch, 20 x 20 cm / 8 x 8 inch and 30 x 30 cm / 12 x 12 inch (V/RL).

De artikelnummers 203, 204, 205, 216, 226, 227, 229 en 265 in de formaten 20 x 120, 30 x 120, 40 x 120 en 60 x 120 cm zijn door en door gekleurd.
Les numéros d'article 203, 204, 205, 216, 226, 227, 229 et 265 dans les formats 20 x 120, 30 x 120, 40 x 120 et 60 x 120 cm sont en pleine masse.
Die Artikelnummer 203, 204, 205, 216, 226, 227, 229 und 265 in den Formaten 20 x 120, 30 x 120, 40 x 120 und 60 x 120 cm sind durchgefärbt.
The article numbers 203, 204, 205, 216, 226, 227, 229 and 265 in the sizes 20 x 120 cm / 8 x 48 inch, 30 x 120 cm / 12 x 48 inch, 40 x 120 cm / 16 x 48 inch and 60 x 120 cm / 24 x 48 inch are full body.

TVG

Traptegel (rechte, geglazuurde voorzijde) / nez de marche (bord droit émaillé) / Treppenfliese (eckige, glasierte Kante) / stair-tread (straight, glazed edge)

TV

Traptegel (rechte voorzijde) / nez de marche (bord droit) / Treppenfliese (eckige Kante) / stair-tread (straight edge)



30 x 120 cm / 12 x 48 inch

HV

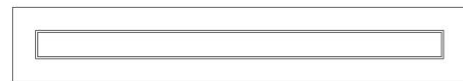
Traptegel (met hoek) / nez de marche (avec coin) / Treppenfliese (mit Ecke) / stair-tread (with corner)



30 x 120 cm / 12 x 48 inch

SV / SRL

Shower drain



15 x 90 cm / 6 x 36 inch

T

Traptegel (rechte voorzijde) / nez de marche (bord droit) / Treppenfliese (eckige Kante) / stair-tread (straight edge)



30 x 30 cm / 12 x 12 inch

Technische data vloertegels / données techniques carreaux de sol / technische Daten Bodenfliesen / technical data floor tiles

Property	Test ISO	Standard EN 14411 Bla	Standard Mosa	Usage area
Length and width	10545-2	+/- 0.6%, max. +/- 2.0 mm	15 x 15 (VV/RM) / 15 x 30 / 20 x 20 / 30 x 30 cm (V/RL); +/- 0.3%; other sizes: +/- 0.04%	Un glazed porcelain floor tiles are frost proof, so suitable for both interior and exterior use. The tiles have got a linear pattern. Mosa advises to fix all tiles in the same direction. Warranty The floor tiles exceed the requirements of Standard EN 14411 Bla. Maintenance For information about the 'Builders Clean' together with daily and periodic maintenance please consult the Mosa documentation or www.mosa.nl. Liability Floor tiles may become slippery when wet. Mosa can accept no liability for the consequences of accidents caused by this. For more information please consult the Mosa documentation or the Technical Product Sheets for each series on our website www.mosa.nl.
Thickness	10545-2	+/- 5%, max. +/- 0.5 mm	+/- 3%	
Straightness of sides	10545-2	+/- 0.5%, max. +/- 1.5 mm	15 x 15 (VV/RM) / 20 x 20 cm: +/- 0.5%; 15 x 30 cm: +/- 0.5% and +/- 0.3%; 30 x 30 cm: +/- 0.3%; 30 x 60 cm: +/- 0.03% and +/- 0.02%; other sizes: +/- 0.02%	
Rectangularity	10545-2	+/- 0.5%, max. +/- 2.0 mm	15 x 15 / 15 x 30 / 20 x 20 / 30 x 30 cm: +/- 0.6%; other sizes: +/- 0.02%	
Edge curvature	10545-2	+/- 0.5%, max. +/- 2.0 mm	15 x 15 / 15 x 30 / 20 x 20 cm: +/- 0.4%; 60 x 120 / 75 x 75 / 90 x 90 / 100 x 100 cm: +/- 0.15%, max. -1.2 / +1.8 mm; other sizes: +/- 0.2%	
Centre curvature	10545-2	+/- 0.5%, max. +/- 2.0 mm	+/- 0.15%, max. +/- 1.8 mm	
Warpage	10545-2	+/- 0.5%, max. +/- 2.0 mm	15 x 15 (VV/RM) / 15 x 30 / 20 x 20 cm: +/- 0.4%; other sizes: +/- 0.2%	
Water absorption	10545-3	≤ 0.5%	toplayer: < 0.05%; body: ≤ 0.3%	
Breaking load	10545-4	< 7.5 mm: 700 N; ≥ 7.5 mm: 1300 N	≥ 1600 N	
Bending strength	10545-4	35 N/mm ²	40 N/mm ²	
Impact resistance	10545-5	not required	0.86	
Wear resistance	10545-6	175 mm ³	120 +/- 30 mm ³	
Coefficient of linear thermal expansion	10545-8	9 x 10 ⁻⁶ [K ⁻¹]	8 x 10 ⁻⁶ [K ⁻¹]	
Thermal shock resistance	10545-9	required	resistant	
Frost resistance	10545-12	required	resistant	
Chemical resistance against:	10545-13			
Household chemicals		≥ class UB	class UA	
Swimming pool salts		≥ class UB	class UA	
Acids and alkalis		not required	class UA	
Non-slip value / walking safety		in accordance with CEN/TS 16165	R9 (200V/200VE/210V); R10 (V); R10/A (V/VV 15 x 15 cm); R10/C (MZVV/MZVR); R11/B (RM); R11/C (RL) Silver	
Cradle to Cradle®				
<hr/>				
Technical data	ASTM test	Requirements	Standard Mosa	Usage area
Water absorption	C 373	≤ 0.5%	surface: < 0.05%; body: ≤ 0.3%	Our frost proof floor tiles may be used in residential and commercial environments. Our limited warranty Royal Mosa warrants that its first choice porcelain tiles are manufactured to ANSI-Standards A 137.1 and meet or exceed the requirements of the standard. Please consult Royal Mosa's sales conditions for complete product warranty details. Maintenance Please consult our Cleaning and Maintenance leaflet on our website www.mosa.nl/us, chapter 'Documentation'. Recycled content Royal Mosa floor tiles are produced with an environmental friendly recycled content of minimum 21%. Colors do not contain lead particles hazardous to health or environment. Consult www.mosa.nl/us, chapter 'Mosa'. Disclaimer notes Like any material, Royal Mosa's porcelain tiles can become slippery when wet. Care should be taken to keep the surface dry at all times. Our tiles should be installed in accordance with the current application guides of the Tile Council of America and/or American National Standards Institute guides and standards. Sizes indicated are nominal. Errors and omissions excepted. Technical Product Sheets For more information please consult the Mosa documentation or the Technical Product Sheets for each series on our website www.mosa.nl/us, chapter 'Documentation'.
Abrasive wear	C 1243	< 175 mm ³	88 mm ³	
Breaking strength	C 648	≥ 250 lbs	6" / 8" / 12" / 18": ≥ 766 lbs; other dimensions: ≥ 1036 lbs	
Bond strength	C 482	≥ 50 psi	246 psi	
Facial dimension (range)	C 499	+/- 0.5%	0.19%	
Range of thickness	C 499	≤ 0.04 inch	0.016 < x < 0.019 inch	
Actual thickness	C 499		6" (VV/RM): 0.28 inch = 9/32"; 12" (MZVV/MZVR): 0.32 inch = 10/32"; 6" (V/RL) / 8" / 12" (V/RL/RM) / 18" (V/RL): 0.40 inch = 13/32"; 18" (VE) / 24" / 30": 0.47 inch = 15/32"; 36" / 40" / 48": 0.51 inch = 16/32"	
Warpage (calibrated) edge	C 485	+/- 0.75%	6" (VV/RM) / 8" / 12" (V/RL/RM): -0.16% ≤ x ≤ 0.07%	
Warpage (rectified) edge	C 485	+/- 0.4%	-0.12% ≤ x ≤ 0.02%	
Warpage (calibrated) diagonal	C 485	+/- 0.5%	6" (VV/RM) / 8" / 12" (V/RL/RM): -0.16% ≤ x ≤ 0.00%	
Warpage (rectified) diagonal	C 485	+/- 0.4%	-0.14% ≤ x ≤ -0.02%	
Wedging (calibrated)	C 502	+/- 0.5%	6" (VV/RM) / 8" / 12" (V/RL/RM): -0.23% ≤ x ≤ 0.19%	
Wedging (rectified)	C 502	+/- 0.25%	-0.14% ≤ x ≤ 0.16%	
Freeze-thaw cycle	C 1026		frost proof	
Mohs scale	C 1026		8	
Modules of rupture	C 674	quartzite 2,000 psi	7,650 psi	
Coefficient of friction	C 1028	≥ 0.6	V/VE/VV: 0.89 (dry) / 0.77 (wet); RL: 0.94 (dry) / 0.80 (wet); MZVV/MZVR: 0.81 (dry) / 0.62 (wet)	
Dynamic Coefficient of Friction (DCOF)	BOT 3000	≥ 0.42	V/VE/VV: 0.76; RL: 0.75; RM: 0.65	

END SECTION 09 30 13

09 64 00 WOOD FLOORING

Part 1-GENERAL

1.01 SUMMARY

A. This section includes information about:

1. Reclaimed Pine Floors

1.03 SUBMITTALS

A. Indication of the following in Shop drawings:

1. Floor Type, Door sizes, and Fire rating.

B. Hardware templates

C. Product Data

1.05 QUALITY ASSURANCE

A. Delivery, storage, and handling

1. Store products in a location that will protect it from being damaged from water, sunlight, and extreme temperature.

PART 2—PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Fine Lumber and Plywood

9407 Brown Lane

Austin, TX 78754

PH (512) 836-8990

Website: www.finelumber.com

2.02 FLOOR CONSTRUCTION

A. Description

1. Type: 5/8" Reclaimed Pine Flooring

PART 3—EXECUTION

3.01-INSTALLATION

1. General-Install flooring in accordance with manufacturer' s instructions
2. Assemble and secure correctly

3.02-PROTECTION

1. Allow flooring to be protected to prevent damages, but normal weathering may occur.

END SECTION 09 64 23**09 91 23 INTERIOR PAINTING****PART 1 GENERAL****1.01. SUMMARY****A. Section Includes:**

1. The Work in this Section requires the surface preparation and field application of primers, paints, stains and coatings to surfaces scheduled in the Schedule.

B. Related Sections:

1. Section 06 20 00—Finish Carpentry.
2. Section 09 00 00—Plaster and Gypsum Board.

1.02. REFERENCES

- A. Green Seal Standard GS-11; May 20, 1993.
- B. US Green Building Council, (USGBC): Green Seal standards for LEED paint credits.
- C. American National Standards Institute (ANSI): Performance Standards.
- D. Paint Decorating Contractors of America (PDCA): Application Standard.
- E. National Paint and Coatings Association (NPCA): Gloss Standard.
- F. American Society for Testing Materials (ASTM): Testing Methods.
- G. Master Paint Institute (MPI): Established paint categories and standards.
- H. Ozone Transmission Commission (OTC): Established levels of Volatile Organic Compounds.
- I. SCAQMD 1168: South Coast Air Quality Management District Rule #1168; October 3, 2003.

J. National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S.

Environmental Protection Agency; current edition.

1.03. SUBMITTALS

A. Manufacturer shall provide sample materials demonstrating finishes and colors. Each sample shall be in triplicate, 5 inches x 7 inches in size, illustrating selected colors for each color and system selected with the specified coats cascaded.

1.04. MAINTENANCE MATERIAL SUBMITTALS

A. Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

1.05. QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten (10) years experience.

B. Installer Qualifications: All products listed in this section are to be applied by a Painting Contractor with a minimum of five years demonstrated experience in surface preparation and field application of the same type and scope as specified.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.

1. Mock-up areas designated by Architect.

2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

3. Approved mock-up areas will serve as the standard for remaining Work.

4. Refinish mock-up area as required to produce acceptable Work.

1.06. DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

C. Disposal:

1. Never pour leftover coating down any sink or drain. Use up material on the job or seal

can and store safely for future use.

2. Do not incinerate closed containers.

3. For specific disposal or recycle guidelines, contact the local waste management agency or district. Recycle whenever possible.

1.07. WARRANTY

A. Inspection of all surfaces to be coated must be done by the manufacturer's representative

to insure proper preparation prior to application. All thinners, fillers, primers and finish

coatings shall be from the same manufacturer to support a product warranty.

Products other

than those submitted shall be accompanied by a letter stating its fitness for use and

compatibility.

B. At project closeout, provide to the Owner or owner's representative an executed copy of

the Manufacturer's standard form outlining the terms and conditions of and any exclusions

to their Limited Warranty against Manufacturing Defect.

PART 2 PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturers:

1. Behr Process Corporation. 3400 W. Segerstrom Ave., Santa Ana, CA 92704. Phone: (714) 545-7101.

B. Materials:

1. Behr Premium Plus Paint+Primer All in One

- a. Color: Eggshell White
- b. Additional: Deep Base for Tinting

2. Volatile Organic Compound (VOC) Content:

- a. Provide coatings that comply with the most stringent requirements specified in the following:

- (a) 40 CFR 59, Subpart D-National Volatile Organic Compound Emission

Standards for Architectural Coatings.

- (b) Determination of VOC Content: Testing and calculation in accordance with 40

CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint

base and water added at project site; or other method acceptable to authorities

having jurisdiction.

3. Compatibility: Provide materials that are compatible with one another and the

substrates indicated under conditions of service and application, as demonstrated by

manufacturer based on testing and field experience.

4. Mixing and Tinting:

a. Except where specifically noted in this section, all painting shall be ready-mixed and pre-tinted. Agitate all paint prior to and during application to ensure uniform color, gloss, and consistency.

b. Thinner addition shall not exceed manufacturer' s printed recommendations. Do not use kerosene or other organic solvents to thin water-based paints.

c. Where paint is to be sprayed, thin according to manufacturer' s current guidelines.

2.02. PRODUCT SUBSTITUTIONS

A. No substitutions shall be allowed except with written permission of the Project Manager.

PART 3 EXECUTION

3.01. INSTALLERS

A. Only qualified installers shall install the product. Qualified installers will be determined by the Project Manager and/or Construction Manager.

3.02. EXAMINATION

A. The Contractor shall review the product manufacturer's special instructions for surface preparation, application, temperature, re--coat times, and product limitations.

B. The Contractor shall review product health and safety precautions listed by the manufacturer.

C. The Contractor shall be responsible for enforcing on site health and safety requirements associated with the Work.

- D. Do not begin installation until substrates have been properly prepared.
- E. Ensure that surfaces to receive paint are dry immediately prior to application.
- F. Ensure that moisture--
retaining substrates to receive paint have moisture content within
tolerances allowed by coating manufacturer. Where exceeding the following
values,
promptly notify Architect and obtain direction before beginning work.
 - 1. 3. Interior Wood: 15 percent.
 - 2. Interior Finish Detail Woodwork, Including Trim, and Casework: 10 percent.
 - 3. Plaster and Gypsum: 15 percent.
- G. Examine surfaces to receive coatings for surface imperfections and
contaminants that could
impair performance or appearance of coatings, including but not limited to,
loose primer,
rust, scale, oil, grease, mildew, algae, or fungus, stains or marks, cracks,
indentations, or
abrasions.
- H. Correct conditions that could impair performance or appearance of coatings
in accordance
with specified surface preparation procedures before proceeding with coating
application.

3.03. INSTALLATION

A. Preparation

- 1. Clean surfaces thoroughly prior to coating application.
- 2. Do not start work until surfaces to be finished are in proper condition
to produce
finished surfaces of uniform, satisfactory appearance.
- 3. Stains and Marks: Remove completely, if possible, using materials and
methods

recommended by coating manufacturer; cover stains and marks which cannot be

completely removed with isolating primer or sealer recommended by coating

manufacturer to prevent bleed-through.

4. Remove Mildew, Algae, and Fungus using materials and methods recommended by coating manufacturer.

5. Remove dust and loose particulate matter from surfaces to receive coatings immediately prior to coating application.

6. Remove or protect adjacent hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings.

7. Move or protect equipment and fixtures adjacent to surfaces indicated to receive coatings to allow application of coatings.

8. Protect adjacent surfaces not indicated to receive coatings.

9. Prepare surfaces in accordance with manufacturer's instructions for specified coatings and indicated materials, using only methods and materials recommended by coating manufacturer.

B. Surface Preparation

1. Gypsum Board: Repair cracks, holes and other surface defects with joint compound to produce surface flush with adjacent surfaces.

2. Metals-Aluminum, Mill-Finish: Clean and etch surfaces with a phosphoric acid-water

solution or water based industrial cleaner. Flush with clean water and allow to dry, before applying primer coat.

3. Metals-Galvanized Steel (not passivated): Clean with a water-based industrial strength

cleaner, apply an adhesion promoter followed by a clean water rinse.

Alternately, wipe

down surfaces using clean, lint-free cloths saturated with xylene or lacquer thinner;

followed by wiping the surface dry using clean, lint-free cloths.

4. Metals-Galvanized Steel, Passivated: Clean with water--based industrial strength

cleaner. After the surface has been prepared, apply recommended primer to a small

area. Allow primer to cure for 7 days, and test adhesion using the "cross-hatch adhesion

tape test" method in accordance with ASTM D 3359. If the adhesion of the primer is

positive, proceed with a recommended coating system for galvanized metal.

5. Metals-Stainless Steel: Clean surfaces with pressurized steam, pressurized water, or water-based industrial cleaner.

6. Plaster: Repair cracks, holes and other surface defects as required to maintain proper

surface adhesion. Apply patching plaster or Joint compound and sand to produce

surface flush with adjacent undamaged surface. Allow a full cure prior to coating

application as recommended by the patching compound manufacturer's

recommendations.

7. Wood:

a. Seal knots, pitch streaks, and sap areas with sealer recommended by coating

manufacturer; fill nail recesses and cracks with filler recommended by coating

manufacturer; sand surfaces smooth.

b. Remove mill marks and ink stamped grade marks.

c. Apply primer coat to back of wood trim and paneling.

8. Wood Doors: Seal door tops and bottoms prior to finishing.

C. Application:

1. Application of primers, paints, stains or coatings, by the Contractor, will serve as

acceptance that surfaces were properly prepared in accordance with the manufacturer's recommendation.

2. Apply each coat to uniform coating thickness in accordance with manufacturer's

instructions, not exceeding manufacturer's specified maximum spread rate for indicated

surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.

3. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.

4. Inspect each coat before applying next coat; touch-up surface imperfections with

coating material, feathering, and sanding if required; touch-up areas to achieve flat,

uniform surface without surface defects visible from 5 feet (1.5 m).

5. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
6. Where paint application abuts other materials or other coating color, terminate coating with a clean sharp termination line without coating overlap.
7. Where color changes occur between adjoining spaces, through framed openings that are of same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.
8. Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.

D. Cleaning:

1. Clean excess coating materials, and coating materials deposited on surfaces not indicated to receive coatings, as construction activities of this section progress; do not allow to dry.
2. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items that have been removed to protect from contact with coatings.
3. Reconnect equipment adjacent to surfaces indicated to receive coatings.
4. Relocate to original position equipment and fixtures that have been moved to allow application of coatings.

5. Remove protective materials.

3.04. RELOCATION CONSIDERATIONS

A. Repair:

1. Repair to Architect's acceptance coatings damaged by subsequent construction activities. Where repairs cannot be made to Architect's acceptance, re-apply finish coating to nearest adjacent change of surface plane, in both horizontal and vertical directions.

3.05. SITE QUALITY CONTROL

1. Protect completed coating applications from damage by subsequent construction activities.

3/25/2015

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Features

CRITERIA	INT. STANDARD	VALUE	UNIT
TVOC & VOC (including tint pigments)	2004/42/CE Max., Value 30g/l (2010), DIN EN ISO 11890-1/2	0.00	g/l
Water Absorption Coefficient	EN 1062-3 - DIN 52617	0.10	kg/(m ² • √h)
Vapor Permeability	DIN 53122, EN 7783-2, EN 1062-1, EN 10795	< 200 Sd 0.18 Class II, Medium High, Medium High	g/m ² (24 h)
Caulking Resistance	ASTM-D-659	800	UV Hour Con.
Damp Abrasion Resistance (Gardner Cycles)	EN 10795 - ISO 11998	Ideal	< 5000
Surface Retention Smog/Dirt	EN 10795	Low	> 9 - ≤ 15
Drying Time at Low Temperature	UNI 10793	> 5	°C
Application on Damp Cement NHL 3.5/5.0	UNI EN 13300	Excellent	-
Potassium Silicate Opaque Paint for Interior	DIN 18363 Paragraph 2.4.1	Yes	-
Application Quality	UNI 10794	Good	-
Hide and Cover Capacity	ISO 6504-3 M.U. 1631	Class 2	< 96 - < 98
pH Value	DIN 19266	9.8 w / 11.3 t	-
Natural Resistance to Mold	DIN 19266	-	-
Alkaline Resistance	UNI 10795	Excellent	-
Specific Gravity (23°C)	EN ISO 2811-2	1.37	g/ml
Granulation	DIN 19643 - EN 21524	0.0 - 0.01	mm

<http://romabio.com/products/ecodomus-matte/>

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Gloss Level	UNI EN ISO 2813	< 30	Matte
Reaction to Fire	EN 13501-1:2002	A 1	Incombustible
Toxicity	EN 13501-1:2002	Non-Toxic	-
EcoLabel	CEE 88/379	3 - 4 - 7 - 8	Criteria EcoLabel
EcoLabel	APEO FREE Exempt of Butyl, Phthalate (DBP), Dioctyl Phthalate (DOP), 2-Ethylhexyl Phthalate (DOP)	-	-
APEO (Alkyl Phenol Ethoxylates)	-	0%	-
PEG (Polyethylene Glycol)	-	0%	-
PG (Propylene Glycol)	-	0%	-
Formaldehyde	-	0%	-
Biocides	-	0%	-

Does not contain chemicals that can aggravate or cause asthma, see NIH Asthma Report 2012.

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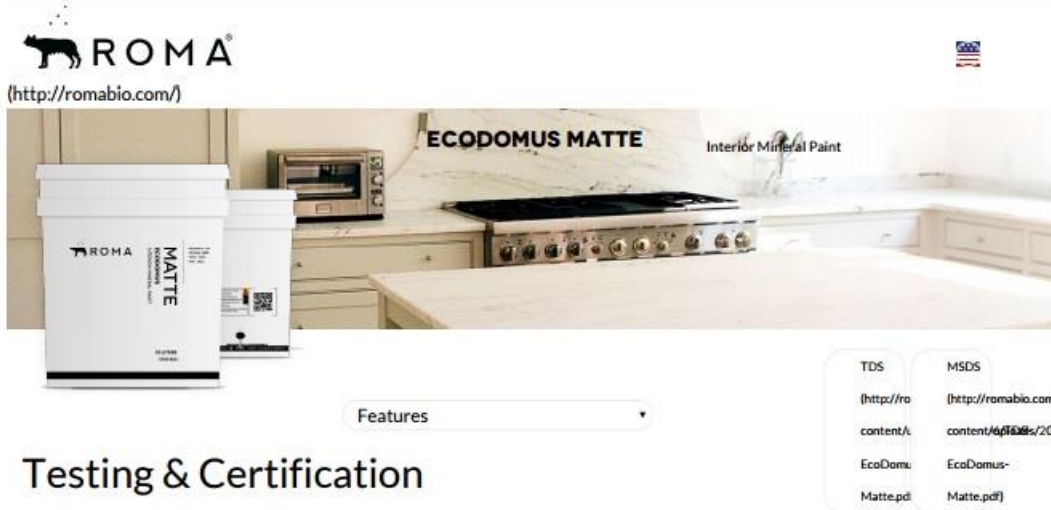
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ECODOMUS MATTE Interior Mineral Paint

Features

TDS (http://romabio.com/content/uploads/2014/09/EcoDomus-Matte.pdf)	MSDS (http://romabio.com/content/uploads/2014/09/EcoDomus-Matte.pdf)
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Testing & Certification

Cradle To Cradle Certified™

ROMA is currently the only paint manufacturer with 13 products Cradle To Cradle™ (C2C) Certified v3.0 in the world. The C2C certification is stringent, transparent, and administered by a 3rd party. It measures continuous improvement of products based upon five attributes: material health, material reutilization, renewable energy and carbon management, water stewardship, and social fairness. ROMA chose C2C certification above other green programs because it sets the highest standard in the building industry for sustainability and environmental health across multiple categories and requires bi-annual renewal with continuous improvement.



(http://romabio.com/wp-

Interior Paints v (http://romabio.com/wp-content/uploads/2014/09/EcoDomus-Matte-C2C-Certification-Report-2014-09-testing-c2c.png)

Healthy Product Declaration™ (HPD)

Health Product Declaration (HPD) is a standard format for reporting product content and direct health hazards associated with exposure to its individual contents. An HPD for ROMA's products can contribute to points for LEED v4 Materials and Resource Credit: Building product disclosure and optimization for Option 1: HPD must include Full Disclosure of Known Hazards for all intentional ingredients and residuals disclosed at least to 1,000 ppm.



(http://romabio.com/wp-

Interior Paints v (http://romabio.com/wp-content/uploads/2014/12/ROMA-Exterior-Paints-HPD.pdf) content/uploads/2014/09/testing-c2c.png)

Indoor Air Quality Test Results

ROMA has passed the following stringent, high standard testing to reveal negligible impact to your indoor air:

1. CDPH SM V1.1-2010 (CA01350) Emissions Test (per Section 8.5)
2. ASTM D5116 Emissions Test Report with CDPH SM V1.1-2010
3. French VOC Label Small Chamber Emissions Test and met the French VOC Label "A+" Class criteria.

IAQ Test Results v (http://romabio.com/wp-content/uploads/2014/12/ROMA-Indoor-Air-Quality-Test-Results.pdf)



Toxicity Verification Report

ROMA utilized ToxServices, a 3rd party verification agency with more than a decade of expertise in toxicology, risk assessment, comparative hazard assessment, and the application of science to promote human health and environmental sustainability, to verify the following claims for 8 interior and 6 exterior mineral paint products:

1. ROMA interior/exterior mineral paint product formulations do not contain the following ingredients:

http://romabio.com/products/ecodomus-matte/

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EcoDomus Matte | ROMA

- a. APEO (Alkylphenol Ethoxylates)
- b. HCHO (Formaldehyde)
- c. PEG (Polyethylene Glycol)
- d. PG (Propylene Glycol)
2. ROMA interior/exterior mineral paint product formulations do not contain chemicals associated with Sick Building Syndrome (SBS).
3. ROMA paint products contain very low or no VOC's.
4. ROMA paint products do not contain any chemicals listed on the Declare Red List (Living Building Challenge).

Toxicity Report v (<http://romabio.com/wp-content/uploads/2014/12/ROMA-Marketing-Claims-Report.pdf>)

ToxSERVICES

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END SECTION 09 91 23

PART 19 - DIVISION 10 – SPECIALTIES

10 24 00 – ROLLING EXTERIOR SCREENS

PART 1 - GENERAL INFORMATION

1.01. SUMMARY

A. This section includes:

1. Rolling Exterior Screens

12' 9" with Serge Ferrari Soltice W92 White

B. Related Sections:

1. 05 45 13 MECHANICAL METAL SUPPORTS

2. 05 50 00 METAL FABRICATIONS

1.02. DELIVERY, STORAGE, AND HANDLING

A. Product shall be delivered to site when needed or ordered by project manager.

B. Polyethylene fabric shall be protected from the sun and weather.

C. Storage on-site shall be facilitated in a dry location, and product shall be protected from rain and moisture during storage on-site.

⊞ Product shall be stored between temperatures of 40 F and 120 F.

1.03. WARRANTY

The structural integrity of the steel shall be warranted for twenty (20) years.

The fabric and sewn composite shade covering shall have a pro-rated warranty of ten (10) years.

PART 2 PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturer:**1. Serge Ferrari**

Website: www.sergeferrari.com

Email: infoUS@sergeferrari.com

PH (954) 942-3600

B. Materials:**1. Quality Assurance**

The steel frames and related concrete foundations for the shade canopy shall be designed in conformance with the 2007 Uniform Building Code as follows Wind Design Speed: up to 100 miles per hour per local requirement.

2. Fabric

High-density polyethylene to block out more than 90% of ultraviolet rays.

Monofilament and tape construction giving stable material.

Minimum fading allowed after 5 years, except for red, which does not have a fading warranty.

All corners shall be strengthened with 15 oz non-tear vinyl material.

3. Thread

Shall be high density, low shrinkage, abrasion resistant, unaffected by cleaning agents, acid rain, mildew, chlorine, saltwater and industrial pollutants.

2.02. PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design exact canopy assembly.

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.

C. Designed to resist wind loads based on Governing Building Code.

D. Structure treated to resist fire in compliance with Governing Building Code.

E. Structure treated to resist corrosion in compliance with Governing Building

Code.

F. Fasteners treated to resist fire in compliance with Governing Building Code.

G. Fasteners treated to corrosion fire in compliance with Governing Building Code.

H. Additional fire and corrosion treatment will need to be applied after installation to combat damage to retardants during assembly.

PART 3 EXECUTION

3.01. EXAMINATION

Examine materials before installation. Reject materials that are wet, moisture damaged, or mold damaged.

3.02. INSTALLATION

1. Once structure is completed fabric will be stretched over frame as described in drawings.

2. Fabric installation must comply with fire regulations as described by Governing Building Code.

END SECTION 10 24 00

10 73 16 - CANOPIES

PART 1 - GENERAL INFORMATION

1.02. SUMMARY

A. This section includes:

1. Canopy Type A Fabric

12' 6" x 12' 6" with painted steel frame (tube steel 2" x3") with Serge Ferrari Soltice W92 White

B. Canopy Type B Fabric

12' 6" x 12' 6" Sail with Serge Ferrari Soltice 86 White

B. Related Sections:

1. 05 45 13 MECHANICAL METAL SUPPORTS

2. 05 50 00 METAL FABRICATIONS

1.02. DELIVERY, STORAGE, AND HANDLING

A. Product shall be delivered to site when needed or ordered by project manager.

B. Polyethylene fabric shall be protected from the sun and weather.

C. Storage on-site shall be facilitated in a dry location, and product shall be protected from rain and moisture during storage on-site.

⊖ Product shall be stored between temperatures of 40 F and 120 F.

1.03. WARRANTY

The structural integrity of the steel shall be warranted for twenty (20) years.

The fabric and sewn composite shade covering shall have a pro-rated warranty of ten (10) years.

PART 2 PRODUCTS

2.01. PRODUCT INFORMATION

A. Manufacturer:

1. Serge Ferrari

Website: www.sergeferrari.com

Email: infoUS@sergeferrari.com

PH (954) 942-3600

B. Materials:

1. Quality Assurance

The steel frames and related concrete foundations for the shade canopy shall be designed in conformance with the 2007 Uniform Building Code as follows Wind Design Speed: up to 100 miles per hour per local requirement.

2. Fabric

High-density polyethylene to block out more than 90% of ultraviolet rays.

Monofilament and tape construction giving stable material.

Minimum fading allowed after 5 years, except for red, which does not have a fading warranty.

All corners shall be strengthened with 15 oz non-tear vinyl material.

3. Thread

Shall be high density, low shrinkage, abrasion resistant, unaffected by cleaning agents, acid rain, mildew, chlorine, saltwater and industrial pollutants.

2.02. PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Division 01 Section "Quality Requirements," to design exact canopy assembly.

- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.
- C. Designed to resist wind loads based on Governing Building Code.
- D. Structure treated to resist fire in compliance with Governing Building Code.
- E. Structure treated to resist corrosion in compliance with Governing Building Code.
- F. Fasteners treated to resist fire in compliance with Governing Building Code.
- G. Fasteners treated to corrosion fire in compliance with Governing Building Code.
- H. Additional fire and corrosion treatment will need to be applied after installation to combat damage to retardants during assembly.

PART 3 EXECUTION

3.01. EXAMINATION

Examine materials before installation. Reject materials that are wet, moisture damaged, or mold damaged.

3.02. INSTALLATION

1. Once structure is completed fabric will be stretched over frame as described in drawings.
2. Fabric installation must comply with fire regulations as described by Governing Building Code.

END SECTION 10 73 16

PART 20 - DIVISION 11 – EQUIPMENT

11 11 36 - VEHICLE CHARGING EQUIPMENT

1.01 GENERAL INFORMATION

A. This section includes the followings:

1. Electric charging station

1.02 SUBMITTALS

A. Submit complete specifications and shop drawings

1.03 QUALITY ASSURANCE

A. Submit certified test reports to verify performance characteristics.

1.04 WARRANTY

A. BMW Ultimate Service

- A. Warranty period: Three (3) year warranty from date of purchase for any material or workmanship defect.
- B. Authorized BMW center will repair or replace defective parts using new or authorized re-manufactured parts.
- C. Warranty does not apply to damage caused by negligence, improper accident damage repairs, or improper use.

PART 2 – PRODUCTS

2.01 ELECTRIC VEHICLE CHARGING BOX

A. BMW Wallbox Pro

1. 129.9 kWh/100km
2. 190 km electric range
3. lithium-ion battery capacity: 18.8 kWh

4. 6-8 hr charge time at 16A (80%)
5. 13 feet long charging cable

PART 3 - EXECUTION

3.01 INSTALLATION

- A. BMW i Wallbox installation service.

3.02 FIELD QUALITY CONTROL

- A. Field Tests: Coverings Etc. to perform testing on all composite units in the Coverings Etc. test facilities. Tests not meeting specified performance requirements and units having deficiencies shall be corrected.

3.03 PROTECTION AND CLEANING

- B. Protection: Protect installed product's finished surfaces from damage during construction
- C. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

END OF SECTION 11 11 36

11 30 13.13 - RESIDENTIAL KITCHEN APPLIANCES

1.01 GENERAL INFORMATION

A. This section includes the followings:

1. Electric Cooktop
2. Residential Ceiling Fans
3. Refrigerator-Freezer
4. Electric Wall Oven
5. Dishwasher

1.02 SUBMITTALS

A. Submit complete specifications and shop drawings

1.03 QUALITY ASSURANCE

A. Submit certified test reports showing compliance with specified performance characteristics.

1.04 WARRANTY

A. Manufacturer's Product Warranty: Coverings etc.

1. Warranty period: Dependent on Manufacture

PART 2 - PRODUCTS

2.01 ELECTRIC COOKTOP

A. Summit

1. 23-inch electric cooktop, 4 cooking zones
2. Black schott ceran glass surface

3. M.-Nr. SINC424220
4. Child Lock
5. Summit 23" 4-Burner SINC424220 Induction Cooktop
6. Dimensions:
 - a. Exterior dimensions: 3.25" x 23" x 20.13"

2.02 RESIDENTIAL CEILING FANS

A. Matthew's Fan Company

1. Eliza EK-WH Model
2. 56" Diameter
3. Energy Star-rated
4. Gloss White Finish

2.04 REFRIGERATOR-FREEZER

A. Blomberg

1. 22" BRFB 1050 FFBI Built-In Fridge/Freezer
2. Energy Star qualified
3. Independent cooling zones: 2
4. Model Number: BRFB 1050 FFBI
5. Dimensions:
 - a. Exterior dimensions: 69 15/16" x 21 15/16" x 21 1/2"

2.05 ELECTRIC WALL OVEN

A. Blomberg

1. 24" BWOS 24100 Built-in Wall Oven
2. ADA Compliant
3. Fingerprint-free Stainless steel finish
4. Model Number: BWOS 24100
5. Safety switch-off
6. Electrical Rating 120-240V AC; 60 Hz
7. Dimensions:
 - a. Exterior dimensions: 23 3/8" x 23 3/8" x 22 2/8"

2.06 DISHWASHER

A. Blomberg

1. 32-inch DW 55100 Series Standard Tub Dishwasher
2. Condensing drying system
3. Energy Star qualified
4. ADA-compliant
5. Quiet Rating - 50dBa
6. Model Number – DW55100
7. Dimensions:
 - a. Exterior dimensions: 32 1/4" x 23 9/16" x 21 5/8"

PART 3 - EXECUTION

3.01 INSTALLATION

- A. General: Install cladding system in accordance with manufacturer's instructions.

3.02 FIELD QUALITY CONTROL

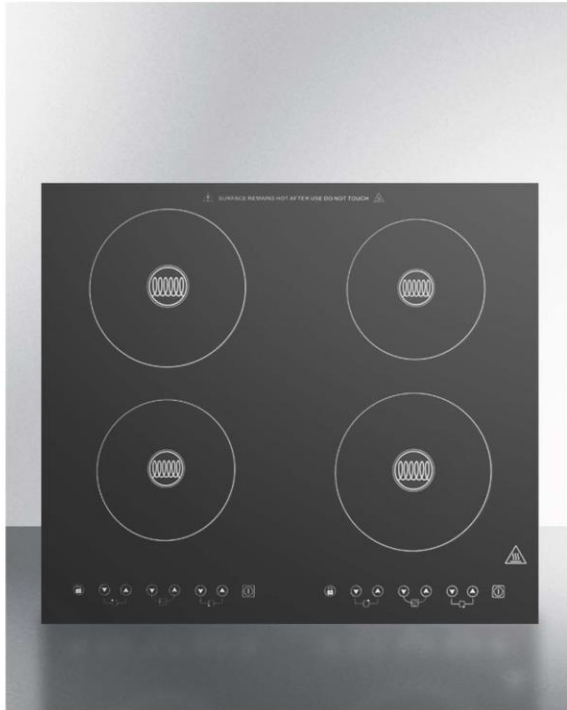
- A. Field Tests: Coverings Etc. to perform testing on all composite units in the Coverings Etc. test facilities. Tests not meeting specified performance requirements and units having deficiencies shall be corrected.

3.03 PROTECTION AND CLEANING

- A. Protection: Protect installed product's finished surfaces from damage during construction
- B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

SUMMIT

SINC424220



3.25" x 23" x 20.13" (H x W x D)

Built-in 220 volt induction cooktop with four zones and Black Ceran™ smooth-top finish

Highlights:

Instantly heats to cook in half the time of standard gas and electric ranges

Smooth Schott Ceran surface made of durable, low maintenance black glass

Complimentary 7-piece cookware set included

Magnetically generated heat produces no open flame and keeps heat confined to cookware

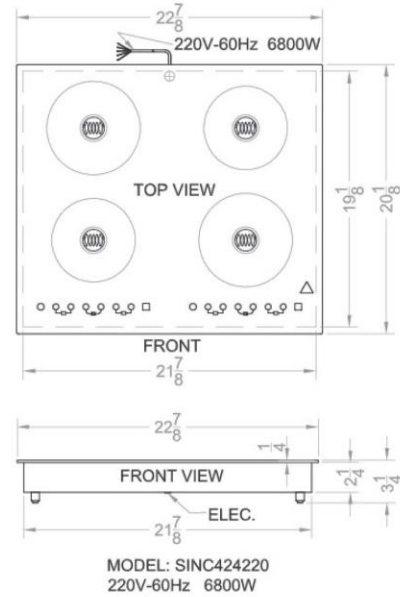
Product Features:

Schott Ceran surface	Smooth surface made of durable and elegant black glass
Beveled edges	Smooth, slightly rounded edges protect you from minor injuries associated with sharp corners
7-piece cookware set	Each purchase includes a complimentary set of induction cookware complete with glass lids
Electromagnetic heat	Heat is produced inside your cookware for even cooking
Energy efficient	84% of the heat created goes directly towards heating cookware contents
Cool surface	Most heat is sent directly to cookware, keeping the surface fairly cool to touch
Automatic pan recognition	Interior coil turns off after 30 seconds if there is no induction cookware on top
Child lock	Prevent accidents with this safety feature
8 power levels	Get precise control of heating temperature with adjustable touch controls



SINC424220 Specifications:

Overview	
Height	3.25"
Width	23.0"
Depth	20.13"
Cabinet	Black
US Electrical Safety	ETL
Other Energy Info	1600W/1800W
Amps	35.0
Voltage/Frequency	220 V AC/60 Hz
Shipping Weight	40.0 lbs.
Induction Cooktop	
Application	Built-in
Heating Type	Induction
Surface	Glass
Number of Elements	4
Controls	Digital
Cooking Timer	Yes
Cutout Height	2.5"
Cutout Width	22.13"
Cutout Depth	19.38"





Eliza

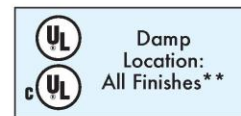
Geometry in Motion

Designed in 2013



Designed by Chicago architect Stephen Katz in 2013, the Eliza blends a beautiful technically derived form with superior function and movement. The unique blade shape is designed to maximize air movement at the outer edge of the blade. The result is more efficient air velocity rings, less blade drag and greater motor optimization. Equally important is Eliza's stationary visual statement which combines modern utility with minimalist geometry.

- 56" diameter.
- Energy efficient, ultra-quiet, six-speed and reversible DC motor with new reliable technology.
- Damp location finishes: brushed nickel and gloss white.
- Blades available in Gloss White, Brushed Nickel, Walnut or Gray Ash.
- Constructed of cast aluminum, polycarbonate and heavy stamped steel.
- Limited Lifetime Warranty
- Standard equipment:
 - One downrod of 10". 5", 20", 30", 48" or 72" downrods also available.
 - Vaulted ceiling mount canopy for up to 30 degrees.
 - Reverse on six-speed, hand-held and wall-mountable remote control.

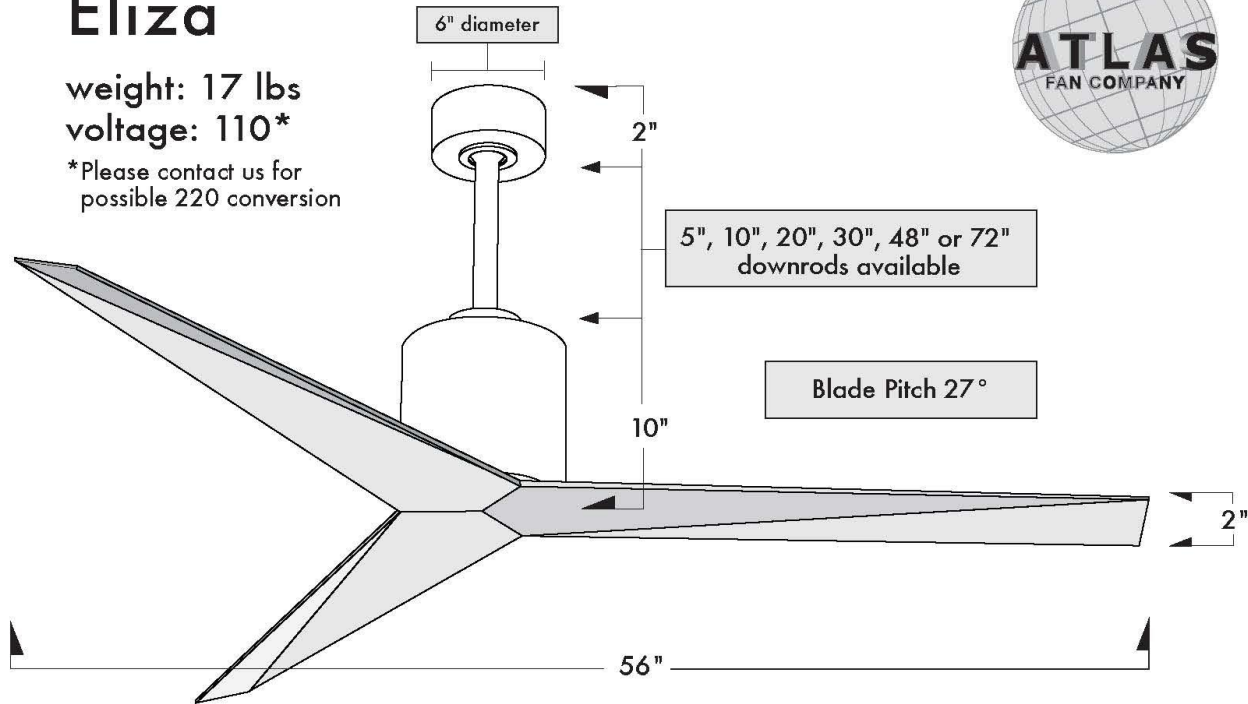


MATTHEWS FAN COMPANY

Eliza

weight: 17 lbs
voltage: 110*

*Please contact us for possible 220 conversion



SKU Naming Convention	
EK-XX-XX (Finish-Blade Finish)	
Finishes	Blade Finish
Brushed Nickel - BN	Brushed Nickel - BN
Gloss White - WH	Gloss White - WH
	Walnut - WN
	Gray Ash - GA

CFM
5396



- 1) The Eliza is compatible with flat or vaulted ceilings and can be mounted with any one of the following downrod lengths: 5", 10", 20", 30", 48" and 72".
- 2) The Eliza is also compatible with a proprietary decora-style accessory wall control: DC-WC.



**Damp location: All standard finishes. Not recommended for salt water/ocean front applications.

1881 Industrial Drive Libertyville, IL 60048 Tele: 847.680.9043 Fax: 847.680.8140 www.matthewsfanco.com

Summer 2015

BRFB 1050 FFBI

10.6 cu. ft. (300 L) total gross volume
Duo cycle no frost cooling



Fridge

6.1 cu.ft (173 L) net fresh food volume
Bottle holder
Illumination with white LED
3 safety glass shelves
3 door racks
2 egg trays
Energy Star qualified

Freezer

2.3 cu.ft (65 L) net freezer volume
Auto defrost
Ice cube tray
Fast freeze function

Hygiene

Antibacterial seal
Hygiene+ antibacterial carbon filter

Technical Information

Dimensions (HxWxD) (cm): 177.7 x 55.6 x 54.5
Dimensions (HxWxD) (in): 69 15/16 x 21 15/16 x 21 1/2

Color

BRFB 1050 FFBI: Fully integrated

Need to order separate kitchen cabinet door from your cabinet manufacturer.

Features



Frost free

Keeps food fresher for longer periods. Eliminates ice and bacteria build-up, avoids unpleasant fridge odors.



Duo cycle frost free technology

Provides more homogenous, energy efficient, and silent cooling. Prevents odor mixing.



Hygiene+ antibacterial carbon filter

Photo catalyst carbon filter, eliminates bacteria, reduces fridge odour and ensures hygiene. The carbon filter can be reactivated easily, with just one day's exposure to sunlight.



HygAIR ionizing technology

Eliminates airborne bacteria and odor forming molecules, by producing natural negative ions. And food stays fresher for longer.



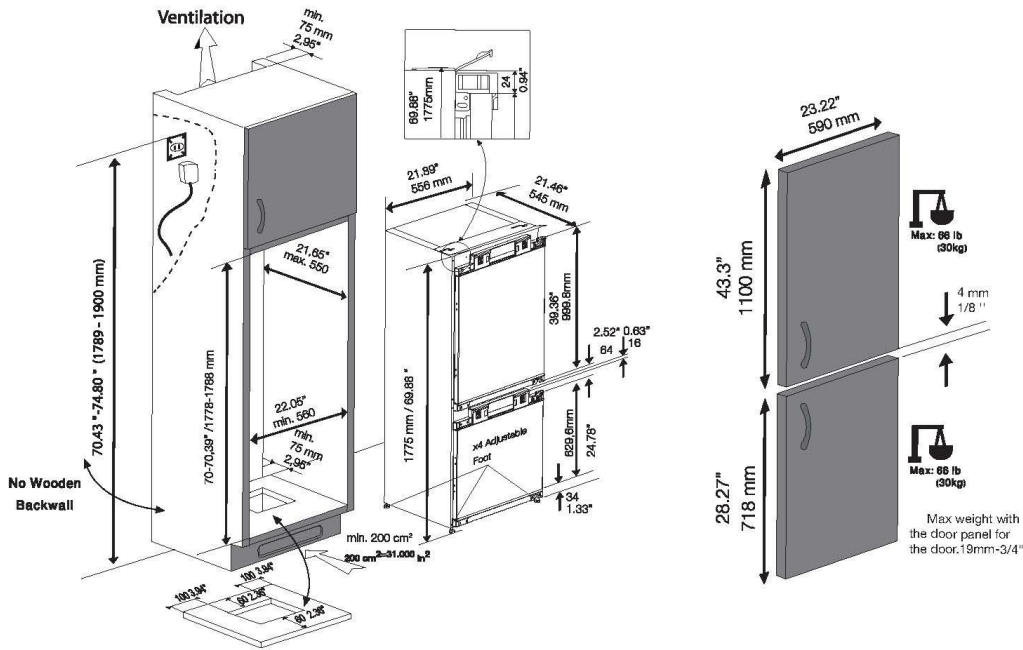
Illumination with white LED

White LED provides a more aesthetic look inside your fridge and less energy consumption.

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BRFB 1050 FFBI

10.6 cu. ft. (300 L) total gross volume
Duo cycle no frost cooling



MODEL CODE	BRFB 1050 FFBI
Type	Fully Integrated Frost Free
Control system	Bottom Freezer Refrigerator
Cooling system	Electronic Control
Cooling system	DUO CYCLE NO FROST COOLING
CAPACITIES	
Total net volume, cu. ft.	8.4
L	238
Fresh food net volume, cu.ft	6.1
L	173
Freezer net volume, cu.ft	2.3
L	65
FRIDGE FEATURES	
Water dispenser	-
Electronic control display type	Push button
Auto defrost	•
Inner illumination	White LED
Shelves	3 safety glasses
Crispers	1
Door racks	3
Wine rack	-
Bottle gripper	•
Egg tray	2 x opaque / 6 egg holder
Fan ventilation	•
FREEZER FEATURES	
Auto defrost	•
Fast freeze function	•
Number of freezer drawers	3
Number of flaps	-
Automatic ice maker	-
Twist ice maker	-
Ice cube tray	•

HYGIENE	
Blue zone	-
hygAIR ionizing technology	-
Hygiene+ antibacterial carbon filter	•
Antibacterial seal	•
TECHNICAL INFORMATION	
Supply voltage, V/Hz	120 V / 60 Hz
Noise level, dBA	39
DIMENSIONS	
Unpacked (HxWxD), cm	177.7 x 55.6 x 54.5
Unpacked (HxWxD), in	69 15/16 x 21 15/16 x 21 1/2
Packed (HxWxD), cm	185.3 x 59.7 x 59.7
Packed (HxWxD), in	72 15/16 x 23 1/2 x 23 1/2
Product weight, kg	68.9
Product weight, lbs	151.6
Packed weight, kg	73
Packed weight, lbs	160.6
PERFORMANCE	
Energy Star qualified	•
ENERGY STAR® Most Efficient 2014	-
Climatic class	T
Annual energy consumption, kWh/year	402
Cooling gas	R600a
COLOR OPTIONS	
WH: White	-
SL: Silver	-
SS: Fingerprint free stainless steel	-
FFBI: Fully integrated	•

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DW 55100 Series Standard Tub Dishwasher

14 Place settings
Top control digital LCD display



Main Features

- 5 programs
- 3 wash temperatures
- Condensing drying system
- 50 dBA wash noise level
- Digital program follow-up display
- Time delay up to 9:30 hrs.
- Allin1 tablet detergent function
- 1/2 Load function
- 3 way euro filtering system
- smartFIT™ front adjustable rear feet
- smartBALANCE™ front adjustable hinge system
- smartPIN™ joint handle system
- Power plug

Interior design

- All stainless steel tank
- Three spray arms (lower, upper and ceiling)

Premium rack loading system

- FlexiRack™ loaded adjustable upper rack
- Upper rack handle
- 4 adjustable mug shelves
- Sliding cutlery basket
- smartFOLD™ plate supports on lower rack
- Stainless Blomberg embossed lower rack handle

Color

- DW 55100 SS: Stainless steel
- DW 55100 FBI: Fully Integrated

Features



14 Place settings

Blomberg dishwasher can perfectly clean dishes up to 14 place settings without leaving any piece of cutlery out.



Double motion float system

All Blomberg dishwashers have a double motion float system (DMFS) that provides maximum security against water damage and a bottom tray to prevent flooding.



Digital display

The electronic display is a quick and easy way to select your programs. Additionally, models with top control panel with numerical display offer a noise level adjustable "end of cycle audible signal". Hidden control panel prevents your children from changing programs and playing with your dishwasher.



5 Level wash

The 5 level wash system ensures immaculately clean dishes by spraying water from every direction.



Silent wash

By utilizing three layers of insulation including bituminous material, cotton insulation and side walls and with its advanced motor technology Blomberg dishwashers are among the quietest models in the market.

ALLIN1

Blomberg dishwashers provide the best performance with all types of compact detergents.

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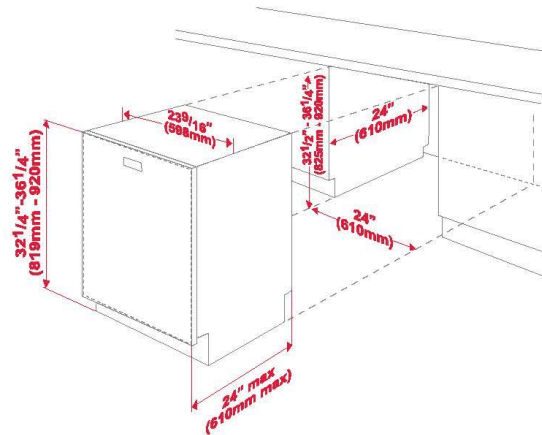
DW 55100 Series Standard Tub Dishwasher

14 Place settings
Top control digital LCD display

SPECIFICATIONS DW 55100 Series

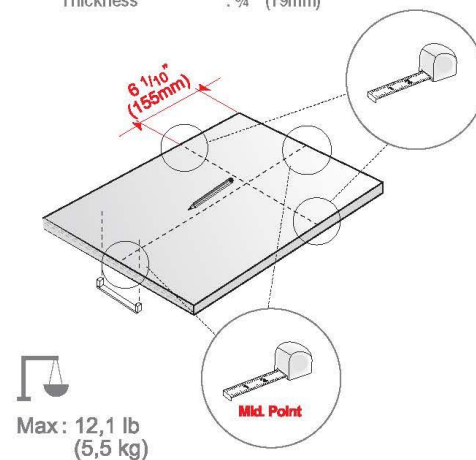
CONTROLS	
Control Type	Electronic
Position	Top
MAIN FEATURES	
Loading Capacity (place settings)	14
Tub material	Stainless Steel
Inner door material	Stainless Steel
Water Softener	-
DMFS overflow protection	-
5 level wash with 3rd spray arm	✓
Delay timer up to 9:30 hrs	✓
3 way euro filter	✓
Drying	Condensation
Turbidity sensor	✓
Silence level, dBA	50 dBA
Allint Tablet function	✓
1/2 Load function	✓
SmartPIN™ joint	✓
Power Plug	✓
PROGRAMS	
Number of programs	5
Rinse & Hold	✓
Quick wash (131°F rinse temp)	✓
China/crystal (149°F rinse temp)	✓
Regular wash (142°F-145°F rinse temp)	✓
Pots and pans plus (167°F rinse temp)	✓
DISPLAY	
Program sequence	✓ / LCD Display
Rinse aid indicator	Electronic
Rinse aid indicator display	✓
Salt indicator display	-
RACK SYSTEM	
smartFOLD lower rack folding tines	✓
Lower rack embossed stainless handle	✓
Cutlery basket	Sliding
Upper rack (inset shelves)	4
smartFOLD, upper rack folding tines	✓
FlexiRack, adjustable upper rack	Loaded
Nylon coated racks	✓
DIMENSIONS	
Packed (HxWxD)	in 34 3/8 x 25 3/16 x 26
	cm 85.9 x 64.4 x 66.1
Packed Weight	(lb/kg) 97/44
Unpacked (HxWxD)	in 32 1/4 x 23 9/16 x 21 5/8
	cm 82 x 59.8 x 54.8
Unpacked Weight	(lb/kg) 90/41
ENVIRONMENTAL STANDARDS	
Energy Star qualified	✓
Energy consumption, kWh/year	273
Water consumption, gal/cycle	3.79
PbHS* compliant	✓

* Lead-free



DW 55100 FBI Front Panel Installation Dimensions

Height of panel door : 28" (711mm)
Recommended width : 23 1/4" to 23 1/2" (592mm - 595mm)
Thickness : 3/4" (19mm)



Max : 12,1 lb
(5,5 kg)

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END OF SECTION 11 30 13.13

11 30 13.23 - RESIDENTIAL LAUNDRY APPLIANCES

1.01 GENERAL INFORMATION

- A. This section includes the followings:
 - 1. Clothes Washer-DRYER

1.02 SUBMITTALS

- A. Submit complete specifications and shop drawings

1.03 QUALITY ASSURANCE

- A. Submit certified test reports showing compliance with specified performance characteristics.

1.04 WARRANTY

- A. Manufacturer's Product Warranty: Coverings etc.
 - 1. Warranty period: One (1) Year Parts & Labor Warranty from date of purchase covering Equator appliances.

PART 2 - PRODUCTS

2.01 CLOTHES WASHER-DRYER

- A. Equator Appliances

1. 13 lbs dry laundry capacity Frontload Washer
2. 1,000 rpm spin speed
3. White
4. Part #
5. EZ 4000 CV – Equator Super Combo
6. Dimensions:
 - a. Exterior dimensions: 23-7/16" x 28-3/8" x 33-7/16"

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install cladding system in accordance with manufacturer's instructions.

3.02 FIELD QUALITY CONTROL

A. Field Tests: Coverings Etc. to perform testing on all composite units in the Coverings Etc. test facilities. Tests not meeting specified performance requirements and units having deficiencies shall be corrected.

3.03 PROTECTION AND CLEANING

A. Protection: Protect installed product's finished surfaces from damage during construction

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

4/16/2015

Equator Appliances – Equator Super Combo EZ 4000 CV Silver, Single-unit Washer-Dryer, 13lbs

03:18

Specifications	Reviews (0)
-----------------------	--------------------

MODEL	<i>EZ 4000 CV – Equator Super Combo</i>
Type	<i>Combo Washer-Dryer</i>
Color	<i>Silver, White</i>
Capacity	<i>13 lbs</i>
Door Diameter / Swing	<i>16" / 180 degree</i>
Programs	<i>14</i>
Adjustable leveling legs	<i>4</i>
Additive Dispenser	<i>Automatic</i>
Stainless Steel Drum	<i>Yes</i>
Dryer Ventilation (Convertible)	<i>Venting / Condensing</i>
Wash or Dry Option only	<i>Yes</i>
Pre-Wash Function	<i>Yes</i>

<http://equatorappliances.com/?product=eZ-4000-cv-equator-super-combo-silver>

2/3

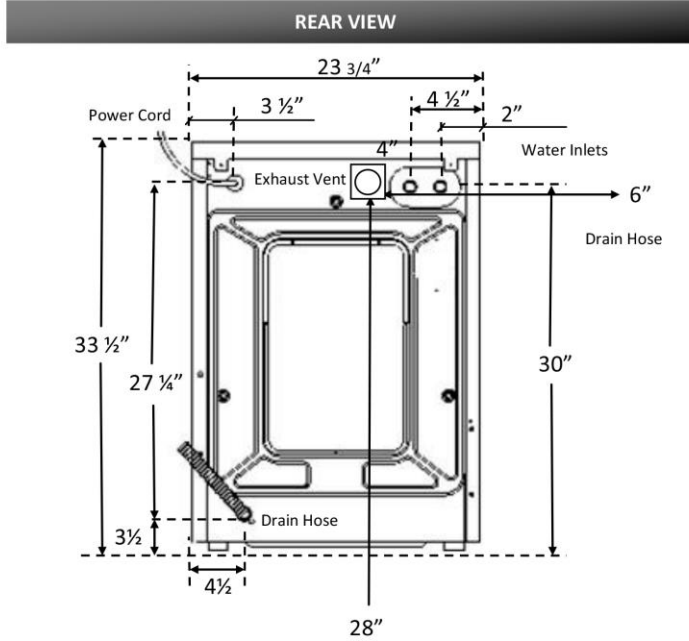
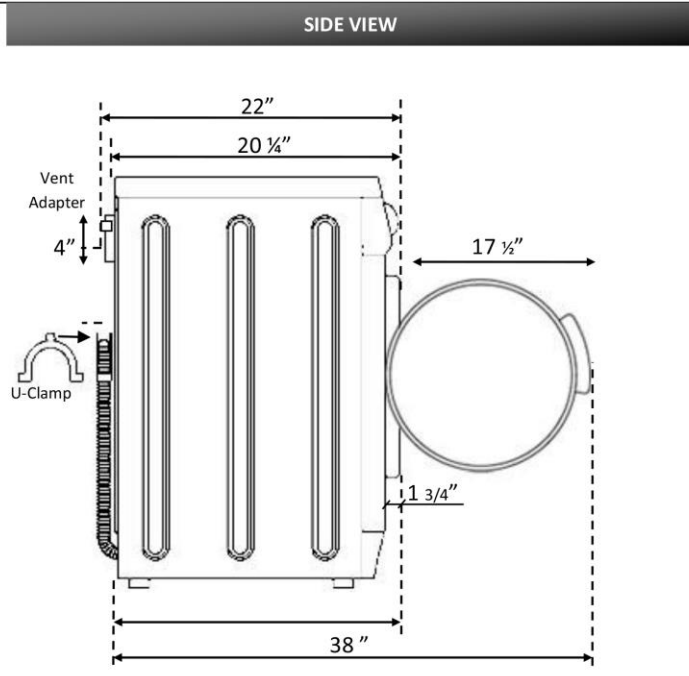
4/16/2015

Equator Appliances – Equator Super Combo EZ 4000 CV Silver, Single-unit Washer-Dryer,13lbs

Half-Heat Option	<i>Yes</i>
Automatic door lock in wash	<i>Yes</i>
Door lock open in dry mode	<i>Yes</i>
Easy access coin-trap	<i>Yes</i>
Speed	<i>1000 rpm</i>
Electrical	<i>110 V 60 Hz 15 A</i>
Height in inches (Net)	<i>33.5</i>
Width in inches (Net)	<i>23.5</i>
Depth in inches (Net)	<i>22</i>
LBS (Net)	<i>161</i>
Warranty	<i>1 Year Parts & Labor</i>



DATA SHEET: EQUATOR SUPER COMBO



Product Model Number
EZ 4000 CV

Color	White / Silver
Capacity	13-lbs
Programs	14
Door Diameter/Swing	16"/180°
Weight (Net/Gross) lbs	161/168
Dryer Ventilation (Convertible)	Venting/Condensing
Wash or Dry Option Only	Yes
Wash or dry only option	Yes
Pre-Wash Function	Yes
Half-Heat Option	Yes
Stainless steel drum	Yes
Automatic door lock in wash	Yes
Door lock open in dry mode	Yes
Easy access coin-trap	Yes
Water Save Option	Yes
Drying Time	0-120 minutes
Spin Speed	1000 rpm.
Additive Dispenser	Automatic
Electrical	110V 60Hz 15A
Unit Dimension HxWxD (inch)	33.5 x 23.5 x 22
Warranty	1 Year Parts and Labor

Power cord length – 5' – Color White
 Drain hose length – 5' Color Grey
 Inlet hose length (2) – 5' Color Black with stainless connector

Installation Location:

- > Unit may be installed in recessed area, closet, or alcove.
- > Air Space Requirements: 2" on sides and 3" in front and back (from the case). Additional installation spacing needs to be considered for easy installation, servicing, and compliance with local codes or ordinances.
- > Floor must support at least 280 lbs. and be a solid, level surface.
- > When locating in a towable trailer or watercraft, position the machine over the axles or midship where movement is at a minimum. Block unit in to prevent extreme movement.

Standpipe Drain System:

- > In RV, installation needs a 1 1/2" (3.7 cm) diameter standpipe with the minimum carry-away capacity of 7 gallons (26 liters) per minute. An air break must be available at the standpipe to avoid siphoning.

Floor Standpipe Drain:

- > Top of standpipe must be at least 24" (60 cm) high and no higher than 40" (101 cm) from the bottom of the machine.

Wall Standpipe Drain:

- > 24" (60 cm) min; 40" (101 cm) max from the end of drain hose to the bottom of the machine.

Sink Drain:

- The drain hose can be clamped to the sink using the U-Clamp provided the top of the sink is not higher than 40" (101 cm) from the bottom of the machine.

Portability Kit Available:

- It comprises of a faucet adapter for direct faucet connection, Y-connector for single faucet connection and casters to make the unit portable.

Mobile Home Installation:

- > The dryer must be exhausted to the outdoors with the termination securely fastened to the mobile home structure. The exhaust must not be terminated beneath the mobile home. Provisions must be made for the introduction of outside air into the dryer. The free air opening shall not be less than 12 sq. inches.

Equator Advanced Appliances • 10216 Georgibelle Drive, Suite 900D • Houston TX 77043
 Toll Free: 800-935-1955 • Fax: 832-202-2732 • www.EquatorAppliances.com • Email: mail@EquatorAppliances.com

END OF SECTION 11 30 13.23

11 93 13 – HYDROPONIC GROWING SYSTEMS

1.01 GENERAL INFORMATION

PART 1- GENERAL

1.01 SUMMARY

A. This section includes information about:

1. Aqauponics system components: Tank, aerator, pump, HDEP, grow beds, and perlit

1.02 SUBMITTALS

A. Manufacturer's data sheets on each product must be submitted, including:

1. Any necessary recommendations and instructions
2. Storage and handling instructions.
3. Installation methods.
4. Shop drawings

1.03 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened until ready for installation

1.04 WARRANTY

A. N/A

PART 2-PRODUCTS

2.01 MANUFACTURER

A. Manufacturers: Ten Acre Organics.

B. Proprietary Products/Systems:

1. Tank
 - A. Fish tank
 - a. 300 gallons—36” deep, 48” diameter galvanized steel
 - B. Sump tank
- b. 2 130 gallon tanks – 72” x 24” x 18.5”
2. Pump (GPH)
 - A. Size: 1000
3. HDEP (piping)
 - A. Submersible pump
 - B. Air pump/Oxygenation bar
 - b. 4 outlet pump for 200 gallon fish tank including 20’ of tubing
 - C. Bell siphons
 - D. Aerator (Spout)
4. Growing Beds
 - A. 4 AB Mod Bountiful growing beds
 - a. 48 Sq. Ft. Area
5. Perlite (plant growth media)

PART 3-EXECUTION

3.01 INSTALLATION

- A. Install products in compliance with the manufacturer's recommendations.
- B. Assemble in compliance with manufacturer’s instructions.

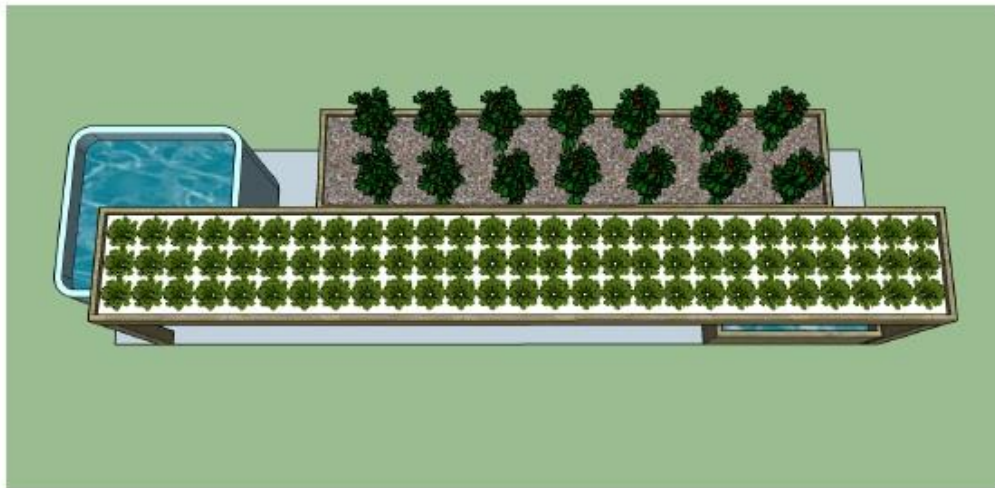
3.02 PROTECTION

- A. Protect installed products until the project is fully completed.
- B. Restore or put back together any damages to any product at a time before any extensive work is done.

UT Solar Decathlon Aquaponic System

Description:

Hybrid Raft/Media, Continuous Flow Aquaponics System



- End Cap
 - 1.5" (x1)
 - 3" (x2)
- Hardware
 - Screws (2.5" x 200)
 - Staples (x500)
 - Pipe Braces (1.5" x4)
- Grow Media (Granite or River Rock)
 - 1-1.5 cubic yards
- Pump (Water)
 - Capacity of 200 gallons per hour at a head height of 3.5 feet
- Blower (Air)
- Miscellaneous
 - Piping Cement
 - Wood Stain

TECHNICAL INFORMATION SHEET

GeoGard™ EPDM Membrane

Item Description
Geomembrane

Item Number
Various



Product Information

Description:

GeoGard EPDM Membrane is a cured single-ply geomembrane designed to meet the tolerances of ASTM D7465. It is fish and plant friendly.

Method of Application:

GeoGard EPDM Membrane must be installed in accordance with current Firestone Specialty Products specifications and details.

Storage:

- Store away from sources of punctures and physical damage.
- Store away from ignition sources as GeoGard EPDM Membrane will burn when exposed to open flame.

Preparation of Substrates:

1. Substrates must be clean, dry, smooth and free of sharp edges, fines, loose or foreign materials, oil, grease, and other materials that may damage the geomembrane.
2. All roughened surfaces that can damage the geomembrane shall be repaired as specified to offer a smooth substrate.
3. All substrate voids greater than 6.3 mm (0.25") wide shall be properly filled with an acceptable fill material.

Precautions:

1. Take care when moving, transporting, handling, etc. to avoid sources of punctures and physical damage.
2. Isolate waste products, such as petroleum products, greases, oils (mineral and vegetable) and animal fats from the geomembrane. Contact Firestone Specialty Products for specific recommendations.
3. Refer to Safety Data Sheets (SDS) for safety information.

LEED® Information:

Post Consumer Recycled Content: 0%
Post Industrial Recycled Content: 0%
Manufacturing Location: Prescott, AR

NOTE: LEED® is a registered trademark of the U.S. Green Building Council.

Packaging:

Thickness: 1.14 mm (0.045") Weight: 1.32 kg/m² (0.27 lb/ft²)
Thickness: 1.52 mm (0.060") Weight: 1.76 kg/m² (0.36 lb/ft²)

TECHNICAL INFORMATION SHEET



GeoGard™ EPDM Membrane

Typical Properties – 1.14 mm (0.045") EPDM Geomembrane				
Property	Test Method	Units	ASTM D-7465	
			SI	Eng
Specific Gravity:	ASTM D-792	gm/cc	1.1	1.1
Unit Weight:	ASTM D-751	kg/m (lb/ft)	1.4	.29
Thickness, Type 1:	ASTM D-412	mm (in)	1.02 +10/-10%	.045 +10/-10%
Tensile Strength, Die C min:	ASTM D-412	MPa (psi)	9.0	1305
Ultimate Elongation, Die C min:	ASTM D-412	%	300	300
Tear Resistance, Die C:	ASTM D-624	kN/m (lbf/in)	26.27	150
Puncture Resistance:	ASTM D-4833	N (lbs)	133	30
Shore A Durometer:	ASTM D-2240	---	65-10	65-10
Resistance to Ozone: 7 days/100 @ 37.8 °C (150 °F) 50% ext.	ASTM D-1149	---	No Cracks	No Cracks
Multiaxial Elongation:	ASTM D-5617	%	100	100
Oven Aging: At 116 °C (240 °F) for 670 hours	ASTM D-573	---	---	---
Tensile strength Die C:	ASTM D-412	MPa (psi)	8.3	1205
Ultimate elongation, Die C:	ASTM D-412	%	200	200
Tear Resistance, Die C:	ASTM D-624	kN/m (lbf/in)	21.9	125
Xenon Arc: for 5040 kJ/(m ² .nm) @ 340 nm @ 80 °C	ASTM G-155/G-151	---	---	---
Visual Inspection 7X No cracks or crazing bent loop @10% strain	ASTM D-518	---	pass	pass
Brittleness Point:	ASTM D-2137	degrees	-45 °C	-49 °F
Water Resistance: Weight after immersion 166 hrs @ 70 °C (158 °F)	ASTM D-471	%	+8,-2	+8,-2
Water Vapor Permeability (max.):	ASTM E-96	Perm-mils	2.0	2.0
Linear Dimensional Change, max:	ASTM D-1204	%	+/- 1.0	+/- 1.0
Chronic Toxicity Screening:	EPA/600/4-89/ 001 ASTM E-729	Method 1000.0	passes passes	passes passes

NOTE: Certified GeoGard EPDM Membrane production materials are special order items requiring a minimum of two weeks as production lead-time

NOTE: GeoGard EPDM Membrane meets or exceeds the minimum requirements set forth by ASTM D-7465 for Type I Non-reinforced geomembrane.

TECHNICAL INFORMATION SHEET

GeoGard™ EPDM Membrane
Typical Properties – 1.52 mm (0.060") EPDM Geomembrane

Property	Test Method	Units	ASTM D-7465	
			SI	Eng
Specific Gravity:	ASTM D-792	gm/cc	1.1	1.1
Unit Weight:	ASTM D-751	kg/m (lb/ft)	1.8	.40
Thickness, Type 1:	ASTM D-412	mm (in)	1.52 +10/-10%	.060 +10/-10%
Tensile Strength, Die C min:	ASTM D-412	MPa (psi)	9.0	1305
Ultimate Elongation, Die C min:	ASTM D-412	%	300	300
Tear Resistance, Die C:	ASTM D-624	kN/m (lb/ft)	40.28	230
Puncture Resistance:	ASTM D-4833	N (lbs)	181.56	43
Shore A Durometer:	ASTM D-2240	---	65-10	65-10
Resistance to Ozone: 7 days/100 @ 37.8 °C (150 °F) 50% ext.	ASTM D-1149	---	No Cracks	No Cracks
Multiaxial Elongation:	ASTM D-5617	%	100	100
Oven Aging: At 116 °C (240 °F) for 670 hours	ASTM D-573	---	---	---
Tensile strength Die C:	ASTM D-412	MPa (psi)	8.3	1205
Ultimate elongation, Die C:	ASTM D-412	%	200	200
Tear Resistance, Die C:	ASTM D-624	kN/m (lb/ft)	37.32	213
Xenon Arc: for 5040 kJ/(m ² .nm) @ 340 nm @ 80 °C	ASTM G-155/G-151	---	---	---
Visual Inspection 7X No cracks or crazing bent loop @10% strain	ASTM D-518	---	pass	pass
Brittleness Point:	ASTM D-2137	degrees	-45 °C	-49 °F
Water Resistance: Weight after immersion 166 hrs @ 70 °C (158 °F)	ASTM D-471	%	+8,-2	+8,-2
Water Vapor Permeability (max.):	ASTM E-96	Perm-mils	2.0	2.0
Linear Dimensional Change, max:	ASTM D-1204	%	+/- 1.0	+/- 1.0
Chronic Toxicity Screening:	EPA/600/4-89/ 001 ASTM E-729	Method 1000.0	passes passes	passes passes

NOTE: GeoGard EPDM Membrane production materials are special order items requiring a minimum of two weeks as production lead-time

NOTE: GeoGard EPDM Membrane meets or exceeds the minimum requirements set forth by ASTM D-7465 for Type I Non-reinforced geomembrane.

TECHNICAL INFORMATION SHEET



GeoGard™ EPDM Membrane

Panel Sizes – 1.14 mm (0.045") Thickness

Part Number	Dimensions		Packaging	Coverage		Typ. Max. Weight	
	SI Units (m)	Eng Units (ft)		SI Units (m ²)	Eng Units (ft ²)	SI Units (kg)	Eng Units (lb)
W56GM41010	3.05 x 30.48	10 x 100	Roll	92.90	1,000	155	342
W56GM41015	3.05 x 45.72	10 x 150	Roll	139.35	1,500	233	513
W56GM41020	3.05 x 60.96	10 x 200	Roll	185.81	2,000	310	684
W56GM42010	6.10 x 30.48	20 x 100	Roll	185.81	2,000	310	684
W56GM42015	6.10 x 45.72	20 x 150	Roll	278.71	3,000	466	1027
W56GM42020	6.10 x 60.96	20 x 200	Roll	371.61	4,000	621	1369
W56GM42510	7.62 x 30.48	25 x 100	Roll	232.26	2,500	388	856
W56GM42515	7.62 x 45.72	25 x 150	Roll	348.38	3,750	581	1283
W56GM42520	7.62 x 60.96	25 x 200	Roll	464.52	5,000	776	1711
W56GM43010	9.14 x 30.48	30 x 100	Roll	278.71	3,000	466	1027
W56GM43015	9.14 x 45.72	30 x 150	Roll	418.06	4,500	698	1540
W56GM43020	9.14 x 60.96	30 x 200	Roll	557.42	6,000	931	2053
W56GM44010	12.19 x 30.48	40 x 100	Roll	371.61	4,000	621	1369
W56GM44015	12.19 x 45.72	40 x 150	Roll	557.42	6,000	931	2053
W56GM44020	12.19 x 60.96	40 x 200	Roll	743.22	8,000	1242	2738
W56GM45010	15.24 x 30.48	50 x 100	Roll	464.52	5,000	776	1711
W56GM45015	15.24 x 45.72	50 x 150	Roll	696.77	7,500	1164	2567
W56GM45020	15.24 x 60.96	50 x 200	Roll	929.03	10,000	1429	3150

Panel Sizes – 1.52 mm (0.060") Thickness

Part Number	Dimensions		Packaging	Coverage		Typ. Max. Weight	
	SI Units (m)	Eng Units (ft)		SI Units (m ²)	Eng Units (ft ²)	SI Units (kg)	Eng Units (lb)
W56GM61010	3.05 x 30.48	10 x 100	Roll	92.90	1,000	214	472
W56GM61015	3.05 x 45.72	10 x 150	Roll	139.35	1,500	321	708
W56GM62010	6.10 x 30.48	20 x 100	Roll	185.81	2,000	428	944
W56GM62015	6.10 x 45.72	20 x 150	Roll	278.71	3,000	642	1416
W56GM65010	15.24 x 30.48	50 x 100	Roll	464.52	5,000	1070	2360
W56GM65015	15.24 x 45.72	50 x 150	Roll	696.77	7,500	1606	3540
W56GM65020	15.24 x 60.96	50 x 200	Roll	929.03	10,000	2140	4720

Please contact Firestone Building Product Geomembrane Sales Department at 1-888-264-1735 for further information.

This sheet is meant to highlight Firestone products and specifications and is subject to change without notice. Firestone takes responsibility for furnishing quality materials which meet published Firestone product specifications or other technical documents, subject to normal roof manufacturing tolerances. Neither Firestone nor its representatives practice architecture. Firestone offers no opinion on and expressly disclaims any responsibility for the soundness of any structure. Firestone accepts no liability for structural failure or resultant damages. Consult a competent structural engineer prior to installation if the structural soundness or structural ability to properly support a planned installation is in question. No Firestone representative is authorized to vary this disclaimer.

END SECTION 11 93 13

DIVISION 12 -FURNISHINGS

12 35 30 - RESIDENTIAL CASEWORK

1.01 SUMMARY

A. This section includes the following:

1. Solid wood casework.
2. Finish painting.

1.02 RELATED REQUIREMENTS

A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating materials, component profiles, fastening methods, jointing details, finishes, and accessories.

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store in ventilated areas horizontally on a level surface. Do not cover with impermeable materials.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance requirements of local authorities having jurisdiction.

1.06 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within one year period after Date of Substantial Completion.

C. Provide fifteen (15) year manufacturer warranty for materials.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. Solid Wood Cabinets:

1. IKEA: Product, Solid Wood Cabinets; www.IKEA.com (888) 888-4532

1 IKEA Way, Round Rock, TX 78665

2.02 MATERIALS

A. Solid wood panels

1. Properties:

- a. See Section 06 15 25.

B. Panelboard

1. Panelboards: Manufacturer's proprietary hollow core panelboards with hidden fasteners.

- a. Texture: Smooth matte finish both sides.
- b. Size: 1-1/4 inch (25 mm) thick, 12 inches (140 mm) wide hollow core board
- c. Slip Resistance Coefficient (ASTM D2047): 0.687 Wet.

2. Edge Cap:

- a. Size: 1/2 inch (12 mm) thick, 1/2 inch (12 mm) wide solid board.
- b. Texture: Smooth Matte.

2.03 ACCESSORIES

A. Fasteners and Anchors:

1. Screws: Bugle head, hardened steel, power driven type, length to achieve minimum 3/4 inch penetration of panelboard.

B. Stains, Sealer and Paint: Select from manufacturer's standard glaze colors.

1. Manufacturer Provided Standard Stain Color:

- a. Java - FVG C 24

2. Sealer: 2K Protection Varnish.

(Note: This sealer product is recommended to protect the stain.)

3. Use of non-manufacturer water borne or oil-based stain is not recommended and will violate the product warranty.

PART 3 – EXECUTION

3.01 PREPARATION

A. Do not install materials until room pre-finishing is complete and dry.

3.02 INSTALLATION – CASEWORK

A. Apply finish stain to individual panelboards prior to assembly.

B. Assemble panelboards as per shop drawings.

C. Fit butt end panelboard joints occurring between support members with metal splines to maintain tight, aligned joints.

D. Secure with manufacturer's proprietary fastener system.

3.03 CLEANING

A. Clean installation per manufacturer recommendations.

B. Provide Owner with two copies of cleaning and maintenance instructions through the submittal process noted in Section 01 77 00 - Closeout Procedures.

3.04 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 12 35 30

PART 22 - DIVISION 13 – SPECIAL CONSTRUCTION

13 31 23 TENSIONED FABRIC STRUCTURES (TFS)

SPECIFICATIONS

PART 1 – GENERAL

1.1 SUMMARY

A. The Tensioned Fabric Structure Manufacturer (hereafter referred to as “TFS Manufacturer”) shall be responsible for the design, engineering, fabrication, supply and installation of the work specified herein. The intent of this specification is to have single source responsibility for the above functions.

B. Performance Requirements: The TFS Manufacturer shall be responsible for the configuration, fabrication and erection of the tensioned membrane structure. All materials provided shall be new and unused.

C. Erection of the complete system shall be the responsibility of the same firm designing and manufacturing the building.

D. The fabric structure shall be a cable and/or frame supported tensioned membrane structure. The fabric shall have low elongation characteristics under tension and shall assume an anticlastic configuration. Structures that have designs incorporating fabric in a flat or mono-axially curved configuration at any location in the roof will not be acceptable.

E. Provide a structure as shown in the drawings and described in this specification. Foundations and anchoring for the structure shall be the responsibility of General Contractor or the TFS Manufacturer.

1.2 SUBMITTALS

A. Data: Manufacturer product data, including specifications and installation instructions

for each component of the TFS. Include laboratory test reports and other data,

where applicable.

B. Engineering drawings: 11" x 17" , dimensioned drawings for the TFS signed and sealed by a licensed civil or structural engineer. Include plan view, elevations, details, sections, connections, and anchorage/footings.

C. Samples: Fabric, 8 ½" x 11" minimum

D. Structural calculations: Signed and sealed by a registered structural or civil engineer specializing in TFS design and engineering.

E. LEED Submittals:

1. Credit MR 4.1 and MR 4.2: For products having recyclable content, provide documentation indicating percentages, by weight, of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

2. Credit MR 5.1 and 5.2: Identify each regional material along with the location of its harvest, extraction, or manufacture. Include material cost for each item.

1.3 REFERENCES

A. AWS D1.1 – American Welding Society Structural Welding Code

B. AWS D1.2 – American Welding Society Structural Welding Code, Aluminum

C. NFPA 701 – National Fire Protection Association Fire Test for Flame Propagation of Textiles and Films



PRECONTRAIN

1002 HIGHLY TRANSLUCENT

Life Cycle Assessment (LCA)




The Life Cycle Assessment (LCA) is measuring the environmental impacts of any product from raw material extraction to the end of the life cycle. Our Life Cycle Assessment has been conducted on the whole Précontraint range by an external environmental consultant, EVEA France, in conformity with ISO 14040 series and submitted to a peer review made by CIRAIQ (Canada).

Impact measurements are converted into common denominator equivalent, chosen among well-known substances and standard units (kg Antimony eq., kg CO2 eq. ...).

The overall impacts of Serge Ferrari Précontraint composite materials are significantly reduced when recycled by means of Texyloop®.

Comparative analysis depending on end-of-life scenarios

Functional unit: 1 sqm Précontraint 1002 S2

Type of impacts	Texyloop® recycling	Landfill	Incineration
 Resource depletion Kg Antimony equivalent	0.024	0.151	0.151
 Global warming kg CO2 equivalent	2.572	4.104	4.757
 Human toxicity Kg 1,4-dichlorobenzene equivalent	0.479	1.324	1.414
 Water consumption litres	139.6	339.6	341.3
 Energy Consumption Mega Joule equivalent	59.7	103.3	103.3
 Bulk waste kg	0.081	1.358	0.252
 Hazardous waste kg	0.0011	0.0029	0.0029

Complete LCA reports, including other types of impacts, are available on request.

LEED certification

Heat Island Effect

The LEED credits requires a Solar Reflectance Index (SRI) >78 for flat roofs and >29 for sloped roofs.

Précontraint membranes help fighting the Heat Island effect, and therefore provide 1 full point under the credit 55c7.2/GIB C9 (roof) and 2 full points under the credit 55c7.1 (non roof).

Additional contributions

Précontraint composite materials can also contribute to the following credits:

- Credit 55c8 - Light pollution reduction
- Credit IEQ 8.1 - Daylight
- IDC1 - Innovation and design

Detailed LEED reports are available on request.

Solar reflectance index (SRI) Précontraint 1002 Fluotop T2 & S2 ASTM 1980

White	> 95%
Ref 8341: Champagne Ref 1074: Beige	> 80%
Ref 2152: Red Ref 2158: Green	> 30%

Environmental communication in conformity with ISO 14021

In september 1999, the ISO published the ISO 14021 standard concerning self-declaration on environmental issues, also called Type II declarations.

The main objective of this standard is to clarify the environmental communication, where the best can be found next to the worst.

ISO 14021 requires the environmental communication to be : exact, precise, verifiable, pertinent and not misleading.

Technical properties	Précontraint 1002-3399 S2	Précontraint 1002-2399 T2	Standards
Application	Static and permanent structures	TROPICAL CLIMATE, Static and permanent structures	
Surface treatment (top/bark)	PVDF / PVDF	HIGH CONCENTRATION PVDF / PVDF	
Making up	Weldable	Weldable after top surface abrasion	
Form	PES HT 1100 Dtex	PES HT 1100 Dtex	
Weight	1050 g/sgm • 31 oz/kgyd	1050 g/sgm • 31 oz/kgyd	EN ISO 2284-2
Width	178 cm • 70.08 in	178 cm • 70.08 in	[±1mm / ±1mm]
Tensile strength (warp/weft)	430/430 daN/5cm 490/490 Lbs/in	430/430 daN/5cm 490/490 Lbs/in	EN ISO 1421 ASTM D 751-00 Cut Strip
Tear resistance (warp/weft)	15/10 daN 105/100 Lbs	15/10 daN 105/100 Lbs	DIN 53 383 ASTM D 751-00 Trapped
Adhesion	12 daN/5cm	12 daN/5cm	EN ISO 2411
Flame retardancy			
Euroclass	B-s2,d0 /EN 1251-1	B-s2,d0 /EN 1251-1	
Rating	M2 /NFPA 92-507 • B1 /DIN 4102-3 • B5 7637 • Test2 /NFPA 701 • CSMF T19		
Guarantee*			



* The technical data here above are average values with a +/-5% tolerance.

ADDITIONAL INFORMATION			
Total thickness	0.78 mm	0.78 mm	
Varnish adhesion longevity	QUV A 4000 h	pass	QUV A 4000 h pass Scotch tape test
Micro organism resistance	---	Method A: degree 0, excellent	EN ISO 844
Dimensional stability			
Elongation 2dH • 10daN/5cm (warp/weft)	+1% / +1%	+1% / +1%	EN 15977
Residual elongation	+0.4% / +0.4%	+0.4% / +0.4%	EN 15977
Solar optical values			
Solar Transmittance (T _{sol})	19%	18%	
Solar reflectance (R _{sol})	64%	65%	
Solar Factor (g _{sol})	24%	22%	
Visible light Transmittance (T _{vis})	14%	15%	EN 410
Visible light reflectance	69%	71%	
UV transmission	0%	0%	
Visible light Transmittance	24%	20%	NFP 38511 (air/water-external)
Thermal and Acoustic performances			
Thermal conductivity (vertical/horizontal)	ca. U=5.6 / 6.4 W/sgm ² °C	ca. U=5.6 / 6.4 W/sgm ² °C	Calculated
Acoustic Weakening index	ca. 14dBA	ca. 14dBA	ISO 717-1
LEED Heat Island Effect			
Roof / Non Roof (up to 1 pt/2 pts)	Solar Reflectance Index >78%	Solar Reflectance Index >80%	SSc 7.2/5Sc 7.1
Environmental Impact: LCA (Life Cycle Assessment)			
Depending on end-of-life scenarios	Texyloop® Recycling	Incineration	Landfill
Resources depletion	0.024	0.151	0.151
Biobal warming	2.572	4.757	4.104
Energy consumption	99.7	103.3	103.3
Water consumption	139.4	341.3	339.6
Management systems			
Quality in conformity with			ISO 9001
Environmental communication in conformity with			ISO 14021
Certifications, labels, recycling capacity			



LCA and LEED reports IS2 and T21 available on request

* Additional information here above are non-contractual.

The values here above are given as an indication in order to allow our customers to make the best use of our products. Our products are subjects to evolutions due to technical progress, we remain entitled to modify the characteristics of our products at any time. The buyer of our products is responsible to check that the here above data are still valid.

* Warranty: Please refer to the text of our warranty. The warranty is valid only after confirmation on case-by-case basis of warranty application. The warranty will not apply to mobile structures. The buyer of our products is fully responsible for their application or their implementation concerning any possible third party. The buyer of our products is responsible for their implementation and installation according to the standards, use and customs and safety rules of the countries where they are used.

* **BEWARE OF HANDLING CONDITIONS:** The high transparency of this product generates some risk of irreversible fold marks. To limit this phenomenon, it is important to avoid crushed folds during fabrication and handling, to pack it with protection material and to transport it as rolls and not bundles.

→ Contact

- Headquarters: +33 004 74 97 41 33
- Your local representative: www.sergeferrari.com

→ TEXYLOOP®

- The Serge Ferrari operational recycling chain
- Secondary raw materials of high intrinsic value compatible with multiple processes
- A quantified response to combat depletion of natural resources

www.texyloop.com

www.sergeferrari.com



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PART 23 - DIVISION 21 – FIRE SUPPRESSION

21 13 13 WET PIPE SPRINKLES SYSTEMS

Uponor, Inc.
5925 148th Street West
Apple Valley, MN 55124
Toll Free: (800) 321-4739
Phone: (952) 891-2000
Fax: (952) 891-1409
www.uponor-usa.com

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes: Multipurpose residential fire suppression system integrated with the potable cold water distribution system, using crosslinked polyethylene (PEX) tubing and ASTM F 1960 cold expansion fittings.

1.02 REFERENCES

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to the extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. ASTM International
 - 1. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials

ASTM E814 Standard Test Method for Fire Tests of Through-penetration Fire Stops

2. ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing
 3. ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
 4. ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing
- C. Underwriters Laboratories, Inc. (UL)
1. UL 1821 Standard for Safety for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service
- D. American National Standards Institute (ANSI)/National Sanitation Foundation (NSF)
1. ANSI/NSF Standard 14 Plastics Piping System Components and Related Materials
 2. ANSI/NSF Standard 61 Drinking Water System Components - Health Effects
- E. International Conference of Building Officials (ICBO)
1. ICBO Evaluation Service (ES) Evaluation Report No. 5142
- F. Southern Building Code Congress International (SBCCI)
1. SBCCI Standard Plumbing Code (PST and ESI Report #9661)
- G. International Plumbing Code (IPC)
- H. Building Officials and Code Administrators International (BOCA)
1. 1993 BOCA National Plumbing Code
- I. International Association of Plumbing Officials (IAPMO)
1. Uniform Plumbing Code (UPC)
- J. National Association of Plumbing, Heating and Cooling Contractors (NAPHCC)
1. National Standard Plumbing Code (NSPC)
- K. U.S. Department of Housing and Urban Development (HUD)
1. HUD Material Release No. 1269
- L. Plastics Pipe Institute (PPI)
1. PPI Technical Report TR-4/03

M. National Fire Protection Association (NFPA)

1. NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes

N. Uponor

1. Uponor Residential Fire Safety AQUASAFE Network System Installation Guide
2. Uponor Residential Fire Safety AQUASAFE Looped System Installation Guide
3. Uponor Professional Plumbing Installation Guide

1.03 SYSTEM DESCRIPTION

A. Design Requirements

1. Standard-grade hydrostatic pressure ratings from Plastics Pipe Institute in accordance with TR-3 as listed in TR-4. The following three standard-grade hydrostatic ratings are required.
 - a. 200 degrees F (93 degrees C) at 80 psi (551 kPa)
 - b. 180 degrees F (82 degrees C) at 100 psi (689 kPa)
 - c. 73.4 degrees F (23 degrees C) at 160 psi (1102 kPa)
2. Hydrostatic temperature and pressure rating from Underwriters Laboratories, Inc., in accordance with UL 1821. The following temperature and pressure rating is required for 1/2", 3/4" and 1" Wirsbo AQUAPEX tubing.
 - a. 120 degrees F (49 degrees C) at 130 psi (895 kPa)
3. Certification of flame spread/smoke development rating of 25/50 in accordance with ASTM E84 for the following PEX tubing sizes when encased with 1/2 inch fiberglass insulation at tube spacing of not less than 4 inches apart.
 - a. 3/8 inch [9.53mm]
 - b. 1/2 inch [12.7mm]
 - c. 3/4 inch [19.05mm]
 - d. 1 inch [25.4mm]
 - e. 1 1/4 inch [31.75mm]

- f. 1 ½ inch [38.1mm]
 - g. 2 inch [50.8mm]
- B. Performance Requirements: Provide a multi-purpose residential fire suppression system that integrates the sprinkler system with the domestic cold water distribution system in a way that eliminates stagnation of water and which has been manufactured, fabricated and installed to comply with regulatory agencies and authorities having jurisdiction, and maintain performance criteria stated by the PEX tubing manufacturer without defects, damage or failure.
- 1. Comply with UL 1821.
 - 2. Comply with ANSI/NSF Standard 14.
 - 3. Comply with ANSI/NSF Standard 61.
 - 4. Comply with ASTM F 877.
 - 5. Comply with NFPA 13D.
 - 6. Show compliance with ASTM E119 and ANSI/UL 263 through certification listings with Underwriters Laboratories, Inc. (UL).
 - a. UL Design No. L557 — 1 hour wood frame floor/ceiling assemblies
 - b. UL Design No. K913 — 2 hour concrete floor/ceiling assemblies
 - c. UL Design No. U372 — 1 hour wood stud/gypsum wallboard wall assemblies
 - d. UL Design No. V444 — 1 hour steel stud/gypsum wallboard wall assemblies

1.04 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer' s product submittal data and installation instructions.
- C. Shop Drawings: Provide installation drawings indicating of tubing layout, sprinkler head locations, manifold locations, plumbing fixtures supported and schedules with details required for installation of the system.
- D. Samples: Submit selection and verification samples of piping.
- E. Quality Assurance/Control Submittals: Submit the following.

1. Test Reports: Upon request, submit test reports from recognized testing laboratories.
 2. Certificates: Submit the following.
 - a. Manufacturer' s certificate that products comply with specified requirements.
 - b. System flow verification results.
 - c. Certificate indicating that the installer is authorized to install the manufacturer' s products.
- F. Closeout Submittals: Submit the following.
1. Warranty documents specified herein.
 2. Operation and maintenance data.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Utilize an installer having demonstrated experience on projects of similar size and complexity and possessing documentation proving successful completion of sprinkler system training by the PEX tubing manufacturer.
- B. Regulatory Requirements and Approvals: Provide domestic potable system that complies with requirements of the following:
1. International Plumbing Code (IPC)
 - a. ICBO Evaluation Service (ES) Evaluation Report No. 5142
 - b. SBCCI Standard Plumbing Code (PST and ESI Report No. 9661)
 2. Building Officials and Code Administrators International (BOCA)
 - a. 1993 BOCA National Plumbing Code
 3. Uniform Plumbing Code (UPC)
 - a. IAPMO Files 3558, 3946 and 3960
 4. National Standard Plumbing Code (NSPC)
 5. HUD Material Release No. 1269
- C. Certifications: Provide letters of certification as follows.

1. Installer is authorized, trained and certified by system manufacturer to install the multi-purpose residential fire safety system.
 2. Installer will utilize skilled workers holding a trade qualification license or equivalent, or apprentices under the supervision of a licensed tradesperson.
- D. Pre-installation Meetings: [Specify requirements for meeting.]. Verify project timeline requirements, manufacturer' s installation instructions and manufacturer' s warranty requirements.

1.06 DELIVERY, STORAGE & HANDLING

- D. General: Comply with Division 1 Product Requirement Section.
- E. Comply with manufacturer' s ordering instructions and lead time requirements to avoid construction delays.
- F. Delivery: Deliver materials in manufacturer' s original, unopened, undamaged containers with identification labels intact.
- G. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.
1. Store PEX tubing in cartons or under cover to avoid dirt or foreign material from being introduced into the tubing.
 2. Do not expose PEX tubing to direct sunlight for more than 30 days. If construction delays are encountered, provide cover to portions of tubing exposed to direct sunlight.
 3. Do not store sprinkler assemblies or cover plates in areas subject to extreme temperatures over 100 degrees F (38 degrees C).

1.07 WARRANTY

- A. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.
- B. Manufacturer' s Warranty: Submit, for owner' s acceptance, manufacturer' s standard warranty document executed by authorized company official. Manufacturer' s warranty is in addition to, and not a limitation of, other rights owner may have under contract documents.

1. Warranty shall provide for repair or replacement of any tube or fittings that are proven to be defective.
2. Warranty shall be transferable to subsequent owners.
3. Warranty Period for Wirsbo AQUAPEX tubing used with Uponor ProPEX® fitting systems: 25-year, non-prorated warranty against failure due to defect in material or workmanship, beginning with date of substantial completion.
4. Warranty Period for ProPEX fittings used with Wirsbo AQUAPEX tubing: 25-year, non-prorated warranty against failure due to defect in material or workmanship, beginning with date of substantial completion.
5. Warranty Period for Wirsbo AQUAPEX tubing used with a fitting system other than ProPEX: 10-year, non-prorated warranty against failure due to defect in material or workmanship, beginning with date of substantial completion.
6. Warranty Period for ProPEX fittings used with PEX tubing other than Wirsbo AQUAPEX: 10-year, non-prorated warranty against failure due to defect in material or workmanship, beginning with date of substantial completion.

1.08 MAINTENANCE

- A. Extra Materials: Provide [Specify number.] additional sprinkler heads for use by owner in building maintenance and repair.
 1. Provide sprinkler cabinet to house extra sprinkler heads.

PART 2 PRODUCTS

2.01 MULTI-PURPOSE RESIDENTIAL FIRE SUPPRESSION SYSTEM

- A. Manufacturer: Uponor, Inc.
 1. Contact: 5925 148th Street West, Apple Valley, MN 55124; Telephone: (800) 321-4739, (952) 891-2000; Fax: (952) 891-1409; Website: www.uponor-usa.com.

2.02 PRODUCT SUBSTITUTIONS

- A. Substitutions: No substitutions permitted.

2.03 MATERIALS

A. Tubing:

1. Material: Crosslinked polyethylene (PEX) manufactured by PEX-a or Engel method.
2. Type: Wirsbo AQUAPEX or Wirsbo AQUAPEX plus
3. Material Standard: Manufactured in accordance with ASTM F876 and ASTM F877 and tested for compliance by an independent third party agency.
4. Standard-grade hydrostatic design and pressure ratings from PPI.
5. Hydrostatic temperature and pressure rating from UL.
6. Minimum Bend Radius (cold bending): No less than 6 times the outside diameter. Bends with a radius less than stated shall require the use of a bend support as supplied by the PEX tubing manufacturer.
7. Nominal Inside Diameter: Provide tubing with nominal inside diameter, in accordance with ASTM F876 as indicated.
 - a. 1/2 inch (12.7 mm)
 - b. 3/4 inch (19.0 mm)
 - c. 1 inch (25.4 mm)

B. Fittings:

1. Material: UNS 3600 series brass.
2. Material Standard: Comply with ASTM F1960.
3. Type: PEX-a cold expansion fitting.
 - a. Assembly consisting of brass insert and PEX-a cold expansion ring.

C. Manifolds:

1. Material: Type L copper body with UNS 3600 series brass ProPEX outlet connections.
2. Manifold Type: Uponor ProPEX 1" Copper Manifold.
3. Manifolds will be manufactured with 1/2" ProPEX fitting brazed to the manifold outlets.

D. Sprinklers:

1. Concealed assembly type shall consist of the following.
 - a. Type 316 stainless steel sprinkler adapter fitting with four Uponor ProPEX outlets.
 - b. Reliable Model RFC 43 (SIN RA0612) heat activated sprinkler set to activate at 155 degrees F (68 degrees C).
 - c. Reliable Model CRFCW concealed cover plate designed to detach from the assembly at 135 degrees F (57 degrees C).
 - d. Reliable protective construction cap.
2. Recessed pendent type shall consist of the following.
 - a. Type 316 stainless steel sprinkler adapter fitting with four Uponor ProPEX outlets.
 - b. Reliable Model F1/Res 49 (SIN R3516) heat activated sprinkler set to activate at 155 degrees F (68 degrees C).
 - c. Reliable Model F1 or F2 escutcheon.
 - d. Reliable protective construction cap.
3. Recessed horizontal sidewall type shall consist of the following.
 - a. Type 316 stainless steel sprinkler adapter fitting with four Uponor ProPEX outlets.
 - b. Reliable Model F1/Res 44 (SIN R3531) heat activated sprinkler set to activate at 155 degrees F (68 degrees C).
 - c. Reliable Model F1 or F2 escutcheon.
 - d. Reliable protective construction cap.

PART 3 EXECUTION

3.01 MANUFACTURER' S INSTRUCTIONS

- B. Comply with manufacturer's product data, including product technical bulletins, installation instructions and design drawings, including:
 1. Uponor Residential Fire Safety AQUASAFE Network System Installation Guide
 2. Uponor Residential Fire Safety AQUASAFE Looped System Installation Guide

3. Uponor Professional Plumbing Installation Guide

3.02 EXAMINATION

A. Site Verification of Conditions:

1. Verify that site conditions are acceptable for installation of fire safety system.
2. Do not proceed with installation of fire safety system until unacceptable conditions are corrected.

3.03 INSTALLATION

A. Uponor Plumbing System:

1. Install the Uponor Plumbing System in accordance with the PEX tubing manufacturer's recommendations and as indicated in the installation handbook.
2. Do not install PEX tubing within 6 inches (152 mm) of gas appliance vents or within 12 inches (305 mm) of any recessed light fixtures.
3. Do not solder within 18 inches (457 mm) of PEX tubing in the same waterline. Make sweat connections prior to making PEX connections.
4. Do not expose PEX tubing to direct sunlight for more than 30 days.
5. Ensure that no glues, solvents, sealants or chemicals come in contact with the tubing without prior permission from the PEX tubing manufacturer.
6. PEX tubing passing through metal studs shall use grommets or sleeves at the penetration.
7. Protect PEX tubing with sleeves where abrasion may occur.
8. Use strike protectors where PEX tubing penetrates a stud or joist and has the potential for being struck with a screw or nail.
9. PEX tubing manufacturer supplied bend supports shall be used where bends are less than six times the outside pipe diameter.
10. Tubing shall be supported to structural members using support methods required by local plumbing codes and the PEX tubing manufacturer's installation handbook.
11. Pressurize the plumbing system with air in accordance with applicable codes or in the absence of applicable codes to a pressure of 25 psi (173 kPa) above normal working

pressure of the system.

12. Comply with safety precautions when pressure testing, including use of compressed air, where applicable. Water shall not be used to pressurize the system if ambient air temperature has the possibility of dropping below 32 degrees F (0 degrees C).

B. Uponor Fire Suppression System:

1. Perform no fabrication of piping systems or other components until approval of submittals is received.
2. Install PEX tubing as indicated on the drawings. Comply with shop drawings for tube layout, manifold location and sprinkler configuration.
3. Do not paint the sprinkler heads or cover plates.
4. Install sprinkler heads in accordance with the PEX tubing manufacturer' s specifications and NFPA 13D.
5. Ensure sprinklers are positioned so that discharge will not be affected by obstructions such as beams or light fixtures.
6. Ensure sprinkler heads maintain minimum distances from heat sources as specified in the PEX tubing manufacturer' s installation manual and NFPA 13D.
7. Support tubing to structural members using support methods required by local plumbing codes and the PEX tubing manufacturer's installation handbook.
8. Ensure system meets or exceeds flow requirements specified in hydraulic calculations by completing a flow verification test on any single sprinkler head.
9. Ensure the protective cap assembly remains in place until construction is complete.

C. Through-penetration Firestop.

1. Ensure one- and two-hour rated through-penetration assemblies have been tested in accordance with ASTM E814.
2. List of firestop manufacturers that list PEX tubing with their firestop systems is available from the PEX tubing manufacturer.

D. Related Products Installation: Refer to other sections listed in Related Sections paragraph herein for related products installation.

3.04 FIELD QUALITY CONTROL

A. Site Tests:

1. Provide flow verification test to confirm system performance meets or exceeds flow requirements as indicated by hydraulic calculations and sprinkler manufacturer's specifications.
2. [Specify applicable test requirements to be performed during and after product installation.].

B. Manufacturer' s Field Services: Provide manufacturer' s field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with the PEX tubing manufacturer' s instructions.

1. Site Visits: [Specify number and duration of periodic site visits.].

3.05 CLEANING

- A. Remove temporary coverings and protection of adjacent work areas.
- B. Repair or replace damaged installed products.
- C. Clean installed products in accordance with manufacturer' s instructions prior to owner' s acceptance.
- D. Remove construction debris from project site and legally dispose of debris.

3.06 PROTECTION

- A. Protect installed work from damage due to subsequent construction activity on the site.



a xylem brand

INSTRUCTION MANUAL

19-001-290B



Residential Fire Pump Package

INSTALLER: PLEASE LEAVE THIS MANUAL FOR THE OWNER'S USE.

DESCRIPTION

The assembly consists of a single pump water boosting system which increases riser pressure by as much as 55 PSI. The pump is automatically controlled to run on demand. The system is to be applied to NFPA 13D systems as required.

**SAFETY
INSTRUCTIONS**

This safety alert symbol will be used in this manual and on the Safety Instruction decal to draw attention to safety related instructions. When used, the safety alert symbol means **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THE INSTRUCTION MAY RESULT IN A SAFETY HAZARD!**

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NOTE: The information contained in this manual is intended to assist operating personnel by providing information on the characteristics of the purchased equipment.

It does not relieve the user of the responsibility to adhere to local codes and ordinances and the use of accepted practices in the installation, operation and maintenance of this equipment.

Further information pertaining to the installation, operation, and maintenance of your Residential Fire Pump Package can be found in the installation Operation and Maintenance manuals for the associated equipment provided:

- A. RCW NPE Pump (I.O.M. Part IMPROT)
- B. Tank (Model Specific)

Section 1 - General Description

1.1 The residential fire pumping package will increase the domestic water pressure at the fixtures from 30 to 55 PSI above that of the city water pressure.

1.2 A pressure switch starts and stops the pump.

1.3 PURPOSE OF MANUAL


1.4 This manual is furnished to acquaint you with some of the practical ways to install, operate, and maintain this unit. Read it completely before doing any work on your unit and keep it handy for future reference.


1.5 Equipment cannot operate well without proper care. To keep this unit at top efficiency, follow the recommended installation and servicing procedure outlined in this manual.

1.6 SAFETY INSTRUCTION

1.7 This safety alert symbol will be used in this manual and on the unit safety instruction to draw attention to safety related instructions. When used the safety alert symbol means **ATTENTION BECOME ALERT! YOUR SAFETY IS INVOLVED! FAILURE TO FOLLOW THIS INSTRUCTION MAY RESULT IN A SAFETY HAZARD.**

1.8 ADDITIONAL SAFETY REQUIREMENTS

 **WARNING:** Prevent electrical shocks. Disconnect the power supply before beginning installation. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

 **WARNING:** Electrical Shock Hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**


1.9 Always use accurate test meters when checking electrical components. Always work with another person in case of emergency.

1.10 STORAGE

1.11 For long periods of storage, the unit should be covered to prevent corrosion and contamination from dirt. It should be STORED in a clean, dry location between 0 and 170°F. The relative humidity should not exceed 85%. The unit should be checked periodically to ensure that no condensation has formed. After storage, again check that it is dry before applying power.

1.12 HANDLING

1.13 Care should be taken to prevent damage due to dropping or jolting when moving the Residential fire pump package. Transportation damage should be brought to the carrier's attention immediately upon receipt.

 **WARNING:** Heavy load, may drop if not lifted properly. Do not lift the entire unit by the motor eyebolts. Lift the unit with slings placed under the unit base rails. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

1.13.1 Location

1.13.2 Install the residential fire pumping package appropriately for ease of inspection, maintenance and service. Observe local electrical codes concerning control panel spacing.

1.14 TEMPERATURE AND VENTILATION


1.15 All electrical equipment is susceptible to failure if operated in ambient temperatures outside of its rating. The OPERATING temperature range for this unit is 40 to 105°F. The relative humidity should not exceed 85% non-condensing. The unit should not be operated outside these extremes.

1.16 ELECTRICAL CONNECTIONS - A.C. POWER & SIGNALS INPUT VOLTAGE

1.17 The input voltage tolerance is +10/-10% of nameplate voltage.

1.18 GROUND CONNECTIONS

1.19 A grounding terminal is provided for a dedicated ground wire connection. All provisions of the National Electrical Code and local codes must be followed.

 **WARNING:** Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

1.20 POWER WIRING

1.21 Power wire types and sizes must be selected based upon conformance with the National Electrical Code and all local codes and restrictions. In addition, only copper (Cu) wire rated for at least 75°C may be used for the power connections. Refer to the input current as listed on the motor nameplate when sizing wire. Connect the input power to the screw terminals on the motor contactor labeled "L1" & "L2". Connect a ground conductor to the ground lug attached to the circuit board.

1.21.1 System Pressure Switch

1.21.2 A system pressure switch is connected to the terminals labels "Pressure".

- 1.21.3 **Flow Switch**
- 1.21.4 An optional flow switch is connected to the terminals labels "Flow Sw".
- 1.21.5 **Local or Remote Alarm Indication**
- 1.21.6 Two relay outputs labeled "Out2" and "Out3" rated for 7 Amps at 240VAC are supplied. These outputs are normally open and close to indicate an alarm condition exists. Out3 closes when the pressure switch closes and stays closed until system pressure restores and the preset timer expires. Out2 closes when the flow switch closes and opens when the flow switch opens.

- 1.22 **FIELD CONNECTION DIAGRAMS**
- 1.23 Refer to the RCW NPE pump Installation, Operation, and Maintenance manual for specific details unique to the pump.
- 1.24 The following field connection diagrams should be reviewed prior to unit installation and operation.

Drawing #	Description	Page
Appendix B	Field Wiring Diagram	9
Appendix C	Field Piping Diagram	10

Section 2 - Installation Instructions

- 2.1 Place the unit preferably on a concrete floor or base. Level the base in both directions by placing steel shims between the base and the anchor bolts.
- 2.5 The power supply required for the unit is indicated on the nameplate located inside the control panel. A dedicated ground wire must be connected to the unit.

WARNING: Heavy load, may drop if not lifted properly. Do not lift the entire unit by the motor eyebolts. Lift the unit with slings placed under the unit base rails. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

WARNING: Electrical shock hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- 2.2 A well-leveled and secured unit will result in quiet operation as well as longevity of service.
- 2.3 See drawing Appendix C for general piping requirements.
- 2.4 Eccentric increasers can be used in the suction line when increasing the pipe size. The straight side of eccentric reducers should be installed on top to eliminate air pockets. Support the suction and discharge lines independently by the use of pipe hangers or anchors. Do not attempt to spring the suction and discharge lines into position.

CAUTION: The Residential fire pump package includes a high pressure relief valve. Make sure the discharge of the valve is directed to the floor drain before making the unit operational. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

WARNING: Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

Single phase motors have internal overload protection. The disconnecting means and short circuit protection are to be supplied and mounted by others.

- 2.6 For units installed with an optional tank, the tank must be installed per the requirements of drawing Appendix C. Fill the tank per the tank prior to putting the unit into service.

CAUTION: Seal damage may occur. Do not run pumps dry. Fill and vent the pump volute prior to operation. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

Section 3 - Putting the Unit Into Service

CAUTION: Prevent subsequent damage. A unit showing symptoms of possible problems (noise, leaks, vibration, and/or continual operation) must be corrected immediately. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

3.1 Whenever the riser water pressure falls below the system pressure switch setting the pump will start through a power relay.

3.2 When the system pressure rises above the setting of the system pressure switch the pump will stop (provided the minimum run timer has expired.)

3.3 ADJUSTMENTS AND SETTINGS

3.3.1 System Pressure Switch

WARNING: Electrical shock hazard. Disconnect and lockout power before servicing the unit. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

3.3.2 Back out the locking screw (see Figure 1) to allow main adjustment wheel to turn freely.

- Determine the pressure to be maintained across the sprinkler system.
- Adjust main adjustment wheel (see Figure 1) to desired setting for pump to turn ON.
- Turn main adjustment wheel counterclockwise to increase or clockwise to decrease pressure. Each number on main adjust wheel represents an approximate window shift of 1.8 psi for EPS40-2. For each 1/2 rotation of the adjustment wheel the window changes by approximately 11 psi for EPS40-2. The LED on Out3 will come ON in the control panel when pressure switch is activated.
- The pressure switch has a fixed differential which doesn't require adjustment for turning OFF the pump. The approximate differential varies from 3 psi @ 10 psi system pressure to 6 psi @ 100 psi system pressure.

- Retest the set point several times to ensure the accuracy of the setting and to ensure the pump starts and stops at the correct pressure.
- Re-seat locking screw.

WARNING: Electrical shock hazard. Disconnect and lockout power before servicing the unit. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

3.3.6 The minimum run timer is factory set to 5 minutes. The setting should be verified before the unit is placed into operation and adjusted if a shorter minimum run time is desired. Do not adjust the timer with power applied to the unit. Set the run timer by moving the small black plastic jumper on the right side of the PCB to 15 seconds, 30 seconds, 1 min, 2 min, 3 min, 4 min, or 5 min. The system will default to 15 seconds if no jumper is used.

3.3.7 Optional Tank

3.3.8 Refer to the specific IOM that was shipped with the tank for installation and operating instructions.

3.3.9 Procedure to set Relief valve:

- Switch ON the pump by opening the test valve slowly to create a pressure drop.
- Close the test valve after the pump turns ON.
- Let the pump run until it reaches the set pressure and switches OFF.
- Loosen (counterclockwise) adjusting screw in relief valve until it releases pressure.

CAUTION: Relief valve exhaust must be piped to an adequately sized drain. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

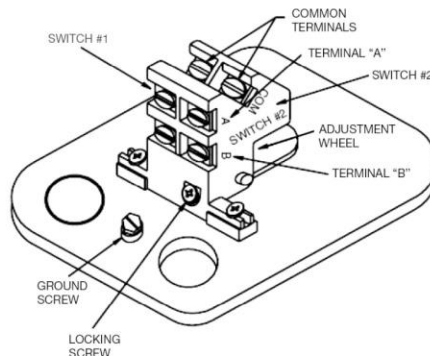


FIGURE 1

Section 4 - Final Check List

A. SYSTEM PIPING AND UNIT INSTALLATION

- ___ 1. Is the unit base properly leveled and secured?
- ___ 2. Is the shut-off valves to the pump suction open?
- ___ 3. Is the shut-off valve on the discharge line open?
- ___ 4. Is the shut-off valve on the hose bib closed?
- ___ 5. Is the piping properly supported to prevent strains on unit?
- ___ 6. Is the system, including the pumps, purged of debris and air?

CAUTION: Seal damage may occur. Do not run pumps dry. Fill and vent the pump volute prior to operation. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN PROPERTY DAMAGE AND/OR MODERATE PERSONAL INJURY.**

B. ELECTRICAL WIRING AND CONTROL SETTINGS

- ___ 1. Does the feeder line voltage correspond to the unit voltage? Check the unit nameplate or motor terminal connection.

WARNING: Electrical shock hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- ___ 2. Are the feeder wires correctly sized for the load?

WARNING: Conduit grounds are not adequate. A separate ground wire must be attached to the ground lug provided in the enclosure to avoid potential safety hazards. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- ___ 3. Have all the power terminals in the control panel been checked for tightness? This is imperative since stranded wires tend to "flow" and become loose after initial installation.

WARNING: Electrical shock hazard. Single phase AC power. Disconnect and lockout power before servicing the unit. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- ___ 4. Is the pressure control correctly set? The pressure switch needs to be set for proper operation. For best results, use a continuity meter (across the switch) to reset the controls. The legend plate on the control indicates approximate readings only and therefore should be used with caution.

Section 5 - Troubleshooting

⚠ DANGER: Troubleshooting live control panels exposes personnel to hazardous voltages. Electrical troubleshooting must only be done by a qualified electrician. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

5.1 Pump will not operate

- 1) Check incoming power
- 2) Check motor overload. Reset if tripped.
- 3) With contactor pulled in, check voltage of the motor leads. Voltage should be the same as the incoming power. If no voltage is present, replace the contactor. If voltage is present, contact an electrician to check the leads and motor.

5.2 Pump will not build pressure

- 1) Suction valve is closed. If closed, open.
- 2) Discharge valve is closed. If closed, open.
- 3) Relief valve is open and discharging to drain, Reset relief valve to correct pressure setting.

4) Hose bib is open. If open, close.

5) Motor not operating at rated RPM. Have motor checked at local motor repair shop.

6) Internal pump damage. Take pump to authorized pump repair facility.

5.3 Pump will not start automatically

- 1) No power. Restore if there is no power.
- 2) System pressure switch is not adjusted properly. Refer to section 3.

⚠ WARNING: Electrical shock hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

Appendix A - Programmable Control Module

1.1 The control system allows for intelligent pump control while improving system reliability. Timers and relays used in a conventional controller are integrated into a single sequence controller. The working program is stored on a non-volatile EEPROM chip that is an integral part of the unit. This means there is no danger of ever losing a program due to power losses.

WARNING: Electrical shock hazard. Inspect all electrical connections prior to powering the unit. Wiring connections must be made by a qualified electrician in accordance with all applicable codes, ordinances, and good practices. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

- 1.2. OK LED is on when the processor is running. If this LED is not lit, check power connections. If power is applied to the unit and LED is still not lit, replace unit.
- 1.3. The Aux in LED is reserved for future use.
- 1.4. The Flow Sw. LED is lit when the flow switch is closed.
- 1.5. The Pressure LED is lit when the pressure switch is closed.
- 1.6. The Out3 LED is lit when Output 3 is closed. Output 3 is closed when the pressure switch is closed, or when the pressure switch is open and the run timer is active.
- 1.7. The Out2 LED is lit when Output 2 is closed. Output 2 is closed when the flow switch is closed.
- 1.8. The Contactor LED is lit when the Contactor output is closed. The Contactor output closes when the pressure switch is closed, or when the pressure switch is open and the run timer is active.

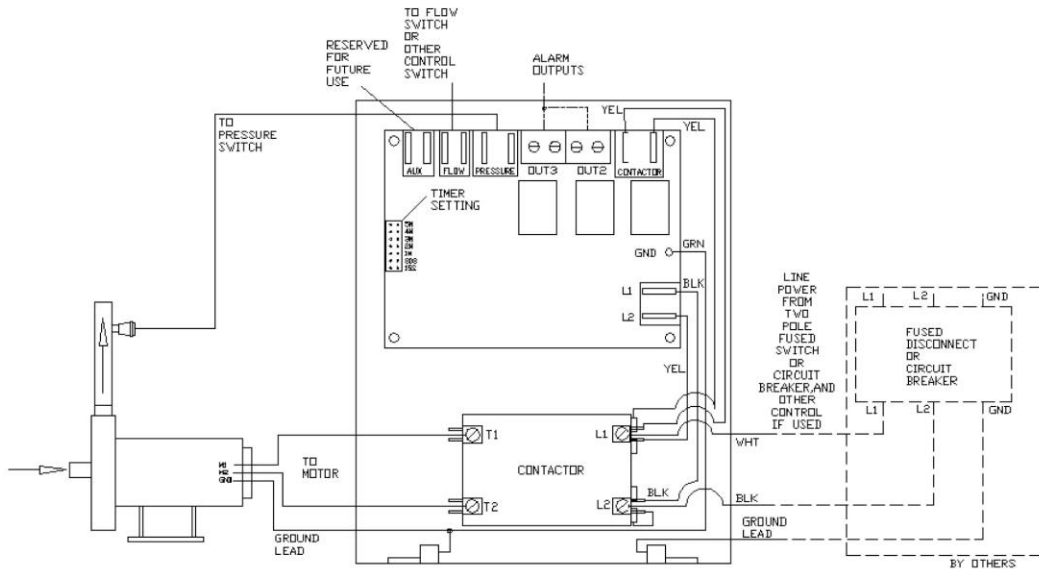
2.0 CHANGING THE MINIMUM RUN TIME

2.1 Adjustable Settings

2.2 The run timer is adjustable to 15 seconds, 30 seconds, 1 minute, 2 minutes, 3 minutes, 4 minutes, and 5 minutes. On the right hand side of the PCB near the OK LED is a small black plastic jumper which sets the run time. Shorting the pins at the top of the connector will set the run time to 5 minutes. Shorting the next set of pins down will set the timer to 4 minutes. Shorting the bottom set of pins sets the timer to 15 seconds. Each setting is labeled on the PCB. If no jumper is used, the timer defaults to 15 seconds.

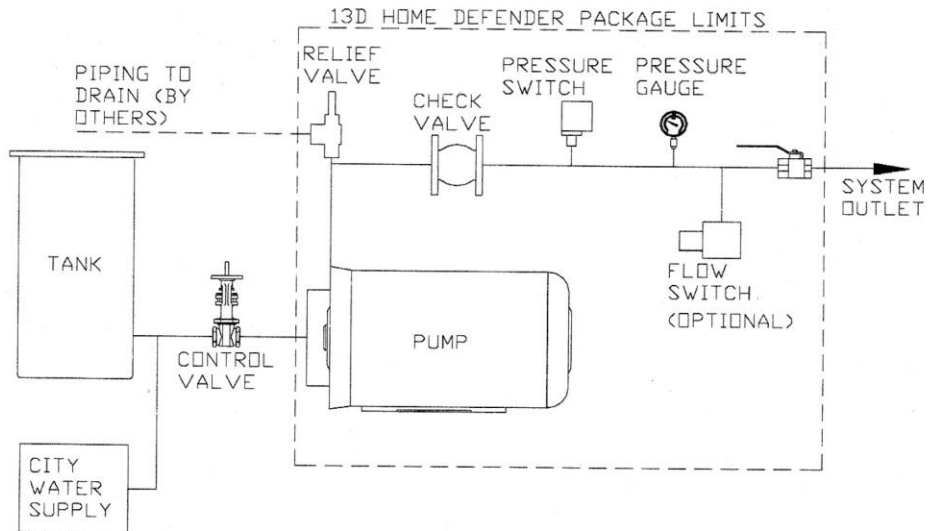
WARNING: Electrical shock hazard. Disconnect and lockout power before servicing the unit. **FAILURE TO FOLLOW THESE INSTRUCTIONS COULD RESULT IN SERIOUS PERSONAL INJURY, DEATH, AND/OR PROPERTY DAMAGE.**

Appendix B - Field Wiring Diagram



Voltage	HP	Amps	M1-M2	GND	Conduit Size
230	1-1/2	10	#14	#12	1/2"
230	3	17	#10	#10	1/2"
230	5	28	#8	#8	1/2"

Appendix C - Field Piping Diagram



Xylem Inc.
10661 Newkirk Street
Dallas, TX 75220
Phone: (469) 221-1200
Fax: (214) 357-5861
www.xyleminc.com/brands/acfirepump

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PART 24 - DIVISION 22 – PLUMBING

22 11 16 DOMESTIC WATER PIPING



SECTION 22 11 16 DOMESTIC WATER PIPING

Display hidden notes to specifier. (Don't know how? [Click Here](#))

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4. GENERAL

1. SECTION INCLUDES

PEX-a pipe and fittings for domestic water piping.

2. RELATED SECTIONS

Section 23 21 13 - Hydronic Piping.

Section 23 21 13 - Hydronic Piping.

3. REFERENCES

ASTM International (ASTM):

ASTM D 2765 - Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics.

ASTM D 6394 - Specification for Sulfone Plastics (SP).

ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
ASTM F 876 - Standard Specification for Cross-linked Polyethylene (PEX) Tubing.
ASTM F 877 - Standard Specification for Cross-linked Polyethylene (PEX) Plastic Hot-
and Cold-Water Distribution Systems.
ASTM F 1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing
Rings for Use with Cross-linked Polyethylene (PEX) Tubing.

American Water Works Association:

AWWA C904 Standard for Cross-linked Polyethylene (PEX) Pressure Pipe, 1/2 in.
Through 3 in., for Water Service.

American National Standards Institute (ANSI)/National Sanitation Foundation (NSF)

ANSI/NSF Standard 14 Plastics Piping System Components and Related Materials.
ANSI/NSF Standard 61 Drinking Water System Components - Health Effects.
ANSI/NSF Standard 359 Valves for Crosslinked Polyethylene (Pex) Water Distribution
Tubing Systems.

American National Standards Institute (ANSI)/Underwriters Laboratories, Inc. (UL)

ANSI/UL 263 Standard for Safety for Fire Tests of Building Construction and Materials.

International Code Council (ICC)

International Plumbing Code (IPC)

International Association of Plumbing Officials (IAPMO)

Uniform Plumbing Code (UPC)

Plastics Pipe Institute (PPI)

PPI Technical Report TR-4/06

Uponor, Inc.

Uponor Professional Plumbing Installation Guide (UPPIG), 2013.

Uponor Plumbing Design Assistance Manual (PDAM), 2014.

Living Building Challenge Redlist

Supplier and installer must make good faith effort to supply red list compliant
materials.

4. SUBMITTALS

Submit under provisions of Section 01 30 00 - Administrative Requirements.

Product Data: Provide manufacturer's product submittal data.

5. QUALITY ASSURANCE

Installer Qualifications: Installer shall have demonstrated experience on projects of similar
size and complexity with documentation proving successful completion of plumbing
system installation and/or training by the PEX tubing manufacturer.

6. DELIVERY, STORAGE, AND HANDLING

Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

Store PEX tubing in cartons or under cover to avoid dirt or foreign material from entering the tubing.

Do not expose PEX tubing to direct sunlight for more than 30 days. If construction delays are encountered, cover the tubing to prevent exposure to direct sunlight

7. WARRANTY

Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

Manufacturer's Warranty: PEX-a manufacturer system warranty shall cover piping and fittings for a duration of 25 years from the date of installation. Piping system warranty shall apply to potable water distribution and water service systems constructed of pipe and fitting products sourced from the same manufacturer.

5. PRODUCTS

1. MANUFACTURERS

Acceptable Manufacturer: Uponor , which is located at: 5925 148th Street West; Apple Valley, MN 55124; Toll Free Tel: (800) 321-4739; Tel: (952) 891-2000; Fax: (952) 891-2008; Email:[request info \(mike.rivers@uponor.com\)](mailto:request info (mike.rivers@uponor.com)); Web:<http://www.uponorpro.com>

Substitutions: Not permitted.

2. PEX PIPE AND FITTINGS

PEX-a (Engle-Method Crosslinked Polyethylene) Piping: ASTM F 876/877 by Uponor.

PEX-a Fittings: elbows, adapters, couplings, plugs, tees and multi-port tees (1/2 inch through 2 inch nominal pipe size): ASTM F1960 cold-expansion fitting manufactured from the following material types:

UNS No. C69300 Lead-free (LF) Brass.

20% glass-filled polysulfone as specified in ASTM D 6394.

Unreinforced polysulfone (group 01, class 1, grade 2) as specified in ASTM D 6394.

Polyphenylsulfone (group 03, class 1, grade 2) as specified in ASTM D 6394.

Blend of polyphenylsulfone (55-80%) and unreinforced polysulfone (rem.) as specified in ASTM D 6394.

Reinforcing cold-expansion rings shall be manufactured from the same source as PEX-a piping manufacturer and marked "F1960".

Pre-Sleeved Piping: PEX-a piping, with a high-density polyethylene (HDPE) corrugated sleeve.

Multi-Port Tees: Multiple-outlet fitting complying with ASTM F 877; with ASTM F 1960 inlets and outlets.

Engineered polymer branch multi-port tee.

Engineered polymer flow-through multi-port tee.

Engineered polymer commercial branch multi-port tee.

Engineered polymer commercial branch multi-port elbow.

Engineered polymer commercial flow-through multi-port tee.

Manifolds: Multiple-outlet assembly complying with ASTM F 877; with ASTM F 1960 outlets.

Engineered polymer valved manifold.

Engineered polymer valveless manifold.

Lead - free copper branch manifold.

Lead-free copper valved manifold.

3. TRANSITION FITTINGS

PEX-to-Metal Transition Fittings:

Manufacturers: Provide fittings from the same manufacturer of the piping.

Threaded Brass to PEX-a Transition: one-piece brass fitting with male or female threaded adapter and ASTM F 1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring.

Brass Sweat to PEX-a Transition: one-piece brass fitting with sweat adapter and ASTM F 1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring.

PEX-to-Thermoplastic Transition Fittings: CPVC or PP-R to PEX-a Transition: one-piece thermoplastic fitting with male or female threaded adapter and ASTM F 1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring.

4. VALVES

PEX-to-PEX, Lead Free (LF) Brass Ball Valves (1/2 inch through 2 inch nominal pipe size)

Manufacturers: Provide ball valve(s) from the same manufacturer as the piping system.

Full-port ball valve: two-piece, ASTM F1960 cold-expansion ends, with PEX-a reinforcing cold-expansion ring.

LF brass valve with a positive stop shoulder manufactured from C69300 brass.

In compliance with: 250 CWP, ANSI/NSF 359, ANSI/NSF 14/61, cNSF-us-pw_G lead free 0.25% Lead max., ASTM F1960, ASTM F 877.

6. EXECUTION

1. EXAMINATION

Site Verification of Conditions: Verify that site conditions are acceptable for installation of the domestic water piping. Do not proceed with installation until unacceptable conditions are corrected.

2. INSTALLATION

Install plumbing system according to approved shop drawings and coordination drawings.

Comply with manufacturer's product data, including product technical bulletins, installation instructions and design drawings, including the following.

Piping Installation:

Install PEX-a Pipe Support, expansion loops, arms and offsets in compliance with Chapter 5 - "System Design and Layout" in the Uponor Plumbing Design Assistance Manual (PDAM).

PEX shall not be installed in areas within five feet of UV light.

Install piping in compliance with manufacturer's Plumbing Installation Guide.

Hangers and Supports:

Horizontal PEX-a Piping Hangers: Install CTS hangers suitable for PEX-a piping in compliance with Chapter 6 - "Installation Methods" and local codes, with the following maximum spacing:

3 inch and below: Maximum span, 32 inches.

1-1/4 inch and above: Maximum span, 48 inches.

Vertical PEX-a Piping: Support PEX-a piping with minimum spacing of 5 feet.

Horizontal PEX-a Piping with PEX-a Pipe Channel: Install hangers for PEX-a piping with horizontal support channel in accordance with local jurisdiction and manufacturer's recommendations, with the following maximum spacing:

3/4 inch and below: Maximum span, 6 feet.

1 inch and above: Maximum span, 8 feet.

PEX-a Riser Supports: Install CTS riser clamps at the base of each floor and at the top of every other floor for domestic hot-water systems. Install mid-story guides between each floor. Install CTS riser clamps at the base of each floor and at the top of every fourth floor for domestic cold-water systems. Install mid-story guides.

Piping Schedule:

Aboveground domestic water piping (3 inch and below) shall be the following: PEX-a piping, with engineered polymer (EP) or lead-free brass F1960 cold-expansion fittings, or lead-free brass compression fittings complying with ASTM F 877.

Pipe Joint Construction: PEX-a Connections: Install per manufacturer's recommendations. Use manufacturer-recommended cold-expansion tool for ASTM F 1960 connections.

Field Quality Control: Do not expose PEX piping to direct sunlight for more than 30 days. If construction delays are encountered, provide cover to portions of piping exposed to direct sunlight.


Uponor AquaPEX® Blue

 Submittal Information
 Revision E: May 24, 2013

Project Information

Job Name: _____

Location: _____

Part No. Ordered: _____

Engineer: _____

Date Submitted: _____

Contractor: _____

Submitted By: _____

Manufacturer's Representative: _____

Approved By: _____

Technical Data

 Material: Crosslinked polyethylene
 PEX-a Engel method; PEX 5206

 Standard Grade Hydrostatic Ratings (PPI): 200°F at 80 psi (93°C at 5.5 bar)
 180°F at 100 psi (82°C at 6.9 bar)
 73.4°F at 160 psi (23°C at 11 bar)

 Linear Expansion Rate: 1.10"/10°F/100'
 (27.94mm/5.56°C/30.48m)

Product Information and Application Use

Uponor AquaPEX® Blue tubing is used primarily in cold potable-water distribution systems, but can also be used in radiant heating and cooling systems containing no ferrous corrodible components or where ferrous components are isolated from the tubing.

✓	Description	Part Number	I.D.	O.D.	Weight
<input checked="" type="checkbox"/>	1/2" Uponor AquaPEX Blue, 100-ft. coil	F3040500	0.475"	0.625"	6 lbs.
<input type="checkbox"/>	1/2" Uponor AquaPEX Blue, 300-ft. coil	F3060500	0.475"	0.625"	18 lbs.
<input type="checkbox"/>	1/2" Uponor AquaPEX Blue, 1,000-ft. coil	F3120500	0.475"	0.625"	54 lbs.
<input type="checkbox"/>	3/4" Uponor AquaPEX Blue, 100-ft. coil	F3040750	0.671"	0.875"	10 lbs.
<input type="checkbox"/>	3/4" Uponor AquaPEX Blue, 300-ft. coil	F3060750	0.671"	0.875"	34 lbs.
<input type="checkbox"/>	3/4" Uponor AquaPEX Blue, 500-ft. coil	F3100750	0.671"	0.875"	54 lbs.
<input type="checkbox"/>	1" Uponor AquaPEX Blue, 100-ft. coil	F3041000	0.862"	1.125"	20 lbs.
<input type="checkbox"/>	1" Uponor AquaPEX Blue, 300-ft. coil	F3061000	0.862"	1.125"	56 lbs.
<input type="checkbox"/>	1" Uponor AquaPEX Blue, 500-ft. coil	F3101000	0.862"	1.125"	93 lbs.



Pre-insulated Uponor AquaPEX[®] with 1/2" Insulation, Coils

Submittal Information
Revision G: March 7, 2014

Project Information

Job Name:

Location: Part No. Ordered:

Engineer: Date Submitted:

Contractor: Submitted By:

Manufacturer's Representative: Approved By:

Technical Data

Service Pipe: Crosslinked polyethylene PEX-a Engel method tubing encased in 1/2" PEX-foam insulation; PEX 5106

Insulation: Multi-layered, closed-cell, crosslinked polyethylene foam

Thermal Conductivity: 0.250 Btu.in/sq.ft.h.degF

Operating Condition Limits: 200°F (93°C) at 80 psi (551 kPa)
180°F (82°C) at 100 psi (689 kPa)
73.4°F (23°C) at 160 psi (1,103 kPa)
1/2"-2" Uponor AquaPEX[®] White only:
120°F (49°C) at 130 psi (896 kPa)

Linear Expansion Rate: 1.10"/10°F/100' (27.94mm/5.56°C/30.48m)



Product Information and Application Use

Pre-insulated Uponor AquaPEX[®] tubing offers all the benefits of Uponor AquaPEX (durable, flexible, corrosion-resistant) but encased in 1/2" PEX-foam insulation to insulate potable water lines and meet national, state and local energy codes. The tubing is approved for use in hot and cold domestic potable water systems, residential fire safety and hydronic radiant heating and cooling systems containing no ferrous corrodible components or where ferrous components are isolated from the tubing. This product is not intended for direct-burial applications in soil or concrete.

✓ Description	Part Number	O.D.	Heat Loss (at 70° Delta T)	R-Value	Coil Size (O.D. x Width)	Weight (lb./coil)
<input type="checkbox"/> 1/2" Pre-insulated AquaPEX with 1/2" insulation, 100-ft. coil	F6040500	1.74"	8.9 BTU/hr/ft	3.3	32.38" x 12.40"	8.0 lbs.
<input type="checkbox"/> 3/4" Pre-insulated AquaPEX with 1/2" insulation, 100-ft. coil	F6040750	2.00"	11.1 BTU/hr/ft	3.1	32.38" x 12.40"	12.8 lbs.
<input type="checkbox"/> 1" Pre-insulated AquaPEX with 1/2" insulation, 100-ft. coil	F6041000	2.27"	13.1 BTU/hr/ft	3.0	57.00" x 10.00"	21.0 lbs.
<input type="checkbox"/> 1 1/4" Pre-insulated AquaPEX with 1/2" insulation, 100-ft. coil	F6041250	2.53"	15.2 BTU/hr/ft	2.9	59.00" x 10.00"	30.0 lbs.
<input type="checkbox"/> 1 1/2" Pre-insulated AquaPEX with 1/2" insulation, 100-ft. coil	F6041500	2.78"	17.1 BTU/hr/ft	2.8	59.00" x 10.00"	42.0 lbs.
<input type="checkbox"/> 2" Pre-insulated AquaPEX with 1/2" insulation, 100-ft. coil	F6042000	3.28"	21.0 BTU/hr/ft	2.7	64.00" x 11.00"	65.0 lbs.

END OF SECTION - 21 11 16

22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

GENERAL

SECTION REQUIREMENTS

Submittals:

Product Data: For each type of product.

Operation and maintenance data.

PRODUCTS

GENERAL REQUIREMENTS FOR PIPING SPECIALTIES

Retain both options in paragraph below if plastic piping specialties are required.

Potable-water piping and components shall comply with NSF 61 **and NSF 14**.

PERFORMANCE REQUIREMENTS

Minimum Working Pressure for Domestic Water Piping Specialties: [**125 psig (860 kPa)**] unless otherwise indicated.

MANUFACTURED UNITS

Pipe-Applied, Atmospheric-Type Vacuum Breakers

Standard: ASSE 1001.

Size: NPS 1/4 to NPS 3 (DN 8 to DN 80), as required to match connected piping.

Body: Bronze.

Inlet and Outlet Connections: Threaded.

Hose-Connection Vacuum Breakers

Standard: ASSE 1011.

Body: Bronze, nonremovable, with manual drain.

Outlet Connection: Garden-hose threaded, complying with ASME B1.20.7.

Finish: bronze.

Reduced-Pressure-Principle Backflow Preventers

Standard: ASSE 1013.

Operation: Continuous-pressure applications.

Pressure Loss: maximum, through middle third of flow range.

Selected Unit Flow Range Limits:

Pressure Loss at Design Flow Rate: for sizes NPS 2 (DN 50) and smaller; for NPS 2-1/2 (DN 65) and larger.

Body: Bronze for NPS 2 (DN 50) and smaller; for NPS 2-1/2 (DN 65) and larger.

End Connections: Threaded for NPS 2 (DN 50) and smaller; for NPS 2-1/2 (DN 65) and larger.

Configuration: Designed for flow.

Accessories:

Valves NPS 2 (DN 50) and Smaller: Ball type with threaded ends on inlet and outlet.

Valves NPS 2-1/2 (DN 65) and Larger: Outside-screw and yoke-gate type with flanged ends on inlet and outlet.

Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.

Water Regulators

Standard: ASSE 1003.

Pressure Rating: Initial working pressure of 150 psig (1035 kPa).

Body: Bronze for NPS 2 (DN 50) and smaller; cast iron for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).

Valves for Booster Heater Water Supply: Include integral bypass.

End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).

Memory-Stop Balancing Valves

Standard: MSS SP-110 for two-piece, copper-alloy ball valves.

Pressure Rating: 400-psig (2760-kPa) minimum CWP.

Size: NPS 2 (DN 50) or smaller.

Body: Copper alloy.

Port: Standard or full port.

Ball: Chrome-plated brass.

Seats and Seals: Replaceable.

End Connections: Solder joint or threaded.

Handle: Vinyl-covered steel with memory-setting device.

Primary Thermostatic, Water Mixing Valves

[<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Standard: ASSE 1017.

Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.

Type: thermostatically controlled, water mixing valve.

Body: Bronze with corrosion-resistant interior components.

Connections: Threaded inlets and outlet.

Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.

Tempered-Water Setting:

Retain "Tempered-Water Design Flow Rate" Subparagraph below only if flow rate is not indicated on Drawings.

Tempered-Water Design Flow Rate:

Selected Valve Flow Rate at 45-psig (310-kPa) Pressure Drop: Pressure Drop at

Pressure Rating: 125 psig (860 kPa) minimum unless otherwise indicated.

Body: Bronze for NPS 2 (DN 50) and smaller; cast iron for NPS 2-1/2 (DN 65) and larger.

End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.

Screen: Stainless steel with round perforations unless otherwise indicated.

Perforation Size:

Clothes Washer Outlet Boxes

Mounting: Recessed.

Material and Finish: box and faceplate.

Faucet: Combination valved fitting or separate hot- and cold-water valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.

Supply Shutoff Fittings: NPS 1/2 (DN 15) gate, globe, or ball valves and NPS 1/2 (DN 15) copper, water tubing.

Drain: standpipe and P-trap for direct waste connection to drainage piping.

Retain one or both "Inlet Hoses" and "Drain Hose" subparagraphs below if required. Hoses are usually included with clothes washers.

Inlet Hoses: Two 60-inch- (1500-mm-) long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.

Drain Hose: One 48-inch- (1200-mm-) long, rubber household clothes washer drain hose with hooked end.

Icemaker Outlet Boxes:

Mounting: Recessed.

Material and Finish: box and faceplate.

Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 (DN 15) or smaller copper tube outlet.

Supply Shutoff Fitting: NPS 1/2 (DN 15) gate, globe, or ball valve and NPS 1/2 (DN 15) copper, water tubing.

Hose Bibbs

Standard: ASME A112.18.1 for sediment faucets.

Body: Bronze.

Seat: Bronze, replaceable.

Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.

Outlet Connection: Garden-hose thread complying with ASME B1.20.7.

Pressure Rating: 125 psig (860 kPa).

Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.

Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.

Finish for Service Areas:

Finish for Finished Rooms: Chrome or nickel plated.

Operation for Equipment Rooms: Wheel handle or operating key.

Operation for Service Areas:

Operation for Finished Rooms Include operating key with each operating-key hose bibb.

Includewall flange with each chrome- or nickel-plated hose bibb.

Nonfreeze Wall Hydrants

Standard: ASME A112.21.3M for-outlet, self-draining wall hydrants.

Pressure Rating: 125 psig (860 kPa).

Operation: Loose key.

Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.

Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).

Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.

Box: Deep, flush mounted with cover.

Box and Cover Finish: Retain "Outlet," "Box," and "Box and Cover Finish" subparagraphs above for concealed-outlet-type wall hydrants or "Outlet" and "Nozzle and Wall-Plate Finish" subparagraphs below for exposed-outlet-type wall hydrants.

Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.

Nozzle and Wall-Plate Finish: Operating Key(s): [**One**] [**Two**] with each wall hydrant.

Ball-Valve-Type, Hose-End Drain Valves Standard: MSS SP-110 for standard-port, two-piece ball valves.

Pressure Rating: 400-psig (2760-kPa) minimum CWP.

Size: NPS 3/4 (DN 20).

Body: Copper alloy.

Ball: Chrome-plated brass.

Seats and Seals: Replaceable.

Handle: Vinyl-covered steel.

Inlet: Threaded or solder joint.

Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7

Stop-and-Waste Drain Valves Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.

Pressure Rating: 200-psig (1380-kPa) minimum CWP or Class 125.

Size: NPS 3/4 (DN 20).

Body: Copper alloy or ASTM B 62 bronze.

Drain: NPS 1/8 (DN 6) side outlet with cap.

Water-Hammer Arresters

Standard: ASSE 1010 or PDI-WH 201.

TypeSize: ASSE 1010, Sizes AA and A through F, or PDI-WH 201, Sizes A through F.

Supply-Type, Trap-Seal Primer Device Standard: ASSE 1018.

Pressure Rating: 125 psig (860 kPa) minimum.

Body: Bronze.

Inlet and Outlet Connections: NPS 1/2 (DN 15) threaded, union, or solder joint.

Gravity Drain Outlet Connection: NPS 1/2 (DN 15) threaded or solder joint.

Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

Drainage-Type, Trap-Seal Primer Device

Standard: ASSE 1044, lavatory P-trap with NPS 3/8 (DN 10) minimum, trap makeup connection.

Size: NPS 1-1/4 (DN 32) minimum.

Body: Chrome-plated, cast brass.

Off-Floor Cartridge Filters:

Description: Simplex, housing with replaceable element for removing suspended particles from water.

Housing: Corrosion resistant; designed to separate feedwater from filtrate and to direct feedwater through water filter element; with element support.

Pipe Connections: Threaded according to ASME B1.20.1.

Support: Wall bracket.

Element: Replaceable; of shape to fit housing.

EXECUTION

INSTALLATION

Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

Install water regulators with inlet and outlet shutoff valves[and bypass with memory-stop balancing valve]. Install pressure gages on inlet and outlet.

Install balancing valves in locations where they can easily be adjusted.

Install temperature-actuated, water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

Install Y-pattern strainers for water on supply side of each [control valve] [water pressure-reducing valve] [solenoid valve] [and] [pump].

Set nonfreeze, nondraining-type post hydrants in concrete or pavement.

Set freeze-resistant yard hydrants with riser pipe in concrete or pavement. Do not encase canister in concrete.

Water-hammer arresters in first paragraph below are best shown on water risers and details. Specifying number, size, and location here is difficult.

Install water-hammer arresters in water piping according to PDI-WH 201.

Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

FIELD QUALITY CONTROL

Retain "Perform the following tests and inspections" Paragraph below to require Contractor to perform tests and inspections.

Perform the following tests and inspections:

Test each according to authorities having jurisdiction and the device's reference standard.

Domestic water piping specialties will be considered defective if they do not pass tests and inspections.

Prepare test and inspection reports.

END OF SECTION - 22 11 19

22 11 23 - DOMESTIC WATER PUMPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data. For each type of product.

a. Include certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIRMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 778 for motor-operated water pumps.

2.2 DOMESTIC WATER PUMPS

A. Horizontally Mounted Centrifugal Pumps:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Grundfos Pumps Corp. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps. Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontally mounted; rated for 125-psig (860-kPa) minimum working pressure and minimum continuous water temperature of 225 deg F (107 deg C).

2.3 MOTORS

A. Comply with NEMA MG 1 unless otherwise indicated.

1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.
- B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- C. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 262913 "Enclosed Controllers."

2.4 CONTROLS

- A. Pressure: Built in pressure sensor; the controller ensures that the pump starts automatically when water is consumed and stops automatically when the consumption ceases.

1. See cut sheet for pump operation.

PART 3 - EXECUTION

3.1 INSTALLATION

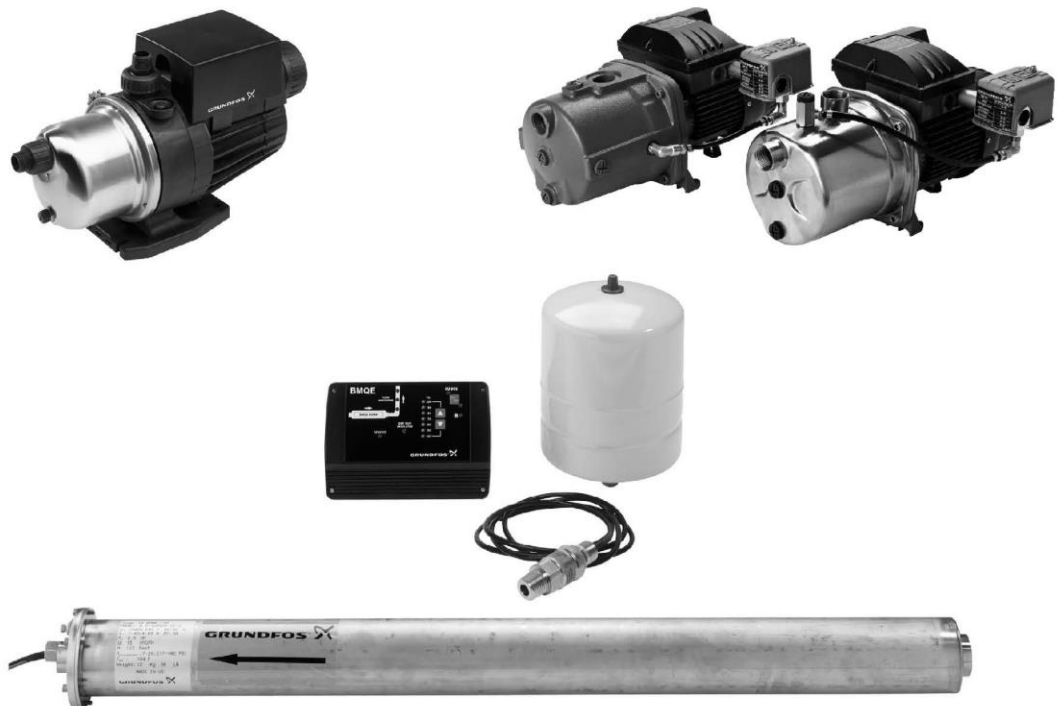
- A. Comply with HI 1.4.
- B. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
- C. Support pumps and piping so weight of piping is not supported by pump volute.
- D. Install electrical connections for power, controls, and devices.
- E. Suspend in-line pumps independent from piping. Use continuous-thread hanger rods and vibration isolation hangers. Fabricate brackets or supports as required for pumps.
- F. .
- G. Connect piping with valves that are at least the same size as piping connecting to pumps.
- H. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- I. Install shutoff valve and strainer on suction side of pumps.
- J. Install nonslam check valve and throttling valve on discharge side of pumps.

- K. Install thermostats in hot-water return piping.
- L. Install on suction and discharge of each pump. Install at integral pressure gage
tappings where
provided.

GRUNDFOS PRODUCT GUIDE

Domestic water supply

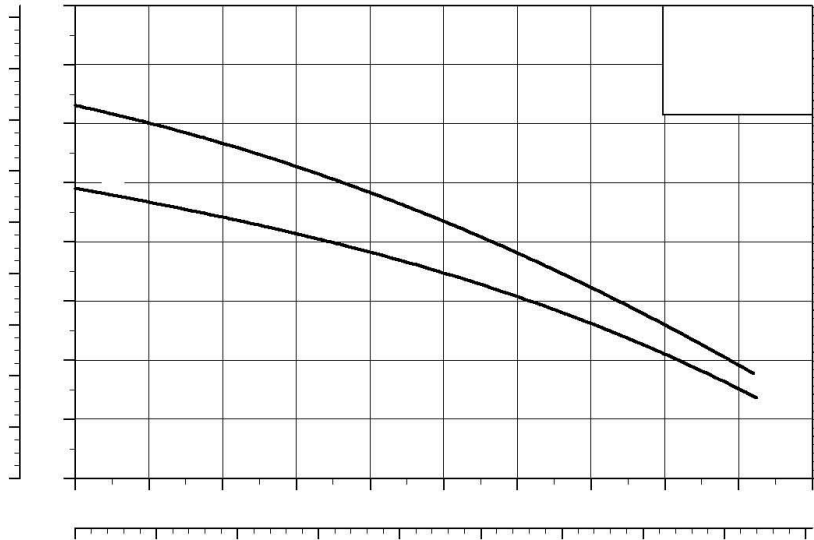
BMQE, MQ, Jets
60 Hz



Domestic water supply

Product overview

Performance range, MQ 60 Hz



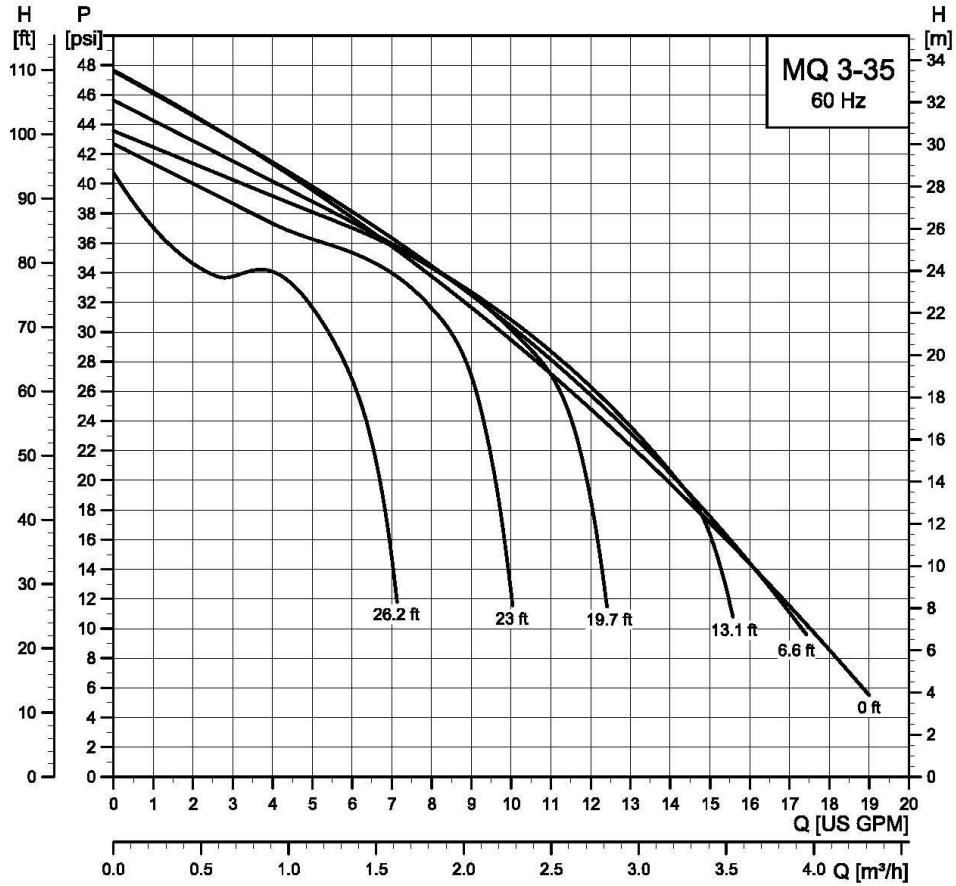
TM04 4141 0909

Product range, MQ

Range	MQ 3-35	MQ 3-45
Maximum flow rate [gpm (m³/h)]		19 (4.3)
Maximum pressure [psi (bar)]	49 (3.4)	63 (4.3)
Maximum system pressure [psi (bar)]		109 (7.5)
Maximum inlet pressure [psi (bar)]		40 (2.7)
Maximum suction lift [ft (m)]		26 (8)
Minimum ambient temperature [°F (°C)]		32 (0)
Maximum ambient temperature [°F (°C)]		113 (45)
Minimum liquid temperature [°F (°C)]		32 (0)
Maximum liquid temperature [°F (°C)]		95 (35)
Net weight [lbs (kg)]		29 (13.2)
Sound pressure level [dB(A)]		< 60
Tank volume [oz (ml)]		13.5 (399)
Air pressure in tank [psi (bar)]		22 to 25 (1.5 to 1.7)
Connections		1" NPT
Priming and drain plugs		3/8" GAS

Curve charts and technical data

MQ 3-35 60 Hz, suction lift performance curve

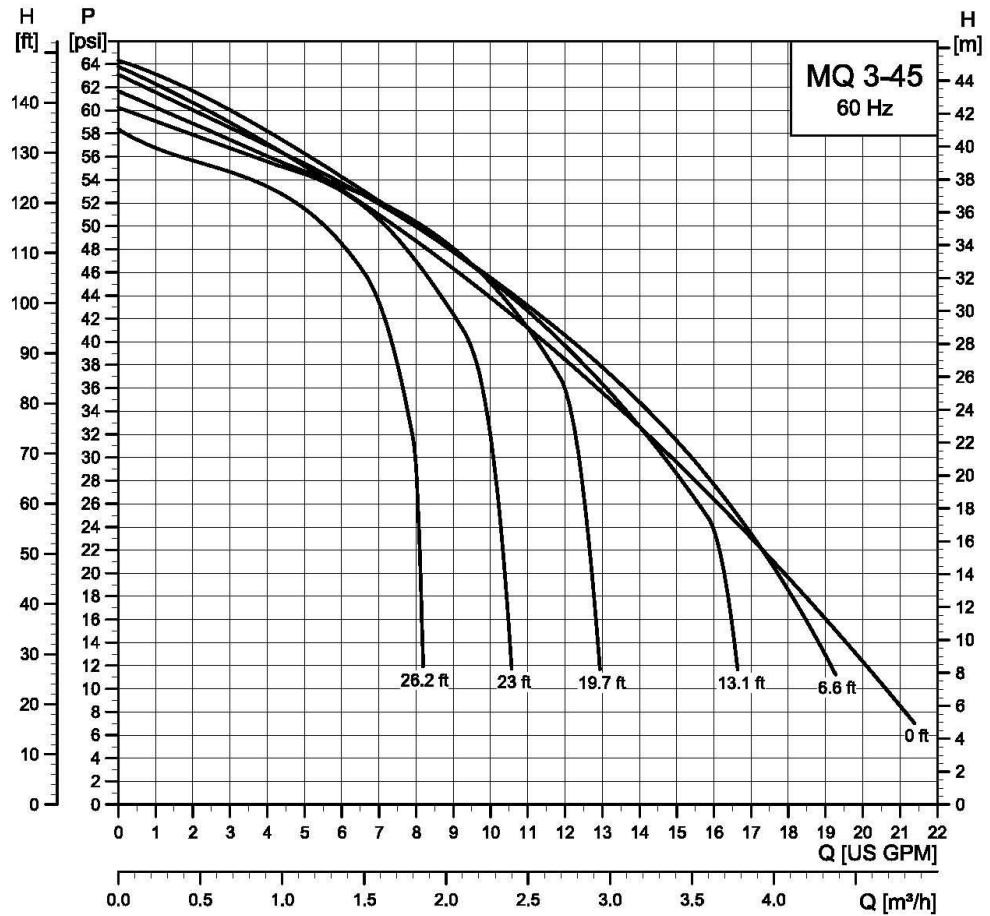


TM05 2056 4311

Provided it is filled with water, the pump is able to lift water from a depth of 26 ft (8 m) in less than 5 minutes.

Note: Use with a foot valve in suction lift applications.

MQ 3-45 60 Hz, suction lift performance curve



Provided it is filled with water, the pump is able to lift water from a depth of 26 ft (8 m) in less than 5 minutes.

Note: Use with a foot valve in suction lift applications.

TMD5 2057 4311

END OF SECTION – 21 11 23

22 12 23.13 – PRESSURE TANKS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data. For each type of product.
 - a. Include certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIRMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 778 for motor-operated water pumps.

2.2 DOMESTIC WATER PUMPS

A. Horizontally Mounted Centrifugal Pumps:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Grundfos Pumps Corp. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps. Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontally mounted;

rated for 125-psig (860-kPa) minimum working pressure and minimum continuous water temperature of 225 deg F (107 deg C).

2.3 MOTORS

A. Comply with NEMA MG 1 unless otherwise indicated.

1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.

B. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

C. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 262913 "Enclosed Controllers."

2.4 CONTROLS

A. Pressure: Built in pressure sensor; the controller ensures that the pump starts automatically when water is consumed and stops automatically when the consumption ceases.

1. See cut sheet for pump operation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with HI 1.4.

B. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

C. Support pumps and piping so weight of piping is not supported by pump volute.

D. Install electrical connections for power, controls, and devices.

E. Suspend in-line pumps independent from piping. Use continuous-thread hanger rods and vibration isolation hangers. Fabricate brackets or supports as required for pumps.

F. .

G. Connect piping with valves that are at least the same size as piping connecting to pumps.

- H. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- I. Install shutoff valve and strainer on suction side of pumps.
- J. Install nonslam check valve and throttling valve on discharge side of pumps.
- K. Install thermostats in hot-water return piping.
- L. Install on suction and discharge of each pump. Install at integral pressure gage tappings where provided.



TECHNICAL BROCHURE
BHYDRO R3

DIAPHRAGM TANKS

HYDROPRO® WATER SYSTEM TANK



GOULDS
WATER TECHNOLOGY
a xylem brand

Goulds Water Technology

Residential Water Systems

FEATURES

Horizontal Models: Feature a universal jet pump bracket and two (2) bolt-on, corrosion-resistant, high density polypropylene feet for installations with limited headspace, such as under mobile homes.

Deep Drawn Steel Shells: Provide maximum material strength.

Inner Shell: Prevents diaphragm from over-expanding.

Heavy Duty Parabolic Diaphragm: this new diaphragm design has improved diaphragm life by reducing abrasive wear. The diaphragm separates air and water to maintain the tank's air charge. The Butyl rubber diaphragm is an FDA approved material and also meets NSF / ANSI 61 - G standards.

Interior Tank Lining:

- Stand models and V45P feature durable polypropylene liner. Meets FDA requirements.
- Mounted pump models and V6P, V15P, V25P and V25H feature fusion bonded polymeric lining. Meets FDA requirements.

Maximum Working Pressure: 125 psi (except mounted pump models, 100 psi).

Temperature Rating: Maximum 120° F

Stainless Steel System Connection: On all Stand, In-Line, Buried and Horizontal models.

Appliance Appearance Exterior Finish: Blue color, high durability exterior finish of tough, powder coat over a zinc phosphate surface treatment.

Tanks are designed for installation indoors or where they are protected from rain, irrigation overspray, salt air and other corrosive environments. Always protect tanks from freezing.

Heavy Duty Base: Made of high density polypropylene on stand models only.

Pre-charge: All tanks charged to 38 PSI.



Certified to NSF/ANSI 61-G



PAGE 2

Goulds Water Technology

Residential Water Systems

Models	Model No.	Total Volume (Gals.)	Drawdown in Gallons at System Operating Pressure Range of			Maximum Drawdown Vol. (Gals.)	Pre-Charge PSI	System Connection	Dimensions		Shipping Weight	Height From Floor to Center of Base Opening
			20/40 PSIG	30/50 PSIG	40/60 PSIG				Diameter	Height		
Stand Models	V45	13.9	5.1	4.3	3.7	8.4	38	1" NPTF	15 3/8"	24 1/8"	23	3 1/2"
	V60	19.9	7.3	6.1	5.3	12.1	38	1" NPTF	15 3/8"	32 3/8"	34	
	V80	25.9	8.9	7.7	6.7	13.9	38	1" NPTF	15 3/8"	39 3/8"	43	
	V80EX	25.9	8.9	7.7	6.7	13.9	38	1" NPTF	15 3/8"	42 3/8"	43	7 1/4"
	V100	31.8	11.8	9.9	8.6	13.8	38	1" NPTF	15 3/8"	47 1/4"	52	3 1/2"
	V100S	31.8	11.8	9.9	8.6	13.8	38	1" NPTF	22"	28"	56	3 1/2"
	V140	45.2	16.5	13.9	12.1	27.3	38	1 1/4" NPTF	22"	36 3/8"	64	
	V200	65.1	23.9	20.0	17.4	39.3	38	1 1/4" NPTF	22"	48 3/8"	89	
	V250	83.5	30.9	25.9	22.5	50.8	38	1 1/4" NPTF	26"	46"	116	
		V260	84.9	31.2	26.2	22.8	44.7	38	1 1/4" NPTF	22"	60 3/8"	113
	V350	115.9	42.9	35.9	31.3	70.5	38	1 1/4" NPTF	26"	61 3/8"	161	3 1/2"
Mounted Pump Models*	V45MP	13.9	5.1	4.3	3.7	8.4	38	3/4" Pipe	15 3/8"	25 1/8"	28	
	V60MP	19.9	7.3	6.1	5.3	12.1	38	3/4" Pipe	15 3/8"	33 3/8"	40	
	V45PST	13.9	5.1	4.3	3.7	8.4	38	3/4" Pipe	15 3/8"	25 1/8"	28	
	V60PST	19.9	7.3	6.1	5.3	12.1	38	3/4" Pipe	15 3/8"	33 3/8"	40	
Buried Models	V60B	19.9	7.3	6.1	5.3	12.1	38	1" NPTM	15 3/8"	28 1/2"	33	
	V140B	45.2	16.5	13.9	12.1	27.3	38	1 1/4" NPTM	22"	32 3/8"	63	
	V6P	1.9	0.7	0.6	0.5	1.3	38	3/4" NPTM	8 3/4"	10 3/8"	7	
In-Line ① Models	V15P	4.9	1.8	1.5	1.4	3.1	38	3/4" NPTM	11"	14 3/4"	11	
	V25P	7.3	2.7	2.3	2.1	3.1	38	3/4" NPTM	11"	21 1/8"	16	
	V45P	13.9	5.1	4.3	3.7	8.4	38	1" NPTM	15 3/8"	21 1/8"	24	
	V25H ①	7.3	2.7	2.3	2.1	3.1	38	3/4" NPTM	11"	21 1/8"	20	
Horizontal Models w/Bracket	V45H	13.9	5.1	4.3	3.7	8.4	38	1" NPTM	15 3/8"	22 3/8"	26	
	V60H	19.9	7.3	6.1	5.3	12.1	38	1" NPTF	15 3/8"	33 3/8"	36	

NOTES:

* Compatible with only certain Goulds jet pumps.

P = Pipe mounted EX = With base extension B = Buried
MP = Mounted pump PST = Pump system tank H = Horizontal with bracket

(All dimensions are in inches and weight in lbs. Do not use for construction purposes.)

① V6P, V15P, V25P and V25H are produced at Charlotte, NC plant after January 2013, resulting in minor dimensional changes.

ACCESSORIES



AW39 Bracket:
Universal pump mounting bracket for use on all stand model tanks.



AWT1 Base Extension:
For use on 15 3/8" models. Provides 4 1/8" base elevation. Supplied in quantities of six (6) per carton.

Order No.	Description	Wt. (lbs.)
AW39	Universal Jet Pump Bracket	2
AWT1	Tank Base Extension (Qty. 6)	5

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're 12,500 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

For more information on how Xylem can help you, go to www.xylem.com



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END OF SECTION – 21 12 23.13

22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1: GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
2. For solvent cements and adhesive primers, documentation including printed statement of VOC content.
3. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE 7-10.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components.

2.2 PIPES AND FITTINGS

- A. PVC Plastic DWV Pipe and Fittings: ASTM D 2665, Schedule 40, plain ends with PVC socket-type, DWV pipe fittings.
 1. Adhesive Primer: ASTM F 656.
 - a. Adhesive primer and cement shall be used in accordance with manufacturer installation procedure and local code.

PART 3 – EXECUTION

3.1 PIPING INSTALLATION

- A. Comply with requirements in Section 221113 "Facility Water Distribution Piping" for basic piping installation requirements.
- B. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- C. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- D. Install soil and waste drainage and vent piping according to ASTM D 2665.
- E. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- F. Comply with requirements in Section 221113 "Facility Water Distribution Piping" for basic piping joint construction.
- G. Comply with requirements in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support devices.

END OF SECTION 22 13 16

22 13 53 - FACILITY SEPTIC TANKS

PART 1 : GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
 - a. Include construction details, material descriptions, dimensions of individual components, and profiles.
 - b. Include manhole openings, covers, and pipe connections.

PART 2 - PRODUCTS

2.1 SEPTIC TANKS (temporary waste water holding for competition only. Same for both Greywater and Blackwater Storage)

A. Polyethylene Septic Tanks:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Quadel Industries.
2. Single-chamber, molded, HDPE or PE construction; fabricated for septic tank application, with access risers and manholes.
3. Capacity: 250 gal.
4. 4" Inlet and Outlet, sized to accordance with local code.

2.2 CLEANOUTS

- A. Cleanouts: ASME A112.36.2M; with round PVC housing.

PART 3 - EXECUTION

3.1 SEPTIC TANK INSTALLATION

- A. Install septic tanks level.
- B. Install Polyethylene septic tanks according to ASTM C 891.



RAINSAFE™ POTABLE WATER FROM RAIN WATER



WATER TREATMENT SYSTEM



RainSafe™ is a complete and pre-assembled, plug & play, certified & patented system for purifying harvested rainwater to potable standards.

The system comprises of a recyclable polyethylene tank; an automatic electronic control unit; inlet & outlet filters, UV light & Ozone generator with injection system, customized Eurocom Pump 30/30 M, and Smart Press pump controller.

The RainSafe™ is energy efficient as the refresh process allowing the UV Lamp to be off for >90% of the day. The unit is supplied with a recyclable white plastic front cover.

Protection Level: IP 40

Working ambient temp: Min. +5°C to max. +35°C

Max. Flow: 50 L/min

Max. Head: 46 meters

Liquid temp range: from +5°C to max. +35°C

Max. working pressure of the RainSafe™: 4.6 bar (460kPa)

Rainwater inlet: ≥20 L/min min. 2.5 bar; max. 8.0 bar

Rainwater inlet connection: 1" BSP F

Potable outlet connection: 1" BSP F

Overflow / vent connection: DN50

Electric connection: CEE7/5 (Schuko)

TECHNICAL DATA

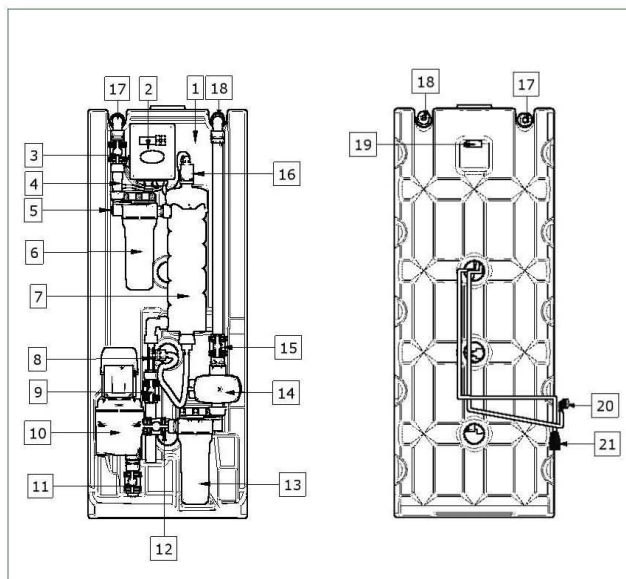
MODEL	CODE	PRICE €	ELECTRICAL DATA				HYDRAULIC DATA										N° IMPELLERS	WEIGHT Kg	Q.TY x PALLET							
			VOLTAGE 50 Hz	P1 MAX W	P2 NOMINAL		In A	Q=m³h		0		0,6		1,2		1,8				2,4		3,0		3,6		
					kW	HP		Q=L/min	0	10	20	30	40	50	60	60				60	60	60	60	60	60	60
RainSafe™ MIDI ⁽¹⁾	60153581	3.500	1x220-240 V ~	0.720	0.45	0.6	3.2	H (m)	46	42,2	37,8	31,2	23,3	14,3	-	4	60	2								

Note: The performances are of the Eurocom 30/30M pump included as part of the RainSafe™; prior to the water leaving the RainSafe™ there is a 10µm carbon filter which will have an affect on the actually performance curve.

⁽¹⁾ Available from March 2013

PARTICULARS

1	RainSafe™ tank – 230 litres
2	RainSafe™ controller
3	Inlet valve
4	Flow monitor
5	Level switch
6	Inlet 5µm polypropylene filter
7	UV & Ozone generator
8	Venturi
9	Valve
10	Eurocom RS 30/30 M
11	Valve
12	Valve
13	Outlet 10µm carbon filter
14	Smart Press pump controller
15	Valve
16	UV lamp socket
17	Rainwater inlet connection: 1" BSP F
18	Potable outlet connection: 1" BSP F
19	DN50 overflow / vent / refresh connection
20	Electrical connections – CEE7/5 (Schuko plug)
21	Electrical connection to rainwater tank pump*; (Schuko socket)



* rainwater tank pump not included

10/6/2014

Fol-Da-Tank 150 Gallon Potable Pillow Tank (FDT-PW150)



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Fol-Da-Tank 150 Gallon Potable Pillow Tank



Online Price: **\$369.99**

Part Number: FDT-PW150
Capacity: 150 Gallons
Size: 60"L x 60"W x 12"H
Weight: 30 lbs.
Ships From: IL
[Freight Calculator](#)



Fol-Da-Tank Collapsible Tanks for Water Shuttle and Storage (Pillow Style)

Please Note: The tank dimensions show a +/- of 6" when filled. Once the tank is filled with water the length and width will shrink.

It was more than fifty years ago that the first Fol-Da-Tank was introduced to firefighters, who recognized its value and quality immediately. In fact, the quality was so good many of these original models are still on the job, performing like new.

Fol-Da-Tank has proved to be the practical answer as an extra water supply for rural areas, where water pressure is low or as a back-up facility for municipal fire departments.

[Installation and Filling of Pillow Tanks](#)
[Pillow Tank Cleaning](#)
[Manufacturer's Warranty Policy](#)
[Pillow Tank Drawing](#)

Applications:

- Fire Fighting – Water shuttle and storage
- Construction sites
- Feeding livestock
- Mixing fertilizer, pesticides, or herbicides
- For parks and nurseries – anywhere water sources are scarce
- Drinking water source

The tanks are **NOT** designed for handling petroleum products.

Features:

- Potable water fabric NSF/ANSI 61 standard
- Eleven standard sizes
- Compact – easy to store – folds down to 18"x18"x18"
- Resists chemical contamination, mildew, rot, and solar heat
- RF welded seams for longer life
- Severe weather tolerance to -40 F
- Fills and empties in minutes by pump or gravity flow
- Easily handled by one person
- 1-1/2" ball valve with female threads included on tanks under 2000 gallons
- 2" ball valve and cam lock fitting included on tanks over 2000 gallons
- Large 4" fill opening
- Transportable by truck

Warranty – The 8130 PW3 NSF/FDA Vinyl is offered with a seven year limited warranty for weathering.

Physical Membrane Specifications

Base - Type:	Polyester
Fabric - Weight:	8.5 oz. / sq. yd.
Finished Coated Weight:	28 +2-1 oz / sq. yd.

<http://www.tank-depot.com/productdetails.aspx?part=FDT-PW150>

1/2

END OF SECTION 22 13 53

22 13 36 – PACKAGED, WASTEWATER PUMP UNITS

SECTION 221353 – GRAYWATER SYSTEM

PART 1 - GENERAL

1.1 REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
 - a. Include construction details, material descriptions, dimensions of individual components, and profiles.
 - b. Include manhole openings, covers, and pipe connections.

PART 2 - PRODUCTS

2.1 GRAYWATER SYSTEM

A. Soft-sided, Low-Profile Bladder Tanks:

1. MANUFACTURER:

- a. Aqua2use
121 Tzu Li 2St, Wu Chi Town
Taichung 0435, Taiwan
PH: +866 (04) 2630-4015
Fax: +866 (04) 2630-4067
www.aqua2reuse.com

2. Tanks must fit within the scheduled maximum dimensions, and have a minimum of the scheduled volume capacity

3. Capacity: 2000 gallons

4. Inlet and Outlet 2" NPT inlet, minimum. 4" minimum op cap for filling/emptying

B.

2.2 CLEANOUTS

A. Tank Pre-screening:

1. The installed tank connection to the rainwater downspouts must be preceded by an inlet screen with a maximum screen spacing less than .02 inches.
2. The Pre-tank screening device must be accessible for periodic clean-out

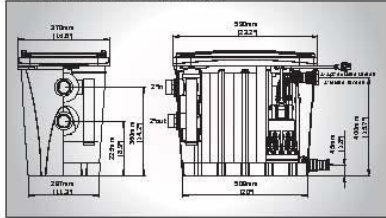
PART 3 - EXECUTION

3.1 RAINWATER TANK INSTALLATION

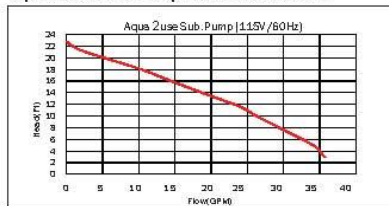
- A. Install in accordance with manufacturers instruction and local code
- B. Bladder tank must be installed on top of suitable ground protection fabric to avoid abraision or puncture
- C. Install rainwater bladder tanks on top of protection fabric, sloping with the ground. Orient such that the inlet ball valve/connection to pump is at the lowest point
- D. Rainwater tank connections and pump must be accessible through the deck for connection/disconnection and periodic maintenance

Aqua2use TECHNICAL SPECIFICATIONS

Aqua2use GWDD Dimensions:



Aqua2use GWDD Pump Performance Curve:



Aqua2use GWDD Pump Specifications:

Outlet		Inlet		Head (ft)		Flow (GPM)		Dimensions (L x W x H (in))	Weight
HP	W	inch	Head (ft)	Flow (GPM)	Head (ft)	Flow (GPM)	L x W x H (in)	Weight	
1/4	200	1-1/4"	16	14	25	36	6.1 x 6.1 x 9.45	9.26	



POTENTIAL WATER REUSE OF 40,000 GALLONS ANNUALLY FOR AN AVERAGE FAMILY OF FOUR

Connection requirements

Power: 110v
Plumbing: 2" inlet and sewer connection
Outlet: Easy connection to 1/2" irrigation tube

Other features

Pump will only run when the tank is full or when activated by the timer - a very efficient system.
Can be disconnected when water is not required
Easy to clean - every 4 to 6 months
The pump and filters can handle water at elevated temperatures
The Aqua2use is UV resistant high grade polyethylene which will not break down in the sun

All parts and the pump are covered by a 12 month replacement warranty

INNOVATED & MANUFACTURED BY



MATALA WATER TECHNOLOGY CO., LTD.

AVAILABLE FROM



Phone: 805.468.4020
info@waterwisegroup.com

www.waterwisegroup.com



The Answer for Graywater Reuse



SUSTAINABLE LIVING

Aqua2use Graywater Diversion Device

Matala® 3D Progressive Filtration:
Technology proved in more than 40 countries



Aqua2use gwdd

MATALA PROGRESSIVE FILTRATION TECHNOLOGY APPLIED IN GRAYWATER DIVERTER

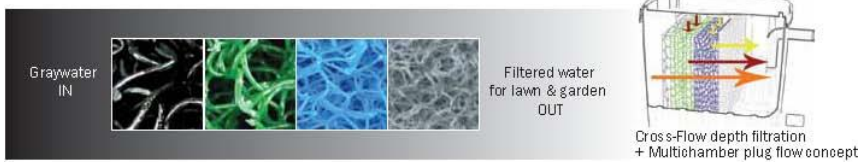


How it works:

- Step 1** When the Matala GWDD valve is open, graywater flows directly to the mains sewage.
- Step 2** When the Matala GWDD valve is closed, graywater from the house is diverted to the inlet of the filter.
- Step 3** The graywater flows through the 1st filterweb that retains major and medium particles such as hair, lint, paper, detergent clogs and other impurities. (The filter web: Matala Black - low density, Matala Green - medium density)
- Step 4** The graywater flows through the 2nd filter web that retains medium and small particles. (The filter web: Matala Green - medium density, Matala Blue - high density)
- Step 5** The graywater flows through the 3rd filterweb that retains small and minor particles. (The filter web: Matala Blue - high density, Matala Gray - super high density)
- Step 6** Filtered graywater is pumped to the irrigation.

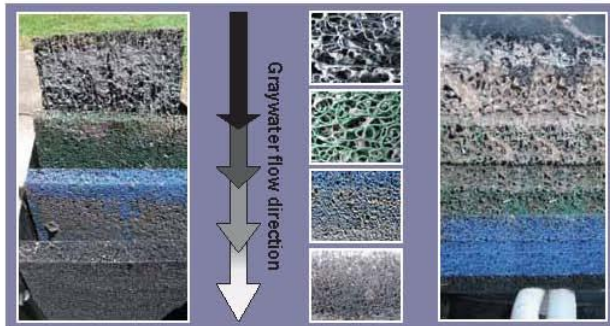
FEATURES & BENEFITS:

- State of the Art Progressive Filtration.
- 6.8 gallons of Matala filter media provides 108 sqft of specific surface area & 90% void space.
- Cross-Flow depth filtration: each filter web has a 3-dimensional structure, able to trap a high volume of impurities without plugging.
- Multichamber plug flow concept: If the first filter web gets clogged the filtration is done by the 2nd and 3rd filter web. If the second web gets clogged, the filtration is done by the 3rd filter web.
- Solid removal: up to 75% for pump operated unit, 90% for gravity unit.
- Submersible pump with integrated Electronic Pump Controller (EPC).
- The pump is protected from dry run, clogging and damage.
- Built in overflow safety.
- Easy to clean.
- System can be installed above ground, half-submerged in ground, or underground.
- Water mark approved.



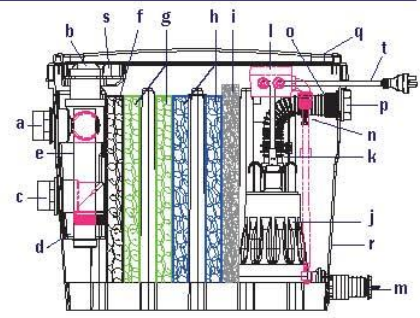
Unit tested in an RV park, Australia:
Matala graywater diverter checked after filtering 40,000L (10,567 gallons) in coming graywater: public shower rooms and laundry

The pictures prove the high filtration efficiency achieved with progressive density Matala filter sheets. The filter can take up a huge volume of hair, lint, sand, soap residue etc....



Aqua2use GWDD Components

- a. inlet (2")
- b. Diverting valve
- c. Outlet to sewer (2")
- d. basket
- e. Overflow stand pipe
- f. Matala FSM190, Black
- g. Matala FSM290, Green
- h. Matala FSM365, Blue
- i. Matala FSM460, Gray
- j. water pump
- k. pump outlet
- l. electronic pump controller
- m. drain/clean out point with 1" plug
- n. kinkfree hose + hose clamp
- o. outlet connector
- p. outlet
- q. tank cover
- r. tank
- s. inlet cover
- t. electrical pump lead



END OF SECTION 22 13 36

22 14 53 RAINWATER STORAGE TANKS

SECTION 221353 – RAINWATER STORAGE TANKS

PART 1 - GENERAL

1.1 REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product.
 - a. Include construction details, material descriptions, dimensions of individual components, and profiles.
 - b. Include manhole openings, covers, and pipe connections.

PART 2 - PRODUCTS

2.1 RAINWATER TANKS

A. Soft-sided, Low-Profile Bladder Tanks:

1. Manufactures: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Husky Portable Containment
 - b. Rainwater Pillow
 - c. Fol-da-Tank
2. Tanks must fit within the scheduled maximum dimensions, and have a minimum of the scheduled volume capacity
3. Capacity: 2000 gallons
4. Inlet and Outlet 2" NPT inlet, minimum. 4" minimum op cap for filling/emptying

B.

2.2 CLEANOUTS

A. Tank Pre-screening:

1. The installed tank connection to the rainwater downspouts must be preceded by an inlet screen with a maximum screen spacing less than .02 inches.
2. The Pre-tank screening device must be accessible for periodic clean-out

PART 3 - EXECUTION

3.1 RAINWATER TANK INSTALLATION

- A. Install in accordance with manufacturers instruction and local code

- B. Bladder tank must be installed on top of suitable ground protection fabric to avoid abraision or puncture
- C. Install rainwater bladder tanks on top of protection fabric, sloping with the ground. Orient such that the inlet ball valve/connection to pump is at the lowest point
- D. Rainwater tank connections and pump must be accessible through the deck for connection/disconnection and periodic maintenance

END OF SECTION 22 13 53

23 32 00 RAINWATER TREATMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cleaning of piping systems.

1.02 SUBMITTALS

- A. Product Data: Provide complete material balance for system components to check for Red-list materials
- B. Shop Drawings: Indicate system schematic and connection requirements.
- C. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Provide analysis of system water after cleaning.
- D. Submit flushing and cleaning plan to the Engineer for approval.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing and use of the type of products specified in this section, with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section.

1.04 REGULATORY REQUIREMENTS

- A. Conform to applicable code for residential plumbing in both competition and permanent house locations

PART 2 PRODUCTS

2.01 EQUIPMENT AND MATERIALS

- A. Installer must furnish Trojan UV MAX-IHS22-E4, or similar product. Product must contain 20" 5 micron cartridge filter and 5 micron carbon filter, and UV light capable of providing NSF-rated disinfection rate at 16 pgm minimum (see cut sheet below)

PART 3 EXECUTION

3.01 PREPARATION

- A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.

C. Provide adequate power for temporary pumps.

3.02 SYSTEM CLEANING AND FLUSHING (CHILLED WATER AND HEATING WATER SYSTEMS)







A. Cleaning and Flushing Plan

1. Installer must furnish owner with comprehensive cleaning and flushing plan for rainwater treatment system

MODEL	IHS12-D4 IHS12-D4/2	IHS22-D4 IHS22-D4/2	IHS22-E4 IHS22-E4/2
Flow Rates			
Rated flow at dose 30 mJ/cm ² @ 95% UVT	12 gpm (45 lpm)	12 gpm (45 lpm)	22 gpm (83 lpm)
Rated flow at dose 40 mJ/cm ² @ 95% UVT	9 gpm (34 lpm)	9 gpm (34 lpm)	16 gpm (60 lpm)
Operating Parameters			
Operating pressure	4 PSI - 125 PSI (27.5 kPa - 862 kPa)	4 PSI - 125 PSI (27.5 kPa - 862 kPa)	4 PSI - 125 PSI (27.5 kPa - 862 kPa)
Ambient air temperature	32°F (0°C) - 122°F (50°C)	32°F (0°C) - 122°F (50°C)	32°F (0°C) - 122°F (50°C)
Ambient water temperature	36°F (2°C) - 104°F (40°C)	36°F (2°C) - 104°F (40°C)	36°F (2°C) - 104°F (40°C)
Hardness (max.)	120 ppm (7 grains per gallon)	120 ppm (7 grains per gallon)	120 ppm (7 grains per gallon)
Iron (max.)	0.3 ppm	0.3 ppm	0.3 ppm
UVT (min.)	75%	75%	75%
Electrical			
Voltage	100 - 240V AC	100 - 240V AC	100 - 240V AC
Frequency	50 - 60 Hz	50 - 60 Hz	50 - 60 Hz
Max. current	0.5 Amp	0.5 Amp	1 Amp
Max. power consumption	50 Watts	50 Watts	83 Watts
Lamp power	40 Watts	40 Watts	70 Watts
Dimensions			
Overall	25.2" x 12" x 28" (64.8 x 30.5 x 71.1 cm)	25.2" x 12" x 28" (64.8 x 30.5 x 71.1 cm)	25" x 12" x 36.6" (63.5 x 30.5 x 92.9 cm)
Inlet & Outlet	3/4" NPT	3/4" NPT	1" NPT
Features			
Chamber material	304 SST	304 SST	316L SST
Audible alarm mute button	Yes	Yes	Yes
Lamp reset button	Yes	Yes	Yes
Lamp age indicator	Yes	Yes	Yes
Lamp operation indicator	Yes	Yes	Yes
Power supply operation indicator	Yes	Yes	Yes
High-flow sediment filter	10"	20"	20"
High-performance carbon filter	20"	20"	20"



SPECIFICATIONS

Specifications	IHS12-D4 IHS12-D4/2	IHS22-E4 IHS22-E4/2	IHS22-D4 IHS22-D4/2
Operating Parameters			
Maximum operating pressure	100 PSI (689 kPa)	100 PSI (689 kPa)	100 PSI (689 kPa)
Minimum operating pressure	4 PSI (27.5 kPa)	4 PSI (27.5 kPa)	4 PSI (27.5 kPa)
Maximum ambient air temperature	122 °F (50°C)	122 °F (50°C)	122 °F (50°C)
Minimum ambient air temperature	36 °F (2°C)	36 °F (2°C)	36 °F (2°C)
Maximum humidity	95%	95%	95%
Maximum hardness	120 ppm (7 grains per gallon)	120 ppm (7 grains per gallon)	120 ppm (7 grains per gallon)
Maximum iron	0.3 ppm	0.3 ppm	0.3 ppm
Minimum UVT	75%	75%	75%
Flow Rates*			
Maximum rated flow at dose of 16 mJ/cm ²	16 GPM (60 LPM)	N/A ¹	16 GPM (60 LPM)
Maximum rated flow at dose of 30 mJ/cm ²	9 GPM (34 LPM)	15 GPM (57 LPM)	9 GPM (34 LPM)
Maximum rated flow at dose of 40 mJ/cm ²	7 GPM (26 LPM)	12 GPM (45 LPM)	7 GPM (26 LPM)
Electrical			
Voltage	100-240V AC	100-240V AC	100-240V AC
Frequency	50-60 Hz	50-60 Hz	50-60 Hz
Max. current	0.5 Amp	0.85 Amp	0.5 Amp
Max. power consumption	50 Watts	83 Watts	50 Watts
Lamp power	40 Watts	70 Watts	40 Watts
Other			
UV Chamber Material	304 SST	316 SST	304 SST
Inlet/Outlet	3/4" NPT	1" NPT	3/4" NPT
Other			
Rated service life of lamp	1 year	1 year	1 year
UV System Certification	 	 	 

¹The max flow rate is determined by the carbon filter

*Flow rates shown are at 85% UVT.

END OF SECTION – 22 32 00

22 33 00 - ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type and size of domestic-water heater.
2. Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1, Section 7, "Service Water Heating."
 - a. Seismic Qualification Certificates: For commercial domestic-water heaters, accessories, and components, from manufacturer.
3. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

B. Warranties: Submit a written warranty executed by manufacturer agreeing to repair or replace water heaters that fail in materials or workmanship within 10 years from date of Substantial Completion. Failures include, but are not limited to, tanks and elements.

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Commercial domestic-water heaters shall withstand the effects of earthquake motions determined according to ASCE 7-10].
- B. Comply with requirements of applicable NSF, AWWA, or FDA and EPA regulatory standards for tasteless and odorless, potable-water-tank linings.
- C. Comply with performance efficiencies prescribed in ASHRAE 90.2, "Energy Efficient Design of New Low-Rise Residential Buildings."

2.2 WATER HEATERS, GENERAL

- A. Insulation: Suitable for operating temperature and required insulating value. Include insulation material that surrounds entire tank except connections and controls.
- B. Anode Rods: Factory installed, magnesium.
- C. Combination Temperature and Pressure Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input and pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into tank.
- D. Drain Valve: Factory or field installed.

2.3 ELECTRIC WATER HEATERS

A. Residential, Small-Capacity, Electric, Domestic-Water Heaters:

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AirGenerate ATI66

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install temperature and pressure relief valves and extend to closest floor drain.
- B. Install vacuum relief valves in cold-water-inlet piping.
- C. Install shutoff valves and unions at hot- and cold-water piping connections.
- D. Make piping connections with dielectric fittings where dissimilar piping materials are joined.

E. Electrically ground units according to authorities having jurisdiction.

AirTap™ Hybrid

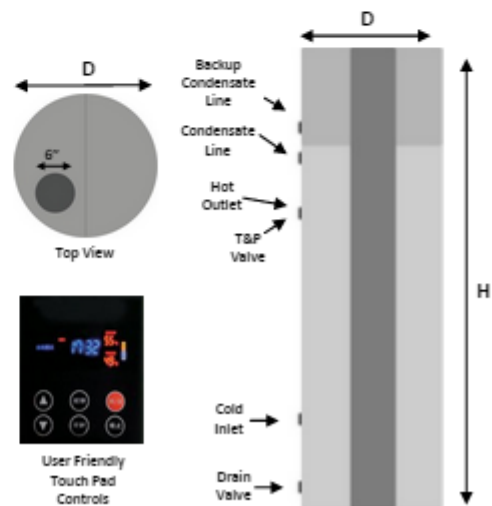
The Next Generation Water heater



Available in 66 and 80 Gallon Models

- Best efficiency in the industry
- High recovery rate
- Made entirely from stainless steel 304
- 3/4" water inlet, outlet, and condensate line
- Backup heating element
- Top exhaust duct
- Releases cool dehumidified air at 400 cfm when heat pump is in operation
- User friendly touch pad controls
- Built in anode rod
- Easy access side connections
- Water temperature can be set anywhere between 90° F to 135° F
- 3 operation modes
 - Energy saver (heat pump only)
 - Hybrid (heat pump & electric element)
 - High demand (electric element only)
- 4 way reversing valve for auto defrost
- Auto overheat detection
- Environmental friendly refrigerant R410a
- Can operate efficiently in ambient temperature ranging between 20° F to 120° F
- Built in T&P valve
- Low nose unit
- Brass drain valve
- Limited Lifetime Warranty

Specifications	ATI66	ATI80
Tank size	66 gallons	80 gallons
Energy Factor (hybrid mode)	2.35	2.2
First Hour Rating (hybrid mode)	70 gallons	80 gallons
Heat Pump BTU Rating	2.5 kW	2.5 kW
Electric Element	4 kW	4 kW
Backup Electric Element	4 kW	4 kW
Compressor	Panasonic	Panasonic
Refrigerant	R410A	R410A
Tank Capsule (stainless steel)	SS304	SS304
Diameter (D)	25.5 inches	25.5 inches
Height (H)	70.5 inches	75.5 inches
Weight	243 lbs	254 lbs
Duct Diameter (top of unit)	6 inches	6 inches
Decibel Rating	48	48
Voltage	220V	220V
Duct-in	Optional	Optional



*AirGenerate reserves the right to make changes without notice.

SECTION 22 41 13.13 - RESIDENTIAL WATER CLOSETS

PART 1 – GENERAL

SUMMARY

A. This section includes:

FLOOR MOUNTED CERAMIC TOILET

1.2 WARRANTY

Refer to Manufacturer

PART 2 – PRODUCTS

2.1 FLOOR MOUNTED CERAMIC TOILET

A. Kohler | Persuade Curv

Dual-Flush

Floor Mount/Floor Outlet

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install according to manufacturer' s installation guide

B. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place.

C. Fasten securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.

D. Repair, refinish, or replace products damaged during installation, as directed by the architect.

KOHLER®

Persuade® Curv Dual Flush Toilet K-3723

Features

- Vitreous china
- Two-piece toilet
- Comfort Height® Elongated bowl
- Dual Flush flushing system
- Includes top-mount dual flush trip lever
- 1.6 gpf (6.0 lpf) or 1.0 gpf (3.8 lpf)
- Fully skirted trapway
- 12" (305 mm) rough-in
- Supply line included
- 4-1/2" (114 mm) x 5-3/4" (146 mm) water area
- 28-5/8" (727 mm) x 14-3/16" (360 mm) x 32-1/2" (826 mm)
- Floor mount / Floor outlet

Recommended Accessories

- K-4008 Toilet Seat
- K-4774 Toilet Seat
- K-4650 Toilet Seat
- K-7659 Angle Stop
- K-7668 Straight Stop

Components

Product includes:

- K-4353 Toilet Bowl
- K-4441 Toilet Tank

Additional included component/s: Tank cover, Dual flush push buttons, Installation kit, Installation template, and Tank accessory pack.



Codes/Standards

- ASME A112.19.2/CSA B45.1
- ASME A112.19.14
- DOE - Energy Policy Act 1992
- EPA WaterSense®

KOHLER® One-Year Limited Warranty

See website for detailed warranty information.

Available Color/Finishes

Color tiles intended for reference only.

Color	Code	Description
	0	White
	96	Biscuit
	47	Almond
	NY	Dune
	95	Ice™ Grey
	7	Black Black™

USA/Canada: 1-800-4KOHLER (1-800-456-4537)

Kohler Co. reserves the right to make revisions without notice to product specifications.

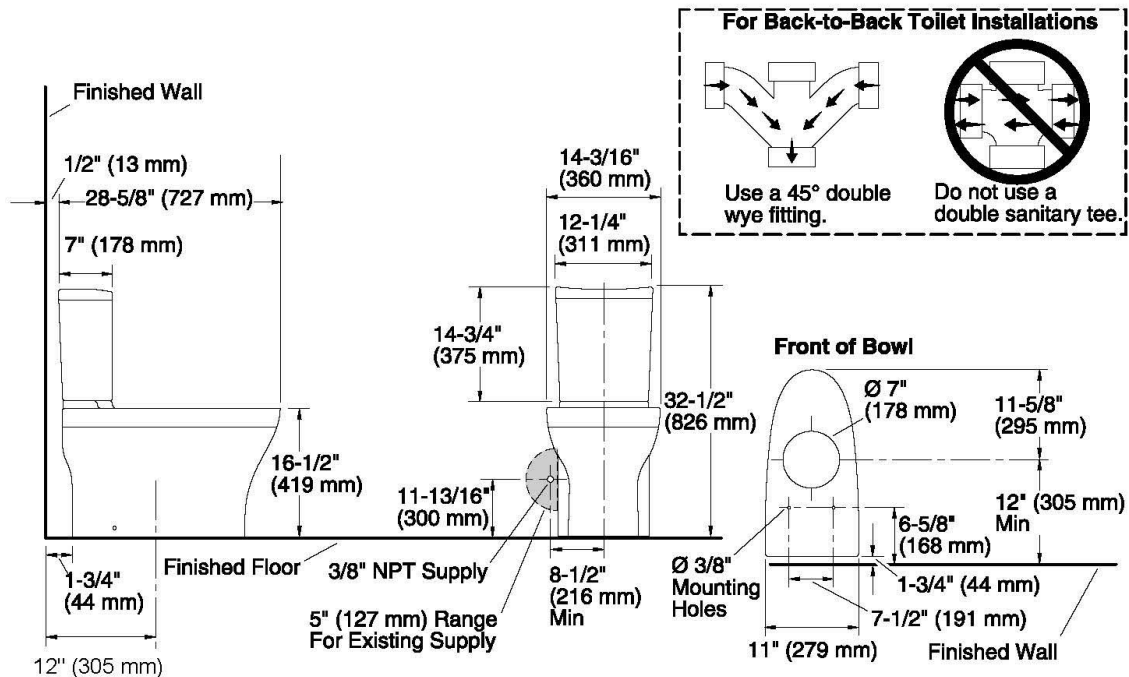
For the most current Specification Sheet, go to www.kohler.com.

8-11-2015 03:01

THE BOLD LOOK
OF **KOHLER**®

KOHLER®

Persuade® Curv
Dual Flush Toilet
K-3723



Technical Information

All product dimensions are nominal.

Toilet type:	Two-piece
Bowl shape:	Elongated front
Trap passageway:	2" (51 mm)
Water Consumption	
Full:	1.6 gpf (6 lpf)
Reduced:	1 gpf (3.8 lpf)
Water surface size:	4-1/2" x 5-3/4" (114 mm x 146 mm)
Rim to water surface:	8-1/2" (216 mm)
Rough-in:	12" (305 mm)
Seat-mounting holes:	5-1/2" (140 mm)

Notes

Install this product according to the installation guide.

IMPORTANT! The rough-in must be 12" (305 mm) or more from the base of the wall or baseboard. Install or relocate the supply and outlet as necessary to conform to rough-in dimensions.

If this toilet is installed in new construction, install a new supply stop following the dimensions in the diagram.

In installations with the supply stop installed, the existing supply stop may need to be relocated if it is less than 8-1/2" (216 mm) from the centerline of the toilet. Dry fit the toilet to confirm if the supply stop needs to be relocated.

The supplied hose will extend roughly 6" (152 mm) from the toilet. If the supplied hose does not reach the supply stop, a longer supply hose may be used.

For back-to-back toilet installations: Use only a 45° double wye fitting.

USA/Canada: 1-800-4KOHLER (1-800-456-4537)

Kohler Co. reserves the right to make revisions without notice to product specifications.

For the most current Specification Sheet, go to www.kohler.com.

8-11-2015 03:01

THE BOLD LOOK
OF **KOHLER.**

END OF SECTION 22 41 13.13

22 41 16.13 - RESIDENTIAL LAVATORIES

PART 1 – GENERAL INFORMATION

SUMMARY

A. This section includes:

Above-counter wash basin

1.02 WARRANTY

B. Refer to Manufacturer

PART 2 – PRODUCTS

2.01 ABOVE-COUNTER WASH BASIN

A. KRAUS | KCV-122-CH

Above-counter wash basin

No faucet holes; requires wall- or counter-mount faucet

White painted underside.

PART 3 – EXECUTION

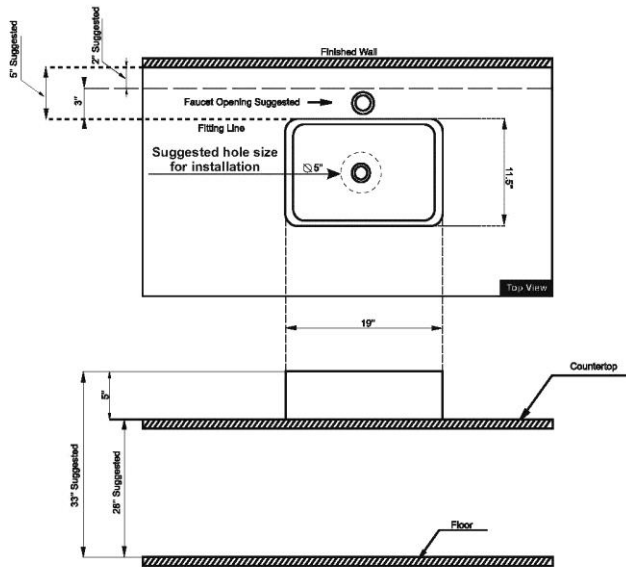
3.01 INSTALLATION

- A. Install per manufacturer' s installation guide.
- B. Set units level, plumb, and true to line, and anchor securely in place.
- C. Fasten securely in place, with provisions for thermal and structural movement.
Install with concealed fasters, unless otherwise indicated.
- D. Repair, refinish, or replace products damaged during installation, as directed by Architect.
- E. Adjust operating parts and hardware for smooth, quiet operation.

Kraus

Rough-In Dimensions

Suggested opening size of the hole in the countertop for proper sink installation should be 5 inches.



NOTE: FAUCET AND WATER SUPPLY ARE NOT INCLUDED

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2

Kraus

Care and Maintenance

Kraus ceramic sinks are crafted from the highest quality materials which make them extremely durable and resistant to corrosion. However, despite the durability and strength of our sinks, they may still be damaged if proper measures are not taken in their care and maintenance.

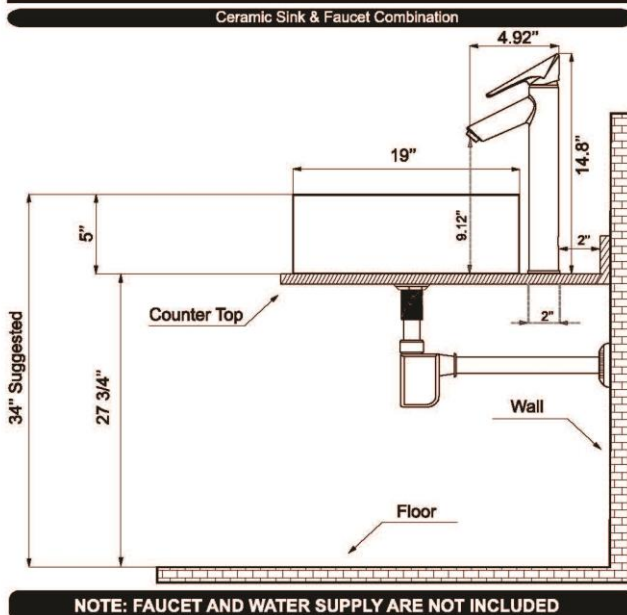
In order to prolong the life of your ceramic sink, simple daily maintenance is the key to keep your ceramic sink in its original condition. We suggest cleaning your sink after each use with a soapy sponge then rinsing thoroughly with warm water. You may dry it with a towel or a dry cloth. This will eliminate water spots and streaks while the sink is in use.

Do not be alarmed in case you begin to notice stains on your sink. They are most often caused by various minerals contained in your water supply. These mineral deposits settle in the surface of the sink and may cause the surface to stain. In order to eliminate stain spots, use a non-abrasive or mild-abrasive cleaner as mentioned earlier. Remember not to apply force while cleaning your ceramic sink. Do not scrub the sink, as you may scratch the surface. When finished, rinse thoroughly with warm water and dry with a towel or a soft cloth. At KrausUSA, your satisfaction with the quality and durability of our products is extremely important to us. Therefore, we hope that you try to avoid prolonged sink contact with products containing high concentrations of acids, dishwashing detergents, or bleaches containing chlorine. These products may stain the surface of the sink. Rinse thoroughly if these products do come in contact with the sink surface and dry it with a towel or soft cloth.

PLEASE NOTE: KrausUSA utilizes the highest manufacturing standards in all of our products. However, slight variations in size and shape on select Ceramic Vessel Sinks may occur from time to time. We recommend not cutting any surfaces based on the sizes and dimensions provided until the product is received. KrausUSA shall not be held accountable for any custom installation issues. Under no circumstances will KrausUSA be held liable for the cost of the repair or replacement of installation materials including, but NOT limited to, marble, stone, granite countertops, tiles, etc. Deviations from recommended installations, misuse, neglect, abuse, modifications or alterations may void your warranty. We advise that you comply with your local building codes as they may vary from state to state.

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About Kraus

Kraus is a leading designer and manufacturer of a broad selection of unique bathroom fixtures and accessories including vessel sinks, faucets, showers, vanities, and bathroom accessories. Kraus incorporates its distinguished style with superior functionality and affordability while maintaining the highest standards of quality in its vast product line.

The Kraus brand name represents a fusion of leading-edge technology and an eye toward design. And we continuously seek new trends while maintaining superior quality at unprecedented prices. The Kraus collection has the widest selection of exquisite styles for any type of décor, from modern residences to countryside homes.

For Kraus, durability and reliability have always been vital components for achieving the highest standards. Every model we offer undergoes rigorous testing and inspection prior to distribution.

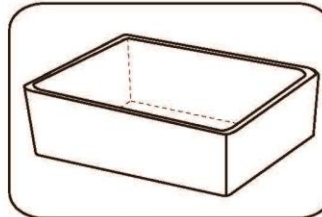
The key element of our success is our customers' satisfaction. As a result, our products are in high demand with shoppers worldwide.

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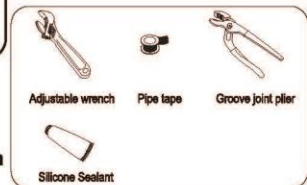
Kraus®

Product Description and Measurements



Installation Instruction
Ceramic Vessel Sink
MODEL-KCV-122

Tools You Will Need



- ★ Kraus Ceramic Collection
- ★ Rectangular Ceramic Sink
- ★ 19" X 11.5" X 5" H
- ★ For Above Counter Installation

Thank You

Dear Valued Customer,
Kraus would like to take this opportunity to thank you for this purchase. It is our sincere hope that you are completely satisfied with your new product. We welcome any questions or comments that you may have and look forward to assisting you with your accessory needs in the future.

Sincerely,
Kraus customer service department.

Prior To Installation Steps

1. Unpack your new product and ensure that all the parts are contained in the packaging.
2. Keep the product in its original box until you ready to install it.
3. The counter top must be flat.
4. Shut off the water supply if replacing a previously-installed vessel sink.
5. Observe all plumbing and building codes in your area.
6. It is recommended that installation of the product be done by a professional plumber.

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1

END OF SECTION 22 41 16.13

22 41 16.16 - RESIDENTIAL SINKS

PART 1 – GENERAL INFORMATION

SUMMARY

A. This section includes:

Under-counter stainless steel kitchen sink

1.02 WARRANTY

Refer to Manufacturer

PART 2 – PRODUCTS

2.01 UNDER-COUNTER STAINLESS STEEL KITCHEN SINK

A. Kohler

Handcrafted 18-gauge stainless steel

18-inch minimum base cabinet width, single bowl, 9-inch depth

Single faucet hole.

Part # K-5540

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install per manufacturer' s installation guide.

- B. Set units level, plumb, and true to line, and anchor securely in place.

- C. Fasten securely in place, with provisions for thermal and structural movement. Install with concealed fasters, unless otherwise indicated.

- D. Repair, refinish, or replace products damaged during installation, as directed by Architect.

- E. Adjust operating parts and hardware for smooth, quiet operation.

KOHLER®

Prolific™ Under-mount Kitchen Sink K-5540

Features

- 36-inch minimum base cabinet width.
- Large Single bowl.
- 10-inch depth provides generous workspace.
- No faucet holes.
- SilentShield® sound-absorption technology offers quieter performance.
- Three graduated ledges in basin allow you to place accessories at your preferred height.
- Beveled cone-shape slopes into the drain, easily disposing debris.
- Includes a bamboo cutting board that fits securely on the sink levels providing an easy-to-clean work surface.
- Includes two durable dishwasher-safe grated racks that provide a convenient shelf for drying, rinsing, and defrosting.
- Includes a durable dishwasher safe wash bin and colander for draining pasta, washing dishes, or defrosting meat.
- Includes installation hardware.

Material

- Handcrafted from 18-gauge stainless steel.

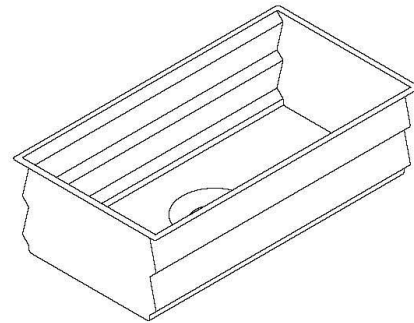
Installation

- Under-mount

Components

Product includes:

- K-5542 Multipurpose Grated Rack
- K-5542 Multipurpose Grated Rack
- K-5541
- K-5544 Prolific™



For complete listing of available colors, go to kohler.com.

Codes/Standards

ASME A112.19.3/CSA B45.4

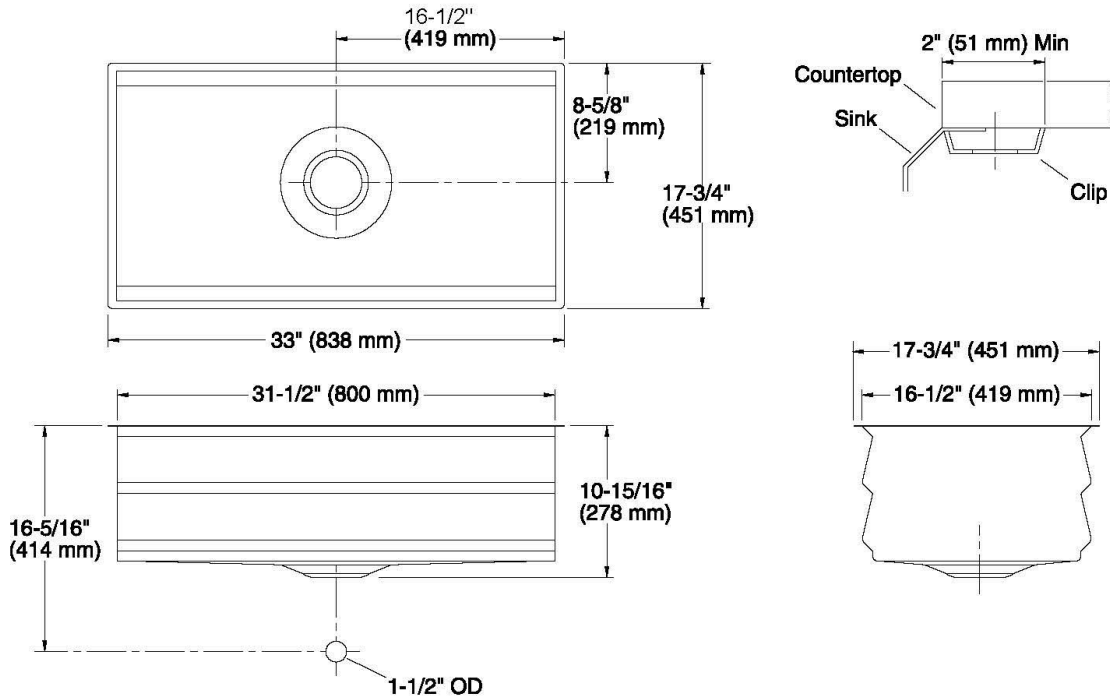
See website for detailed warranty information.

Product Specification

Sink shall be 33" (838 mm) in length, 17-3/4" (451 mm) in width, and 10-15/16" (278 mm) in height. Sink shall be made of 18-gauge stainless steel. Sink shall be single bowl. Sink shall have no faucet holes. Sink shall feature SilentShield® sound-absorption technology. Sink shall include bamboo cutting board, dishwasher safe wash bin and colander, and installation hardware. Sink shall be for under-mount installation. Sink shall be KOHLER Model K-5540.

KOHLER®

Prolific
Prolific™ Under-mount Kitchen Sink
K-5540



Technical Information

All measurements are nominal.

Bowl configuration:	Single
Installation:	Under-mount
Bowl area (Only)	Length: 31-1/2" (800 mm) Width: 16-1/2" (419 mm) Bowl depth: 10" (254 mm) Water depth: 10" (254 mm)
Drain hole:	3-3/4" (94 mm)
Template:	Under-mount, 1093327-7, required, included

Installation Notes

Install this product according to the installation guide.

Allow a minimum of 2" (51 mm) clearance from the cutout for clip attachment.

END OF SECTION 22 41 16.16

22 41 23 RESIDENTIAL SHOWER

PART 1 – GENERAL INFORMATION

1.01 SUMMARY

This section includes:

GROHE Retro-fit 210

Drain Shower

1.02 WARRANTY

Refer to Manufacturer

PART 2 – PRODUCTS

A. Retro-fit 210 Shower System

GROHE StarLight® finish

GROHE EcoJoy® technology for less water and perfect flow

GROHE DreamSpray® perfect spray pattern

SpeedClean anti-lime system

Inner WaterGuide for a longer life

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Install per manufacturer' s installation guide.

- B. Set units level, plumb, and true to line, and anchor securely in place.

- C. Fasten securely in place, with provisions for thermal and structural movement.
Install with concealed fasters, unless otherwise indicated.

- D. Repair, refinish, or replace products damaged during installation, as directed by Architect.

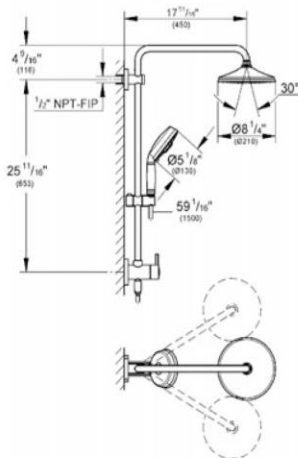
- E. Adjust operating parts and hardware for smooth, quiet operation.

RETRO-FIT 210 Shower System*

MODEL # 26125

GROHE America, Inc | 200 North Gary Avenue, Suite G, Roselle, IL 60172
Phone: +1 (800) 444-7643 | Fax: +1 (800) 225-2778 | us-customerservice@grohe.com

Pure Freude an Wasser



Product Description: Shower System*

Standard Specification:

- GROHE StarLight® finish
- GROHE EcoJoy® technology for less water and perfect flow
- GROHE DreamSpray® perfect spray pattern
- SpeedClean anti-lime system
- Inner WaterGuide for a longer life

Consisting of:

- 17 3/4" horizontal swivel shower arm
- Built-in diverter allows change between:
 - Metal head shower 1 spray (28 375)
 - Rain
 - Metal shower hose 59" (28 417)
 - With ball joint
 - Rotation angle ± 20°
- Hand shower 3 sprays (27 129)
- 3 adjustable sprays Rain / Jet / Pure
- Adjustable in height with gliding element
- Angle adapter
- Max Flow Rate 2.5 gpm (9.5 L/min)
- Rotation cone for Twistfree-function
- Suitable for instantaneous heaters from 18 kW/h

Applicable Codes & Standards:

- Energy Policy Act of 1992
- ASME A112.18.1/CSA B125.1

Color:

- 26125 000 chrome
- 26125 EN0 Brushed Nickel

Mosa. Tiles.

Mosa Shower Drain®

Product description

A combination of an unglazed, single-fired, fully vitrified floor tile (in accordance with EN 14411 Bla), produced with the Ultragres-process, with a 4 mm circular opening, permanently fixed to a specially designed stainless steel frame, and a high quality shower drain made by Easy Drain® with a watertight membrane for a permanent watertight wall/floor connection.

Product advantages

Application of the Mosa Shower Drain® provides a unique and at the same time creates a logical appearance of a 100% tiled floor with integrated drainage. Distinctive features are:

- modular size;
- easy installation;
- suitable for new building and renovation;
- no disruption of the tiled floor due to 'strange' materials;
- no silicone joints around the drain; the Mosa Shower Drain® can be grouted along with the rest of the floor tiles;
- large drainage capacity, suitable for rain showers;
- detachable tile element, easy to clean.

A permanently watertight connection between shower drain and floor or wall is achieved due to the watertight membrane, permanently fixed to the shower drain. The Mosa Shower Drain® can be positioned in a corner or directly against the back wall of the shower.

Product specification

Dimensions, surface structure, build-in height and drain capacity

Modular size in cm incl. 3 mm joint	Production size in mm	Surface structure	Build-in height incl. tile	Water trap	Drain capacity
15 x 90 cm	147 x 897 mm	V/RL/RQ*	86 mm	30 mm	30 l/min.
			105 mm	50 mm	42 l/min.

* V = flat; RL = Terra Maestricht® structure; RQ = Quartz® structure

Technical data

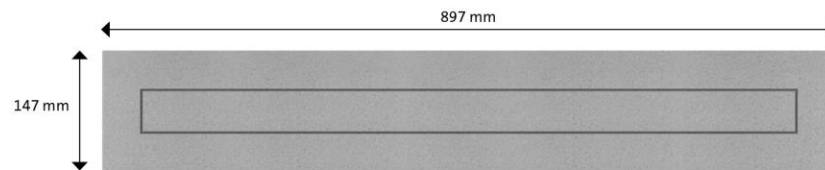
Component	Specification	Norm	Extra information
Floor tile	Unglazed Ultragres	Product norm EN 14411 Bla	Mosa norm is more stringent than EN-Norm; see also the Technical Product Sheet Floor Tiles Unglazed for enhanced technical information.
Stainless steel frame	Stainless steel 1.4301		
Adhesive	MS-polymer, 1-component	EN 542 (density)	Sustainable polymer high-density adhesive; resistant to high temperatures and permanent exposure to water; chemically resistant.
Shower drain 30 mm water trap	Stainless steel 1.4301, gauge 1.5 mm, drainage capacity 30 l/min., connection ø 40 mm	EN 1253/2 (min. 24 l/min.)	
Shower drain 50 mm water trap	Stainless steel 1.4301, gauge 1.5 mm, drainage capacity 42 l/min., connection ø 50 mm	EN 1253/2 (min. 24 l/min.)	

Mosa. Tiles.

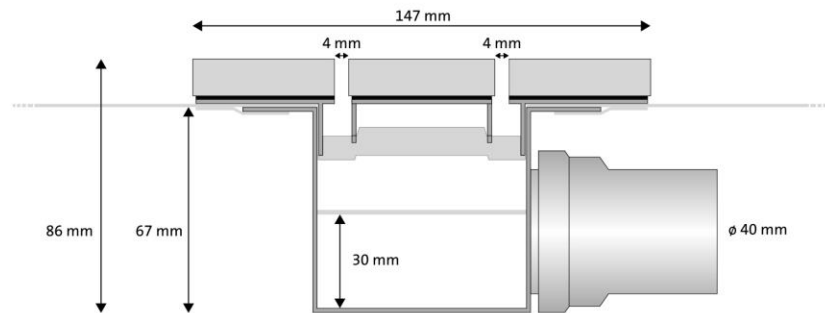
Mosa Shower Drain®

Build-in dimensions

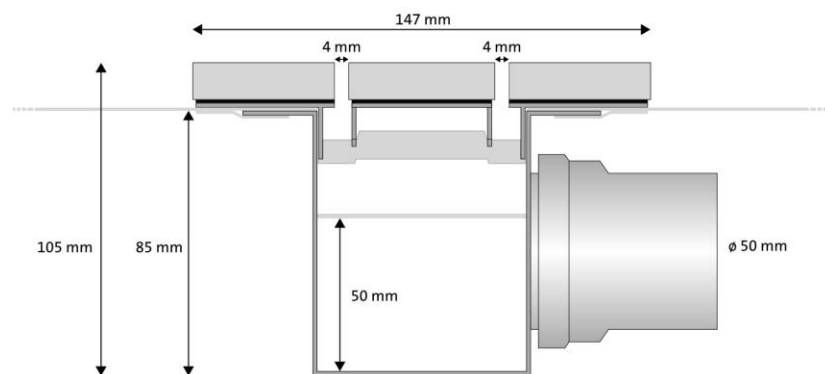
Top view



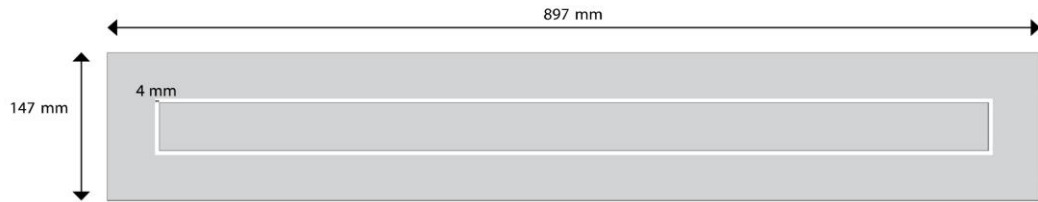
Profile 30 mm water trap



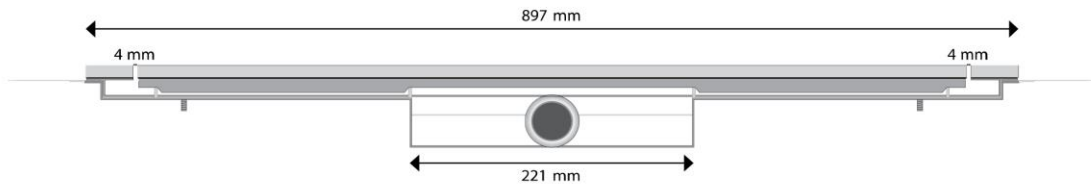
Profile 50 mm water trap



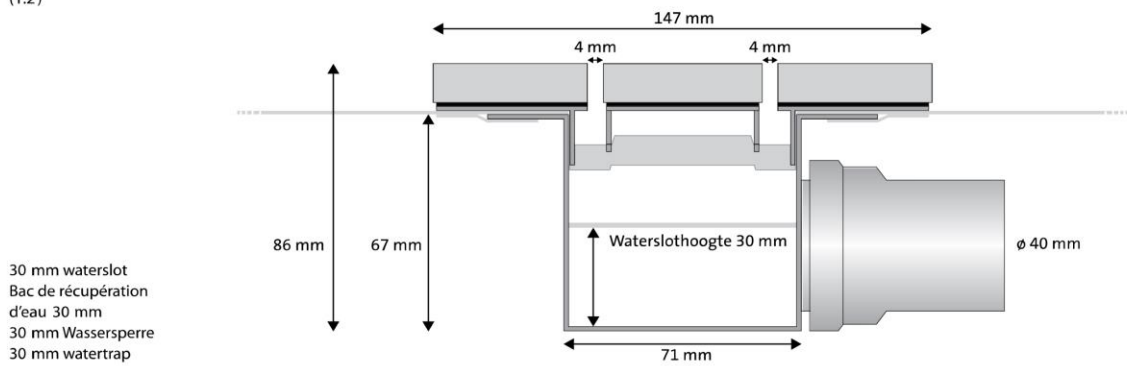
Bovenaanzicht
Vue de dessus
Draufsicht
Top view
(1:6,5)



Vooraanzicht
Vue frontal
Vorderansicht
Front view
(1:6,5)



Zij-aanzicht
Profil
Seitenansicht
Profile
(1:2)



Mosa. Tiles.

Mosa Shower Drain®

Laying and installation instructions

See comprehensive installation guidelines and demo on www.mosa.nl, chapter 'Documentation'.

Maintenance

Tile frame and detachable tile element of the Mosa Shower Drain® may be cleaned and maintained in the same manner as regular unglazed floor tiles from Mosa. See www.mosa.nl for the latest cleaning and maintenance advices and instruction videos.

The detachable tile element can be easily removed using the orange tile hook supplied with the Mosa Shower Drain® enabling the cleaning of the stainless steel shower drain. This will also permit the removal and cleaning of the removable water trap.

Sampling

showroomservice@mosa.nl; Tel.: +31 (0)43 368 93 23

General inquiries

Sales Support: info@mosa.nl; Tel.: +31 (0)43 368 92 29; Fax: +31 (0)43 368 93 56



Koninklijke Mosa bv
Meerssenerweg 358
P.O. Box 1026
NL-6201 BA Maastricht
T +31 (0)43 368 92 29
F +31 (0)43 368 93 56
info@mosa.nl
www.mosa.nl

The text for this Technical Product Sheet replaces all preceding versions and has been composed with the utmost care and in cooperation with the leading mortar and adhesive producers. All recommendations are based on current state-of-the-art knowledge. This Technical Product Sheet contains information about Mosa products, properties and applications, and therefore may not be used as a guarantee for the stated recommendations. Mosa will not be held responsible should this information be used as a guarantee. For warranties and liability we refer to our General Terms and Conditions of Sale. No rights can be derived from the contents of this Technical Product Sheet. Errors excepted. For the latest version see www.mosa.nl.

22 41 39 RESIDENTIAL FAUCETS, SUPPLIES AND TRIM

PART 1 – GENERAL INFORMATION

1.01 SUMMARY

A. This section includes:

LAVATORY FAUCET

SINK FAUCET

1.03 WARRANTY

Refer to manufacturer

PART 2 – PRODUCTS

2.01 LAVATORY FAUCET

GROHE Atrio OHM

1. Two-Hole Basin Mixer S-Size
2. GROHE StarLight® finish
3. Wall mount

SINK FAUCET

GROHE Concetto

1. Single-lever sink mixer 1/2"
2. GROHE StarLight® finish
3. GROHE SilkMove® ceramic cartridge

PART 3 – EXECUTION

3.01 INSTALLATION

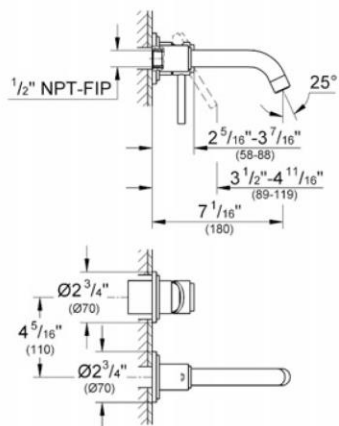
- A. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

ATRIO OHM
Two-Hole Basin Mixer
S-Size

MODEL # 19291

GROHE America, Inc | 200 North Gary Avenue, Suite G, Roselle, IL 60172
Phone: +1 (800) 444-7643 | Fax: +1 (800) 225-2778 | us-customerservice@grohe.com

Pure Freude an Wasser



Product Description:
Two-Hole Basin Mixer
S-Size

Standard Specification:

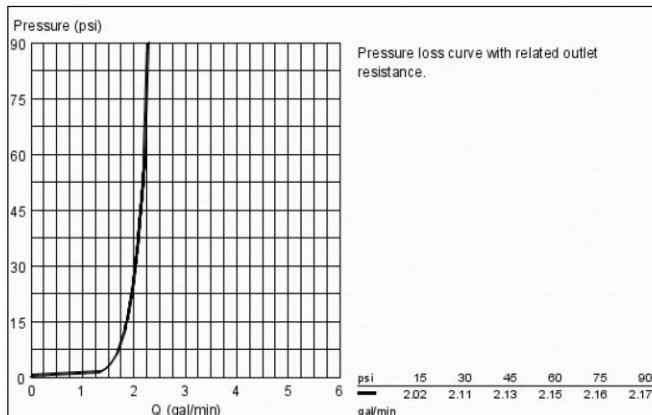
- GROHE StarLight® finish
- Wall mount
- Set for final installation for
- 32 641
- Without concealed body
- Separate escutcheons Ø 2 3/4"
- 7 1/6" (180 mm) spout
- Center distance 4 5/16" (110 mm)

Applicable Codes & Standards:

- Energy Policy Act of 1992
- NSF 61
- ASME A112.18.1/CSA B125.1
- US Federal and State material regulations
- EPA WaterSense®
- ICC/ANSI A117.1

Color:

- 19291 001 chrome
- 19291 EN1 Brushed Nickel inf

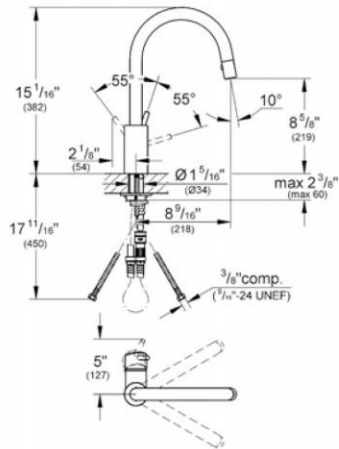


CONCETTO
Single-lever sink mixer 1/2"
MODEL # 32665

Pure Freude an Wasser



GROHE America, Inc | 200 North Gary Avenue, Suite G, Roselle, IL 60172
Phone: +1 (800) 444-7643 | Fax: +1 (800) 225-2778 | us-customerservice@grohe.com



Product Description:
Single-lever sink mixer 1/2"

Standard Specification:

- GROHE StarLight® finish
- GROHE SilkMove® ceramic cartridge
- Single hole installation
- Swivel Spout
- Extractable integrated trigger spray
- Integrated non-return valve
- Stainless Steel Braided Flexible Supplies
- Quick installation system
- **Protected against backflow**
- Max Flow Rate 1.75 gpm (6.6 L/min)
- Variable Handle Positioning

Applicable Codes & Standards:

- Energy Policy Act of 1992
- NSF 61
- ASME A112.18.1/CSA B125.1
- US Federal and State material regulations
- ICC/ANSI A117.1
- CalGreen

Color:

- 32665 001 chrome
- 32665 DC1 supersteel

END OF SECTION 22 41 39

PART 25 - DIVISION 23 - HEATING, VENTILATING, AND AIR- CONDITIONING (HVAC)

23 06 60.13 – REFRIGERANT CONDENSER SCHEDULE

PART 1 GENERAL

1.01 SYSTEM HARDWARE OVERVIEW:

A. See 23 09 93 for list of equipment for Chiller Heat Pump. The instrumentation and control must also control the Energy Recovery Ventilators, in addition to the hydronic system.

1.02 CONTROL SYSTEM COMPONENTS OVERVIEW

A. Subsystems:

1. Zone Thermostats: Controls for the HVAC system will consist of zone thermostats with temperature and relative humidity sensors that communicate analog and digital status information to a central control system.

2. Central Control System: The central control system will sense a call for heating or cooling from a room thermostat, and open/close the requisite valves before turning any pumps on. Similarly, when the setpoint temperature is satisfied, the system will sense it is time to turn off, and shut down all relevant hardware. The central control system will interface with (or be a part of) the Chiltrix control system.

3. Pump flow Control: Flow rate will be maintained and self-balanced using a suitable pump capable of built-in pressure measurement and flow self-regulation. These pumps must also

have the option to self-manage flow velocity to maintain a certain temperature differential.
See Ecocirc XL cut sheet for more details on the pump' s built-in control features.

PART 2 EQUIPMENT

2.01 MANUFACTURERS

Chiltrix, Inc.

PO Box 62546

Virginia Beach, VA 23466

PH: (757) 549-1494

Website: www.chiltrix.com

2.02 CONTROLLERS

A. Control Systems hardware and software are unspecified, such that any reasonable platform and software solution will be considered. Preference shall be given towards:

- 1) Low Cost
- 2) Simplicity
- 3) Opensource/freeware software or hardware
- 4) interactability/interface capability with the HVAC and home electronics systems already chosen.



The World's Most Efficient Chiller Heat Pump

CX30 Chiller Heat Pump

30,000 BTU Heating / 24,000 BTU Cooling
All-DC Inverter
Cooling COP 4.35 / Heating COP 5.97

Multiple IDUs - Up to 7 Indoor Units Per CX30 Outdoor Unit. Modular, supports up to 10 ODUs per system.



Ultra High Efficiency Heat Pump Chiller

The CX30 obtains it's ultra high efficiency rating using existing technologies in a new way. For example, we use a DC-Inverter compressor and a DC-Inverter water pump (both are variable speed) controlled together to achieve the best possible balance of water flow rate and compressor speed.

A special control algorithm looks at the temperature delta between the entering and exiting water temperatures of the chiller, and also compares the exiting water temperature to the system settings. A microcontroller constantly adjusts the pump and compressor speeds independently of each other to maintain the needed capacity at the lowest possible power draw. There is not a more efficient air source heat pump chiller made anywhere by anyone.

All air conditioning or heating systems must be sized to handle the extremes of the climate or conditioning load. A fixed capacity system must be sized so that it is able to handle the hottest (or coldest) day ever expected. That means that fixed capacity systems are much larger than they need to be almost all of the time.

The CX30 system capacity is fully dynamic and can operate between 25% and 115% of its rated capacity, as needed, and matches its actual capacity to the instantaneous heating or cooling load in real time. This means the system is always the right size for changing conditions and is never oversized.

The right size system is always more efficient than an oversized system. To go beyond variable capacity, add extremely high COP/EER performance and you end up with an ultra high IPLV rating and an ultra efficient heating and cooling system. Meet the CX30.

Save More w/ Inverter Fan Motors

All of the thin-line (5.1" thin) wall, floor and ceiling fan coil units use DC-Inverter fan motors and run on 120v 60Hz power. The high-wall unit and ducted fan coil units use a standard FCU fan and operate on 208-240V 50/60Hz power.

Server Room Cooling

CX30SE (Server Room Edition) offers up to 2.4 tons cooling with a humidity control option. SE model offers an optional Free Cooling add-on which allows EER 41 & COP 12+ cooling performance during winter at low ambient temperatures.

Solar Ready

Perfect for solar PV operation with super low power draw and a 3 amp soft start that's easy on inverters and batteries. Also integrates directly with solar thermal hydronic heating & solar water heating systems.

Boiler Integration

Can serve as low-cost primary heat when used with existing boiler heating system. Dramatically reduces heating costs for users of propane or oil fired boiler systems.

Modular – Stackable

The CX30 can be configured with up to 10/15 outdoor units to create systems up to 30 Tons Cooling/37.5 Tons Heating

Heating Performance

COP 5.97 at 43F. The CX30 provides heat at outdoor temperatures to -14F (-25C) and still achieves a COP of 2.97.

UL 1995 / CSA 22.2 / TUV



www.chiltrix.com





The World's Most Efficient Chiller Heat Pump

CX30 Chiller Heat Pump

30,000 BTU Heating / 24,000 BTU Cooling
All-DC Inverter
Cooling COP 4.35 / Heating COP 5.97

The CX30 is Stackable to 10+ Systems
Use up to 7 Indoor Units per System.

UL 1995 / CSA C22.2 / TUV

Best of Breed Components

At Chiltrix we used every trick in the book and then some to deliver the highest electrical efficiency possible. And we didn't stop there. The components we use to build our chillers are sourced from the world's top manufacturers and include heat exchangers from Sweden, German pumps, American valves, electronics from Japan, and a compressor from Toshiba.

No corner has been cut when it comes to making sure that the parts and materials used to manufacture the CX30 are the best available. Our chiller is designed for performance - to deliver the lowest kW usage per BTU of any chiller heat pump available, and to perform this task for a 20-year service life.

There is no other chiller like the CX30 available on the market at any price. Contact us to learn more about designing a chiller system for your home, commercial location, or server room. We can also help you integrate our system with an existing system, retrofit replacement, or integration with solar or to an existing boiler.

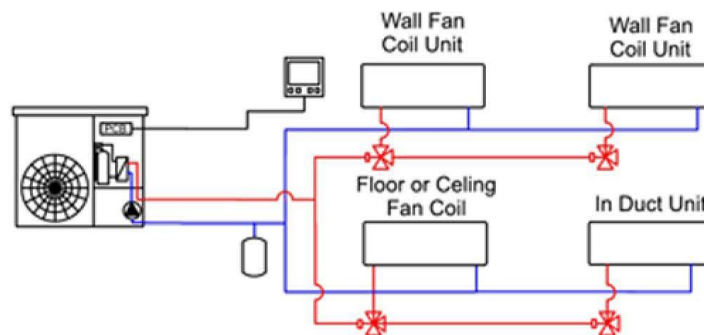
Model CX30-ODU	Ambient air temp/outlet water temp (F)	Capacity BTU / Power (kW)
Heating Capacity/Power Input (kW)	at A68°/W95°	41,300/1.69
	at A49°/W95°	30,559/1.50
	at A49°/W113°	29,056/1.76
	at A35°/W95°	27,212/1.45
Cooling Capacity	at A35°/W113°	25,847/1.70
	at A95°/W64°	27,793/1.78
	at A95°/W54°	24,105/1.62
	at A95°/W44°	20,165/1.47
Max. Current (A)		12
Power - varies w/ capacity (kW)		.258 to 1.8
Electric supply		220-240v 50/60HZ
Max. Water Temperature (°F)		140
Running Temperature Range- Heating (°F)		-13 to 100
Running Temperature Range- Cooling (°F)		-4 to 126
Refrigerant circuit	Refrigerant	R410A 2kg
	Compressor	Twin Rotary GMCC
	Heat exchanger	Toshiba DC Inverter
	Electronic Expansion Valve	Copper & Aluminum
	Air Flow (CFM)	Emerson 1412
Water circuit	Heat Exchanger	SWEP BPHE
	Inlet/Outlet Connections	DN25 1"
	Water flow (GPM)	Variable. 2 to 6
	Max/Min Pressure	44/15 PSI
	Water Pump	WILO VSD Variable Speed
Unit dimensions W x H x D (mm)		1091*780*400
Package Dimensions W x H x D (mm)		1170*960*470
Net weight (Lbs.)		210
Gross weight (Lbs.)		232
Noise level (dB(A))		49

Up to 7 Indoor Units

You can use up to 7 indoor fan coil units of any type including high-wall (mini-split type), low wall, ceiling, floor standing, etc. You can also use in-duct fan coil units for creating a small central heating & air conditioning system.

The system is also compatible with solar hydronic heating, or can be connected to a boiler system to provide a low cost primary heating source.

All of the slim-line (5.1" thin) wall, ceiling, and floor units use DC Inverter fan motors for energy savings, providing a long lasting and quiet solution.



Distributed By:

hotspot energy

HotSpot Energy Inc.
2133 Smith Ave.
Chesapeake VA 23320
www.hotspotenergy.com

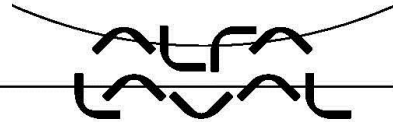
info@hotspotenergy.com

1-800-916-2067



www.chiltrix.com





To: Drew & Charlie
 Company: HTS Texas
 Tel:
 Fax:
 From: Christopher Close
 Date: 9/16/2014
 Project: USRICCEL-818 / UT-TUM Solar
 Pages: 5

Alfa Laval Inc.
 5400 International Trade Drive
 Richmond, VA 23231
 USA
 Tel: (513) 767-3366
 Fax: (804) 588-5112
 www.alfalaval.us

Dear ,

Based on the conditions specified, the following Alfa Laval plate heat exchanger is required. Please see the attached data sheet and dimensional drawing for detailed information.

Item	Qty	Description	RCPL Price
HX-1	1	AQ1L-FG, with (60) ALLOY 304 plates with NBRP CLIP-ON gaskets. Freight: Add \$ TBD Leadtime: 3-5 weeks after release to production	

Quoted price is FOB Richmond, VA.

Quotes are valid for 30 days.

All orders are subject to the attached Alfa Laval Standard Terms and Conditions.

A 25% down payment is requested on all orders over \$100,000, due at time of release for fabrication.

Thank you for the opportunity to provide a quotation on this project. Should you have any further questions, please contact me at (513) 767-3366.

Best regards,

Christopher Close

Christopher Close

MISSION: To optimize the performance of our customers' processes. Time and time again.

Cas 2000-5.52
 Christopher S Close/9/16/2014/ 2:21:47PM
 RCPL PHE USD 14.1
 Richmond SU 14.1
 Application: AHRI 400 Version 12.1
 Automatic 1-Phase



Alfa Laval Plate Heat Exchanger Specification

Model : AQ1L

Item : HX-1 Date : 9/16/2014

Fluid	<u>Hot side</u>		<u>Cold side</u>	
		Water		Water
Density	lb/ft ³	62.45		62.47
Specific heat capacity	Btu/lb, °F	1.00		1.01
Thermal conductivity	Btu/ft, h, °F	0.338		0.336
Viscosity inlet	cP	1.31		1.35
Viscosity outlet	cP	1.47		1.52
Volume flow rate	GPM	20.0		20.0
Inlet temperature	°F	50.0		41.0
Outlet temperature	°F	43.0		48.0
Pressure drop	psi	4.06		3.86
Fouling resistance* 10000	ft ² , h, °F/Btu			0.0
Duty Margin	%			0.00
Heat exchanged	kBtu/h			70.43
L.M.T.D.	°F			2.0
Heat transfer coefficient clean conditions	Btu/ft ² , h, °F			753.3
Heat transfer area	ft ²			46.5
Relative directions of fluids			Countercurrent	
Number of plates			60	
Channel arrangements		1*29H		1*30H
Number of passes		1		1
Extension capacity			17	
Plate material / thickness		ALLOY 304 / 0.40 mm		
Connection diameter	in	1		1
Design pressure	psi	150.0		150.0
Design temperature	°F	150.0		150.0
Overall length x width x height	in	24 x 7 x 31		
Net weight, empty / operating	lb	186 / 201		
Nominal A-Dimension	in	5.20		

Performance is AHRI 400 Certified.

Certified in accordance with the AHRI Liquid to Liquid Heat Exchangers Certification Program which is based on AHRI Standard 400. Certified units may be found in the AHRI Directory at www.ahridirectory.org.

PLATE HEAT EXCHANGER SPECIFICATION

PART 1 GENERAL

1.01 SCOPE

1.01.1 Furnish as shown on the plans, a Plate and Frame heat exchanger as manufactured by Alfa-Laval or approved equal. The Plate Heat Exchanger manufacturer shall not subcontract or purchase for resale the plates. He shall press his own patterns of plates.

1.01.2 The Plate Heat Exchanger Manufacturer shall have an established and on-going QA/QC program including manuals available for inspection at plant.

1.01.3 The Plate and Frame heat exchanger manufacturer shall have extensive background and experience in the design and fabrication of plate and frame heat exchangers. The manufacturer shall have fabricated plate heat exchangers for a minimum of twenty (20) years.

1.02 REFERENCES

- ASME Section II - Material Specification
- ASME Section V - Non-Destructive Testing
- ASME Section IX - Welding and Brazing qualifications
- ASME Section VIII - Pressure Vessel Code
- AHRI Standard 400 - Liquid to Liquid Heat Exchangers

1.03 CERTIFICATION

1.03.1 AHRI Certification



Plate heat exchangers shall be certified according to AHRI Standard 400 and listed on the AHRI.org site <http://www.ahridirectory.org/ahridirectory/pages/llhe/defaultSearch.aspx>. If heat exchanger is not AHRI certified, then the manufacturer shall provide an independent third party field performance test using the mapped ratings, limits and tolerances of AHRI Standard 400 to verify performance to specification. Any and all cost associated with correcting a non-performing heat exchanger to meet the performance requirements shall be the responsibility of the supplier. Any cost associated with the field performance test shall be included in the price of the heat exchanger.

As alternate, if heat exchanger is not AHRI certified, then the manufacturer shall provide 110% of the heat transfer area of an AHRI certified heat exchanger and provide written verification of performance to specification. Any and all cost associated with correcting a non-performing heat exchanger to meet the performance requirements shall be the responsibility of the supplier.

1.03.2 ASME Certification

Plate heat exchangers shall be designed, constructed, and tested in accordance with Section VIII, Division I of the ASME Pressure Vessel Code, and shall be code stamped.

1.4 WARRANTY

1.04.1 The warranty period shall be 3 years from date of shipment for AHRI certified plate heat exchangers.

PART 2 PRODUCT

2.01 FRAME COMPONENTS

- 2.01.1 Preference will be given to single pass designs with all connections on the fixed cover.
- 2.01.2 The fixed and movable covers shall be of sufficient thickness for the design pressure and code requirements and shall have no welded reinforcements or stiffeners.
- 2.01.3 The movable cover shall be provided with a steel roller bearing for units greater than 50" in height (from bottom of feet). This allows the movable cover to be moved without additional rigging or handling equipment.
- 2.01.4 The carrying and guide bars shall be designed to allow for expansion of at least 15%.
- 2.01.5 The carrying and guide bars guiding system shall be precision manufactured of stainless steel to prohibit corrosion and facilitate movement of the plates. Painted or plated surfaces are not permitted.
- 2.01.6 Entire frame shall be bolted together to allow unit to be field assembled to permit rigging into place. Welding of the frame components is not permitted.
- 2.01.7 Plate and carrying bar design shall permit the removal or access to any plate in the plate pack without the need to remove any other plates.
- 2.01.8 Provide lifting lugs designed to allow lifting of the entire units flooded weight.
- 2.01.9 All steel surfaces shall be thoroughly cleaned and prepared for painting per SSPC-SP1063T, painting over mill scale is not acceptable. All steel components shall be Aliphatic Acrylic Polyurethane coated.

2.02 CONNECTIONS

2.02.1 Connections equal to or less than 2" shall be stainless steel NPT type.

To avoid leakage on port area, studded port design should be provided on heat exchangers with connections greater than 2". Flanged nozzle connections are not acceptable.

2.03 COMPRESSION BOLTS

- 2.03.1 Compression bolts shall not require special tools and shall be equipped with lock washers at the movable cover to facilitate opening and closing of the unit from the fixed cover.
- 2.03.2 Compression bolts shall be equipped with captive nuts at the fixed cover and threaded nuts at the movable cover. Welding of the nut to the closure bolt is prohibited.
- 2.03.3 Bolts shall be provided with rolled threads to reduce galling and double width hex nuts to adequately distribute the load, plus ball bearing box washers at all critical closing bolts on all units greater than 50" in height.
- 2.03.4 Bolts shall be liberally coated with LUBRIPLATE FML-2 for lubrication and rust prevention, and covered with a plastic protective sleeving for protection from the environment and to prevent bodily injury. Zinc plating is prohibited.
- 2.03.5 The bolting system shall be designed so that only (4) compression bolts are required opening and closing of the unit.

2.04 PLATES

- 2.04.1 The plate and frame heat exchanger shall consist of pressed type ALLOY 304 to provide the required heat transfer area to meet the operating conditions specified.
- 2.04.2 Individual plates shall be pressed from a homogeneous single metal sheet in one step. No multi-stage pressing of one sheet is allowed.
- 2.04.3 Each heat transfer plate to be with herringbone corrugations to optimize heat transfer with nominal pressure loses. Corrugations to be designed to provide support to adjacent plates at evenly distributed support points to allow pressurization of each circuit to a full differential of 1.3 times the design pressure for one hour without buckling or deformation of the heat transfer plates.
- 2.04.4 All plates and gaskets shall be permanently marked to identify quality and material.
- 2.04.5 Each heat transfer plate shall have a built-in self-aligning system to accurately locate the plates in the frame assembly and prevent lateral plate movement and maintain maximum gasket contact under pressure.
- 2.04.6 Plates shall be reinforced on the upper and lower mounting slots to avoid bending hangers on the plates.
- 2.04.7 The plate and frame heat exchanger shall be designed to perform the capacities and pressure drops as shown on the schedule. Plates to be ALLOY 304 with 2B finish and tapered gasket grooves.
- 2.04.8 The plate pack shall be covered with a aluminum shroud in accordance with OSHA.

2.05 GASKETS

- 2.05.1 Gaskets shall have relieving grooves to prevent intermixing of fluids and cause leak to flow to outside of unit.
- 2.05.2 One piece molded CLIP-ON NBRP gaskets are required and shall fit around both the heat transfer area and the port holes.
- 2.05.3 Preference shall be given to non-glued gasketing systems.
- 2.05.4 If an adhesive is necessary, it shall be compatible with the gasket material and the fluids. The adhesive shall be a 2 component epoxy glue and heat cured.

PART 3 INSPECTION AND TESTING

- 3.01.1 The plate heat exchanger shall be designed to withstand full test pressure of 195 psi in one circuit with zero pressure in the alternate circuit.
- 3.01.2 Hydrostatic test shall be in accordance with ASME Section VIII, Division 1, paragraph UG-99.
- 3.01.3 Plate heat exchanger shall be ASME U Stamped.

PART 4 PREPARATION FOR SHIPMENT

- 4.01.1 A nameplate shall be securely attached to the exchanger in a location that is easily accessible and visible after installation. The nameplate must include working pressure, design temperature, closing dimension, surface area, media, and plate/gasket material.
- 4.01.2 The plate heat exchanger shall be flushed clean at factory prior to shipment. All connections shall be factory sealed to prevent the entrance of foreign material during transit.

TERMS AND CONDITIONS OF SALE

These Terms and Conditions Apply to All Quotations, Orders, and Contracts for Alfa Laval Inc. Products (hereafter "Equipment"). As used in these Terms and Conditions of Sale, the word "Equipment" includes all hardware, parts, components, software and options.

1. ACCEPTANCE: Our sale to you is limited to and expressly made conditional on your assent to the terms and conditions of sale herein and, if applicable, on the attendant quotation, both of which form a part of this order and which supersede and reject all prior agreements, representations, discussions or negotiations, whether written or oral, with respect hereto and any conflicting terms and conditions of yours, or any statement therein, whether or not signed by you. We will furnish only the quantities and Equipment specifically listed on the face hereof or the pages attached hereto. We assume no responsibility for terms or conditions of, or for furnishing other equipment or material shown in, any plans and/or specifications for a project to which the Equipment quoted or ordered herein pertain or refer.

2. PRICES: Unless otherwise specified in writing, all quoted prices are firm for thirty (30) days from the date of offer. Stenographic, clerical and mathematical errors are subject to correction.

3. DELIVERY: Dates for the furnishing of services and/or delivery or shipment of Equipment are approximate only and are subject to change. Quoted lead times are figured from the date of receipt of complete technical data and approved drawings as such may be necessary. We shall not be liable, directly or indirectly, for any delay in or failure to deliver caused by carriers or delays from labor difficulties, shortages, strikes or stoppages of any sort, failure or delay in obtaining materials from ordinary sources, fires, floods, storms, accidents, or other acts of God or *force majeure*, by any statute, regulation, administrative order or decree or order or judgment of a court of law or other causes beyond our reasonable control. Unless otherwise specifically agreed in writing by us, in no event shall we be liable for any damages or penalties whatsoever, or however designated, resulting from our failure to perform or delay in performing due to any of the causes specified in this paragraph 3.

4. SHIPMENT, RISK OF LOSS, TAXES: Prices are in U.S. Dollars, F.O.B. Alfa Laval shipping point, unless otherwise noted. Duty, brokerage fees, insurance, packing and handling as applicable are not included unless otherwise noted. Our prices do not include federal, state, municipal or other government excise, sales, use, occupational, processing, transportation or like taxes now in force or enacted in the future. You shall pay any taxes we may be required to collect or pay now or at any time in the future (including interest and penalties imposed by any governmental authority), or any taxes you may be required to pay, that are imposed upon the sale, delivery or support of Equipment purchased or licensed as a part of this order, or you shall provide us with a tax exemption certificate acceptable to the appropriate taxing authorities.

5. CREDIT AND PAYMENT: Unless otherwise noted on the face hereof payment for Equipment shall be (30) days net. *Pro rata* payments shall become due with partial shipments. Any discount period which may be granted by us begins on the invoice date and all payments are due 30 days after the invoice date. All payments shall be made without deduction, deferment, set-off, lien or counterclaim of any nature. All amounts due not paid within 30 days after the date such amounts are due and payable shall bear interest at the lesser of 1.5 percent per month or the maximum rate of interest allowed by law. We reserve the right at any time to suspend credit or to change credit terms provided herein, when, in our sole opinion, your financial condition so warrants. Failure to pay invoices when such invoices are due and payable, at our election, shall make all subsequent invoices immediately due and payable irrespective of terms, and we may withhold all subsequent deliveries until the full account is settled. We shall not, in such event, be liable for delay of performance or nonperformance of contract in whole or in part subsequent to such event.

6. CANCELLATIONS AND CHANGES: Orders which have been accepted by us are not subject to cancellation or changes in specification except upon prior written agreement by us and upon terms that will indemnify us against all losses resulting from or arising out of such cancellation or change in specifications. In the absence of such indemnification, we shall be entitled to recover all damages and costs of whatever nature permitted by the Uniform Commercial Code.

7. DEFERRED SHIPMENT: If shipment is deferred at your request, payment of the contract price shall become due when you are notified that the Equipment is ready for shipment. If you fail to make payment or furnish shipping instructions we may either extend the time for so doing or cancel the contract. In case of deferred shipment at your request, storage and other reasonable expenses attributable to such delay shall be payable by you.

8. EQUIPMENT WARRANTY AND REMEDY:

(a) For new Equipment only, we warrant to you that the Equipment that is the subject of this sale is free from defects in design (provided that we have design responsibility), material and workmanship. The duration of this warranty is twelve (12) months from delivery to you (the "Warranty Period"). If you discover within the Warranty Period a defect in design, material or workmanship, you must promptly notify us in writing. Within a reasonable time after such notification, we will correct any such defect with either new or used replacement parts, at our option. Such repair, including both parts and labor, is at our expense.

(b) For repairs, parts and service provided by us, we warrant to you that the repairs parts and service we provide to you will be free from defects in material and workmanship. The duration of this warranty is ninety (90) days from as applicable (i) the date the machine which required the repairs, parts or service is returned to you by us, (ii) the date of your receipt of the part, or (iii) the date of repair, if performed at your facility. If during this ninety day period you discover a defect in the repairs, parts or service you must promptly notify us in writing.

(c) All warranty service is subject to our prior examination and approval and will be performed by us at your facility or at service centers designated by us. All transportation to and from the designated service center will be at our expense. If we are unable to repair the Equipment to conform to the warranty after a reasonable number of attempts, we will provide, at our option, one of the following: (i) a replacement for such Equipment, or (ii) full refund of the purchase price. These remedies are your exclusive remedies for breach of warranty. Unless otherwise agreed in writing by us, our warranty extends only to you and is not assignable to or assumable by any subsequent purchaser, in whole or in part, and any such attempted transfer shall render all warranties provided hereunder null and void and of no further force or effect.

(d) We will use all reasonable efforts to obtain for you any manufacturer's guarantees or warranties for any sub-assemblies included in the Equipment. To the extent such warranties are assignable, we hereby assign to you all warranties that are granted to us by our suppliers of any sub-assemblies contained in the Equipment.

(e) The warranties set forth above are inapplicable to and exclude (i) any product, components or parts not manufactured by us or covered by the warranty of another manufacturer, (ii) damage caused by accident or the negligence of you or any third party, normal wear and tear, erosion, corrosion or by disasters such as fire, flood, wind and lightning, (iii) damage caused by your failure to follow all installation and operation instructions or manuals or to provide normal maintenance, (iv) damage caused by unauthorized or improper installation of attachments, repairs or modifications, (v) damage caused by a product or component part which we did not design, manufacture, supply or repair, or (vi) any other abuse or misuse by you or any third party.

9. LIMITATION OF LIABILITY: In no event shall we be liable, and you hereby waive any claims against us and release us from liability to you, for any indirect, special, punitive, incidental, or consequential damages whatsoever based upon breach of warranty, breach of contract, negligence, strict tort, or any other legal theory. Excluded damages include, but are not limited to, loss of profits, loss of savings or revenue, loss of use of the Equipment or any associated equipment, cost of capital, cost of any substitute Equipment, facilities or services, downtime, the claims of third parties including customers, and injury to property. This limitation does not apply to claims for personal injury. Some states do not allow limits on warranties, or on remedies for breach in certain transactions. In such states, certain of the limitations in this paragraph and in subparagraph 8(c) may not apply.

TERMS AND CONDITIONS OF SALE (CONT.)

10. OWNERSHIP: All drawings, designs and specifications supplied by us have been prepared or assembled by us and are solely our property. Such drawings, designs and specifications have been furnished in order to provide full documentation and on the condition that they shall not be reproduced or copied in any manner whatsoever, in whole or in part, except for your internal use as necessary, and upon the further condition that, as our sole property, they shall not be used, in whole or in part, for furnishing information to others or for any purpose not specifically authorized in a writing signed by one of our corporate officers. These ownership provisions shall not be superseded by any printed form used in connection with or arising out of a sale induced by a proposal or otherwise.

11. PATENT INFRINGEMENT

(a) We warrant that the Equipment in the condition sold to you is free of the rightful claim of infringement of any apparatus claims of any third-party U.S. patent issued as of the date of our acknowledgment and acceptance of your order, and we will defend, indemnify and hold you harmless from such claims; provided, however, we make no express or implied warranties of non-infringement and undertake no indemnification in respect of third-party rights where the alleged patent infringement is based upon or related to (i) any method, process or product claims in third-party U.S. patents; (ii) any combination of the Equipment with other equipment not supplied by us; or (iii) any modifications of the Equipment made by you and not approved by us.

(b) You shall notify us within 30 days of your receipt of notice of an alleged third-party patent infringement claim that would entitle you to patent infringement indemnification pursuant to paragraph 11(a), and we shall thereupon assume defense of the claim at our expense. We shall have the sole right to settle or otherwise compromise such a third-party claim, including but not limited to the right to either (i) modify the Equipment to avoid infringement if you are agreeable to the modification, (ii) repurchase the Equipment from you at a price equal to the then-current fair market value of the Equipment, or (iii) secure rights by assignment or license to permit continued use of the Equipment.

(c) If a third party charges us with patent infringement relating to Equipment sold by us to you, we shall have the right to either (i) modify the Equipment to avoid infringement if you are agreeable to the modification, (ii) repurchase the Equipment from you at a price equal to the then-current fair market value of the Equipment, or (iii) secure rights by assignment or license to permit continued use of the Equipment. If a third party charges us with patent infringement on the bases set forth in paragraph 11(a)(i), (ii) or (iii), you shall hold us harmless for all expenses and awards of damage assessed against us, and we shall also have the right to modify or repurchase the Equipment or to secure rights for continued use by way of assignment or license as set forth in this paragraph.

(d) Our total, cumulative liability under paragraphs 11(a), (b) and/or (c) is limited to 100% of the price paid to us by you for the Equipment.

12. SAFETY AND HEALTH STANDARDS: The Equipment described herein (or on the specifications provided herewith) complies with applicable safety and health standards issued pursuant to the Occupational Safety and Health Act of 1970 (the Act) and in effect on this date as such standards are interpreted and understood by us. These standards may be amended and/or their meaning may be clarified prior to shipment or performance, and if such change or clarification requires changes in the Equipment described herein, we shall make the necessary changes available to you. You shall pay for any and all such changes at our prices therefore in effect at time of shipment or performance, as the case may be. Because actual compliance by employers with the Act is beyond our control, we cannot and do not represent that the use of the Equipment described herein, nor the location, installation or maintenance thereof, will comply with the Act or regulations and standards issued pursuant thereto. We make no representation of compliance with safety and health standards contained in any statute, regulations or ordinance of any state or political subdivision thereof applicable to the Equipment described herein unless you have notified us of the existence and contents of such standards and we have agreed in writing to the incorporation of such standards in the specifications relating to such Equipment. Nothing in this provision shall operate to modify or affect in any manner whatsoever our disclaimer of any liability for consequential damages contained elsewhere in these terms and conditions of sale.

13. INSPECTION: Upon prior written notice, you may make reasonable inspections of Equipment at our facility. We reserve the right to determine the reasonableness of the request and to select an appropriate time and location for such inspection. You agree to execute appropriate confidentiality provisions upon our request prior to visiting our facility. All costs of inspection shall be solely determined by us and shall be payable by you. No inspection or expediting by you at the facilities of our suppliers is authorized.

14. SOFTWARE PROVISIONS: If software is provided hereunder, you are granted a nonexclusive, royalty free license only for your use of the software provided with our Equipment. Under this license you may: (i) use our software in machine readable object code only and only with the Equipment provided; (ii) copy our software into any machine readable object code form for back up purposes in support of your use of our software on the Equipment provided; and (iii) create one additional copy of the software for archival purposes only. This license may not be assigned, sublicensed or otherwise transferred by you without our prior written consent. You hereby recognize and acknowledge that the software provided to you hereunder comprises valuable trade secret and/or copyright property of Alfa Laval [or its licensor] and you covenant that you will take adequate precautions against access to the software by, or disclosure of the software to, anyone not authorized hereunder to use or have access to the software.

15. TIME LIMIT FOR BRINGING SUIT: Any action you file against us, whether for breach of contract, including but not limited to breach of warranty, or for negligence or strict tort, must be commenced within 90 days following the expiration of the Warranty Period.

16. MODIFICATION OF TERMS: The terms and conditions of sale set forth herein are an integral part of our proposal and/or confirmation of order. These terms shall not be deemed altered or modified by printed or other "standard" terms in a purchase order, acceptance or similar document. Our confirmation or acknowledgment of any order is with the express understanding that all printed or other "standard" language on any such documents submitted by you will be entirely disregarded to the extent that it varies from the terms and conditions of this proposal/order which may be modified only by typed or handwritten language in the body of your order, acceptance or similar document, together with a written acknowledgment and acceptance of such modification by us.

17. LIMITATION ON WARRANTIES: THE WARRANTIES SET FORTH HEREIN ARE IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING AN IMPLIED WARRANTY OF MERCHANTABILITY, AN IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND AN IMPLIED WARRANTY OF NONINFRINGEMENT. WE HEREBY EXPRESSLY EXCLUDE FROM THIS CONTRACT THE IMPLIED WARRANTY OF MERCHANTABILITY, THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND THE IMPLIED WARRANTY OF NONINFRINGEMENT. OUR WARRANTIES AND LIABILITIES HEREUNDER ARE LIMITED AS STATED HEREIN.

18. APPLICABLE LAW: Any controversy or claim arising out of the contract or the breach thereof shall be finally decided with binding effect on both parties by the courts of Virginia and in accordance with the laws of the Commonwealth of Virginia, without giving effect to the provisions thereof relating to conflict of laws.

THE EQUIPMENT AND PARTS DESCRIBED IN THESE TERMS AND CONDITIONS OF SALE MAY CAUSE INJURY IF NOT OPERATED PROPERLY AND FOR THIS REASON ALL OPERATORS SHOULD BECOME THOROUGHLY FAMILIAR WITH THE OPERATING INSTRUCTIONS BEFORE OPERATING THE EQUIPMENT.

Rev 032204

END OF SECTION – 23 06 60.13

23 09 13 INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 GENERAL

1.01 SYSTEM HARDWARE OVERVIEW:

A. See 23 09 93 for list of equipment for hydronic system. The instrumentation and control must also control the Energy Recovery Ventilators, in addition to the hydronic system.

1.02 CONTROL SYSTEM COMPONENTS OVERVIEW

A. Subsystems:

1. Zone Thermostats: Controls for the HVAC system will consist of zone thermostats with temperature and relative humidity sensors that communicate analog and digital status information to a central control system.

2. Central Control System: The central control system will sense a call for heating or cooling from a room thermostat, and open/close the requisite valves before turning any pumps on. Similarly, when the setpoint temperature is satisfied, the system will sense it is time to turn off, and shut down all relevant hardware. The central control system will interface with (or be a part of) the Chiltrix control system.

3. Pump flow Control: Flow rate will be maintained and self-balanced using a suitable pump capable of built-in pressure measurement and flow self-regulation. These pumps must also

have the option to self-manage flow velocity to maintain a certain temperature differential.
See Ecocirc XL cut sheet for more details on the pump' s built-in control features.

PART 2 EQUIPMENT

2.01 ACCEPTIBLE BIDDERS

A. The specifications for the instrumentation and controls for the HVAC system are open-ended such that any qualified companies or persons may provide a bid

2.02 CONTROLLERS

A. Control Systems hardware and software are unspecified, such that any reasonable platform and software solution will be considered. Preference shall be given towards:

- 1) Low Cost
- 2) Simplicity
- 3) Opensource/freeware software or hardware
- 4) interactability/interface capability with the HVAC and home electronics systems already chosen.

END OF SECTION

23 09 93 SEQUENCE OF OPERATIONS FOR HYDRONIC SYSTEM CONTROLS

PART 1 GENERAL

1.01 SYSTEM COMPONENT OVERVIEW:

RC/HP Air-Source hydronic chiller/heat pump The chiller/heat pump (reversible heat pump capable of heating and cooling) is air-cooled system by Chiltrix® consisting of the Outdoor unit that contains the vapor compression cycle, water refrigerant heat exchanger, and water circulation pump. The Outdoor Unit functions as the condenser in air conditioning (cooling) mode, and the evaporator in heat pump (heating) mode. The unit transfers heat from/to the hydronic loop working fluid via an internal water/refrigerant heat exchanger. This unit will be located in/on the mechanical equipment module (a self-contained equipment skid/closet).

Since Austin is a relatively moderate climate, and because this house will be well insulated, we do not anticipate needing an additional heat source beyond the heat pump.

P-HL Circulation Pump, Hydronic Loop The pump pressurizes and distributes water through the hydronic system. The Chiltrix heat pump/chiller has an internal pump, so the loop system will be plumbed to create a primary/secondary distribution loop.

FC1-5 Ductless fancoils Hydronic fan-coil units will provide active air conditioning (cooling and dehumidification in summer, and heating in the winter) for each room of the home. Each room will have a programmable thermostat to allow for room-by-room thermal control. AC condensate will either be drained from the fan-coils to an accumulator tank(s) for periodic manual re-supply of the aquaponics system, or directly outside for reuse in the landscaping.

P-TS Circulation Pump, Thermal Storage This pump circulates water through the thermal storage heat exchanger, and can pump the rainwater back into the primary rainwater tank if the water is needed for consumption. This pump will be controlled. This pump will be located in the mechanical equipment module next to the tank. An inlet screen (Y-Strainer)

should precede the pump inlet to minimize chances of debris damaging the pump or clogging the heat exchanger.

HX Thermal storage heat exchanger The thermal storage heat exchanger is the interface between the house water system and the house hydronic HVAC system. The heat exchanger is a non-mixing water/water heat exchanger sized to maximize heat transfer and minimize the temperature difference between the two fluids. The heat exchanger will most likely be some sort of plate heat exchanger (likely a brazed plate heat exchanger), which are a relatively common and commodity type heat exchanger that can be sourced from a number of manufacturers or suppliers.

TST thermal storage tank We will utilize the rainwater tank (likely filled with potable water for the competition) as the thermal storage working fluid. Since the water will be directly cooling the hydronic loop working fluid, it must be chilled down to a low temperature (~43F), and needs to remain cold. Incorporating a layer of insulation, and/or shielding the tank would help maintain the thermal resource. Additionally, thermal stratification needs to be maintained to operate effectively, so it would be ideal to avoid wide/shallow tanks for this application.

ERV1-3 Ventilation One design goal is to make the house envelope tight so that infiltration is minimized and energy is not wasted. Ventomaxx ductless ventilation fans with ERV cycling technology will be used to provide fresh air to the two modules (1 in kitchen/living room, 1 in each bedroom).

SV- & SVT- Solenoid Valves. The system flow control is managed by digital (open/closed) solenoid valves.

1.02 SEQUENCE OF OPERATION FOR HYDRONIC CONTROLS

A Operating Mode Selection Logic:

1. *Air-cooled Mode*

The default operating mode for the system will be the regular air-cooled mode. This mode of operation is used during all times that the system is not in thermal storage discharge mode, or recharging the system. The indoor unit isolation solenoid valve (SV-4) should be a 'normally open' solenoid valve, such that it fails or loses power, it defaults to open.

2. Thermal Storage Discharge

The chilled water thermal storage shall be operated during the 'on-peak hours' of the Austin Energy summer season:

-Between June 1 and Sept 30

-Weekdays, between the hours of 2pm and 8pm

Additionally, the thermal storage will only operate when the tank is charged (as determined by the tank temperature array). The thermal storage mode will operate as long as these criteria are met, otherwise the system will default to normal air-cooled operation.

3. Thermal Storage Recharge

The thermal storage will recharge during the off-peak hours (10pm-6am), with the goal of re-cooling all of the water back to the starting temperature during this time period.

The exact operation of the recharge mode is flexible, since recharge could either occur in parallel to meeting the house load, or be treated as a separate load that is only cooled after all of the house load is met. Experimental testing will determine which method works more effectively with the given pump/flow control systems.

Additional optional recharge control logic could include the incorporation of historical load data and forecasted outdoor temperatures to model the night time house load, and optimize recharge to occur at the most efficient times.

B. Zone Thermal Comfort Control:

The heating/cooling systems are operated in an on/off manner to simplify operation.

Thermostats in each of the zones measure temperature (and humidity?), If the measured value is outside of the setpoint range, the thermostats send a digital (on/off) signal to open the solenoid valve to the corresponding fan coil, and power on the air conditioning or cooling system via the HVAC Controller. The HVAC Controller will use its internal operating mode decision logic (day and time, TES state-of-charge) to determine whether to power on the heat pump, or to utilize the thermal storage, to cool the space.

The HVAC Controller will monitor the temperature in the thermal storage tank (and/or the inlet/exit temperatures of the thermal storage heat exchanger) to determine level of charge in the thermal storage tank

Since this is a two-pipe system, heating/cooling change-over requires a manual input.

Therefore, if the interior space temperature exceeds a bound not controllable in the current mode, a system alert signal will be sent to the user.

C. System Operation in Thermal Storage Discharge Mode:

In the thermal storage discharge mode, the indoor unit and outdoor units are turned off and bypassed from the hydronic loop by closing valve SV- 4. When there is a call for cooling (from a room thermostat), the HVAC Controller powers on pump P-HL (hydronic loop circulation pump) and pump P-TS, and configures the valves for operation.

Pump P-HL circulates water to the fan coils and through the thermal storage heat exchanger HX. Pump P-HL is controlled via a constant pressure differential drive to maintain the rated flow rate through each fan coil as valves SV1-5 open and close. The fan coil unit branches are pressure balanced such that they receive their rated flow rate at the desired pressure drop.

On the thermal storage side, valves SVT-1 and SVT-2 are opened to a position such that water is drawn off of the bottom of the tank by the thermal storage loop pump P-TS. Valve SV-6 is

closed to prevent back-flow, while valve SV-5 is open so water can be returned to the top of the tank. Pump P-TS operates via a constant built-in temperature differential controller, based on the temperature differential between the supply and return on the thermal storage side of heat exchanger HX.

The hydronic system delivers water to the fan coil(s) at rated flow until all thermostats report being within the temperature setpoint, at which point the pumps turn off.

D. System Operation in Thermal Storage Recharge Mode:

In thermal storage recharge mode, SV-4 is open, and the indoor and outdoor units (HP-IU and HP-OU) are energized. When there is a call for cooling from the room thermostat(s), the fan coils and circulation pump operate in their normal manner. When the house load is met, the HVAC Controller checks the thermal storage temperature array to see if it is recharged, and if not, the units stay on (circulating water through the heat exchanger) and the thermal storage pump is turned on.

Control valves SVT-1 and SVT-2 are opened to a position such that water is drawn off of the top of the tank by pump P-TS. Valve SV-5 is closed to prevent back-flow, while valve SV-6 is open so water can be returned to the bottom of the tank. Pump P-TS operates with the same constant temperature differential controller to recharge the temperature differential in the tank.

When the thermal storage tank temperature array registers that the tank is fully recharged, the thermal storage recharge is complete, and the thermal storage system goes into stand-by mode it is time for thermal storage discharge.

The system does not immediately recharge on Fridays, and instead waits until Sunday night/Monday morning to recharge since the system won't operate on the weekends.

E. System Operation in Thermal Storage Air-Cooled (Normal) Mode:

In normal air-cooled mode, a call for cooling from a room thermostat turns on the indoor and outdoor units, and the hydronic loop circulation pump. All thermal storage equipment will remain off.

PART 2 EQUIPMENT

2.01 ACCEPTIBLE BIDDERS

A. The specifications for the Thermal storage control system are open-ended such that any qualified companies or persons may provide a bid

2.02 CONTROLLERS

A. Control Systems hardware and software are unspecified, such that any reasonable platform and software solution will be considered. Preference shall be given towards:

- 1) Low Cost
- 2) Simplicity
- 3) Opensource/freeware software or hardware

4) interactability/interface capability with the HVAC and home electronics systems already chosen.

END OF SECTION

23 21 13 HYDRONIC PIPING



SECTION 23 21 13
HYDRONIC PIPING

Display hidden notes to specifier. (Don't know how? [Click Here](#))

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7. GENERAL

1. SECTION INCLUDES

Hydronic Piping and Fittings (PEX-a) for the Following Applications:

- Hot-water heating piping, above ground.
- Chilled-water piping, above ground.
- Condenser-water piping.
- Makeup-water piping, above ground.

Flexible Pre-Insulated Pipe Distribution System (ASTM Ecoflex) for Hot and Cold Fluids:

- Potable HDPE distribution system.
- Potable PEX-a distribution system.
- Thermal single distribution system.

2. RELATED SECTIONS

Section 22 11 13 - Facility Water Distribution Piping.

Section 23 21 13 - Hydronic Piping.

3. REFERENCES

ASTM International (ASTM):

- ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
- ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

American National Standards Institute (ANSI)/American Water Works Association (AWWA)

- ANSI/AWWA C901 AWWA Standard for Polyethylene (PE) Pressure Pipe and Tubing, 1/2 inch (13 mm) Through 3 inch (76 mm), for Water Service
- ANSI/AWWA C906 AWWA Standard for Polyethylene (PE) Pressure Pipe and Fittings, 4 inch (100 mm) Through 63 inch (1575 mm), for Water Distribution.

American Standards Institute (ANSI)/National Sanitation Foundation (NSF): ANSI/NSF 61
Drinking Water System Components - Health Effects

International Code Council (ICC): International Plumbing Code (IPC)

International Association of Plumbing and Mechanical Officials (IAPMO): Uniform Plumbing Code (UPC)

Plastic Pipe Institute (PPI): PE 3408/PE 3608 IPS Geothermal Pipe Specifications

Uponor, Inc.: Uponor Pre-insulated Pipe Systems Design and Installation Manual, current edition

4. SUBMITTALS

Submit under provisions of Section 01 30 00 - Administrative Requirements.

Product Data: Submit manufacturer's product submittal data and installation instructions.

Shop Drawings: Provide installation drawings indicating: piping layout, size dimension by installation segment, vault locations, support fixtures and schedules with all details required for installation of the system.

Samples: Submit selection and verification samples of piping.

Quality Assurance/Control Submittals

Test Reports: Upon request, submit test reports from recognized testing laboratories. Submit the following documentation.

Manufacturer's certificate stating that products comply with specified requirements.

Manufacturer's flow schedule for the distribution system.

Documentation that the installer is trained to install the manufacturer's products

Closeout Submittals: Submit the following documents.

Warranty documents specified herein.

Operation and maintenance data.

Manufacturer's field reports specified herein.

Final as-built piping layout drawing.

5. QUALITY ASSURANCE

Installer Qualifications: Use an installer with demonstrated experience on projects of similar size and complexity and possessing documentation proving familiarization training by the tubing manufacturer.

Regulatory Requirements and Approvals: Ensure the piping distribution system complies with all applicable codes and regulations.

Certifications: Provide letters of certification indicating: Installer uses skilled workers holding a trade qualification license or equivalent, or apprentices under the supervision of a licensed trades person.

Pre-installation Meetings:

Verify project requirements, excavation conditions, system performance requirements, manufacturer's installation instructions and warranty

requirements.

Review project construction timeline to ensure compliance or discuss modifications as required.

Interface with other trade representatives to verify areas of responsibility.

Establish the frequency and construction phase the project engineer intends for site visits and inspections by the tubing manufacturer's representative.

6. DELIVERY, STORAGE and HANDLING

General: Comply with Division 1 Product Requirement Section.

Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

Store potable pre-insulated piping coils under cover to prevent dirt or foreign material from entering the service tubing.

Do not expose the service pipe to direct sunlight for more than 30 days. If construction delays are encountered, cover piping that is exposed to direct sunlight.

7. WARRANTY

Manufacturer's Warranty for Hydronic Piping: Manufacturer's standard 30 year warranty for PEX-a piping.

Manufacturer's Warranty for Pre-Insulated Pipe Distribution Systems: Submit, for owner's acceptance, USA manufacturer's standard 5-year warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under contract documents.

Warranty covers the repair or replacement of any piping or fittings proven defective.

Warranty may transfer to subsequent owners.

The most recent limited warranty published by the manufacturer takes precedence at the time of installation.

8. PRODUCTS

1. MANUFACTURERS

Acceptable Manufacturer: Uponor , which is located at: 5925 148th Street West; Apple Valley, MN 55124; Toll Free Tel: (800) 321-4739; Tel: (952) 891-2000; Fax: (952) 891-2008; Email:[request info \(mike.rivers@uponor.com\)](mailto:request info (mike.rivers@uponor.com)); Web:<http://www.uponorpro.com>

Substitutions: Not permitted.

2. HYDRONIC PIPING AND FITTINGS (PEX-a)

Performance Requirements: PEX-a piping and fittings shall meet the following pressure and temperature ratings:

- 200 degrees F (93 degrees C) at 80 psi (551 kPa).
- 180 degrees F (82 degrees C) at 100 psi (689 kPa).
- 73.4 degrees F (23 degrees C) at 160 psi (1,102 kPa).

Plastic Pipe and Fittings:

PEX-a (Engle-method Crosslinked Polyethylene) Piping: Uponor Wirsbo hePEX , ASTM 876 with oxygen-diffusion barrier that meets DIN 4726.

PEX-a Fittings, Elbows and Tees (1/2 inch through 2 inch nominal pipe size): ASTM F1960 cold-expansion fitting manufactured from the following material types:

UNS No. C69300 Lead-free (LF) Brass.

20 percent glass-filled polysulfone as specified in ASTM D6394.

Unreinforced polysulfone (group 01, class 1, grade 2) as specified in ASTM D6394.

Polyphenylsulfone (group 03, class 1, grade 2) as specified in ASTM D6394

Blend of polyphenylsulfone (55-80%) and unreinforced polysulfone (rem.) as specified in ASTM D6394.

Reinforcing cold-expansion rings shall be manufactured from the same source as PEX-a piping manufacturer and marked "F1960".

PEX-a Fittings (2-1/2 inch through 4 inch nominal pipe size): SDR9 compression type fitting consisting of a double O-ring insert with a compression sleeve tightened around the pipe and insert.

Plastic-to-Metal Transition Fittings:

Manufacturer: Provide fittings from the same manufacturer of the piping.

Threaded Brass to PEX-a Transition: One-piece brass fitting with male or female threaded adapter and F1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring. Typically used for PEX sizes 2 inch and below.

Brass Sweat to PEX-a Transition: One-piece brass fitting with sweat adapter and F1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring. Typically used for PEX sizes 2 inch and below.

Dezincification-resistant (DZR) Brass to PEX-a Transition: Male NPT thread and PEX compression fitting. Editor: Typically used for PEX sizes 2-1/2 inch through 4 inch.

Plastic-to-Metal Transition Unions:

Manufacturer: Provide unions from the same manufacturer of the piping.

Threaded Brass to PEX-a Union: One-piece brass fitting with male or female threaded adapter and F1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring. Typically used for PEX sizes 2 inch and below.

Brass Sweat to PEX-a Union: One-piece brass fitting with sweat adapter and F1960 cold-expansion end, with PEX-a reinforcing cold-expansion ring. Typically used for PEX sizes 2 inch and below.

Piping Applications:

Hot-water heating piping, aboveground (2 inch and below) shall be the following: PEX-a piping, with F1960 cold-expansion fittings.

Hot-water heating piping, aboveground (2 1/2 inch through 4 inch) shall be the following: PEX-a piping, with compression fittings.

Chilled-water piping, aboveground (2 inch and below) shall be the following: PEX-a piping, with F1960 cold-expansion fittings.

Chilled-water piping, aboveground (2 1/2 inch through 4 inch) shall be the following: PEX-a piping, with compression fittings.

Condenser-water piping, aboveground (2 inch and below) shall be the following: PEX-a piping, with F1960 cold-expansion fittings.

Condenser-water piping, aboveground (2 1/2 inch through 4 inch) shall be the following: PEX-a piping, with compression fittings.

Makeup-water piping, aboveground (2 inch and below) shall be the following: PEX-a piping, with F1960 cold-expansion fittings.

Makeup-water piping, aboveground (2 1/2 inch through 4 inch) shall be the following: PEX-a piping, with compression fittings.

3. ASTM ECOFLEX POTABLE HDPE DISTRIBUTION SYSTEM

Design Requirements: The potable HDPE service piping is USA manufactured and tested in accordance with ASTM F714, PE 3408, PE 3608 and AWWA C901/C906 standards. This product is listed with NSF/ANSI 61 or NSF-pw. The potable HDPE service piping has hydrostatic ratings in accordance with the temperatures and pressures listed in the ASTM standard. The hydrostatic ratings are:

-30 degrees F to 73 degrees F at 160 psig (-34 degrees C to 23 degrees C at 1103 kPA).

-30 degrees F to 100 degrees F at 125 psig (-34 degrees C to 38 degrees C at 862 kPA).

-30 degrees F to 120 degrees F at 101 psig (-34 degrees C to 49 degrees C at 696 kPA).

-30 degrees F to 140 degrees F at 80 psig (-34 degrees C to 60 degrees C at 552 kPA).

Performance Requirements: Provide a potable HDPE distribution system that is USA manufactured, fabricated and installed to comply with regulatory agencies and authorities with jurisdiction, and that maintains performance criteria stated by the tubing manufacturer without defects, damage or failure.

Show compliance with ASTM F714 for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

Show compliance with ANSI/AWWA C901 for Polyethylene (PE) Pressure Pipe and Fittings (for 3-inch or less piping).

Show compliance with ANSI/AWWA C906 for Polyethylene (PE) Pressure Pipe and Fittings (for 4-inch piping).

Show compliance with NSF/ANSI 61 or NSF-pw regarding Drinking Water System Components.

Show compliance with PE 3408 and PE 3608 for Geothermal Pipe Requirements.

Service Tubing:

Material: High-density polyethylene (HDPE) manufactured to NSF-certified SDR-11.

Material Standard: Manufactured in accordance with ASTM F714, AWWA C906, PE 3408, PE 3608 (or PE 3454) and NSF 61.

Pressure Ratings: Hydrostatic design and pressure ratings are in accordance with AMST standards; operating limits stated in System Description Article (1.03).

Nominal Inside Diameter: Provide tubing with nominal inside diameter in accordance with ASTM F714, as indicated. Note: Numbers in brackets are the metric equivalent pipe size.

3/4 inch (20mm).

1 inch (25mm).

1-1/4 inch (32mm).

1-1/2 inch (40mm).

2 inch (50mm).

3 inch (90mm).

4 inch (110mm).

Outer Jacket:

Material: Corrugated seamless high-density polyethylene (HDPE)

The HDPE jacket completely encompasses and protects the insulation from moisture and damage.

Outer jacket shall be extruded directly over the insulation and is flexible.

Minimum Bend Radius:

3/4 inch pre-insulated potable HDPE tubing with 2.7-inch (68mm) jacket has a bend radius of 10 inches (254mm).

1 inch pre-insulated potable HDPE tubing with 2.7-inch (68mm) jacket has a bend radius of 12 inches (304mm).

1-1/4 inch pre-insulated potable HDPE tubing with 5.5-inch (140mm) jacket has a bend radius of 14 inches (356mm).

1-1/2 inch pre-insulated potable HDPE tubing with 5.5-inch (140mm) jacket has a bend radius of 18 inches (457mm).

2 inch pre-insulated potable HDPE tubing with 5.5-inch (140mm) jacket has a bend radius of 30 inches (762mm).

3 inch pre-insulated potable HDPE tubing with 6.9-inch (175mm) jacket has a bend radius of 32 inches (812mm).

4 inch pre-insulated potable HDPE tubing with 7.9-inch (200mm) jacket has a bend radius of 48 inches (1219mm).

The outer jacket shall contain 2 percent carbon black, finely divided and thoroughly dispersed to provide protection from UV degradation.

Insulation:

The insulation shall be layered expanded cross-linked water-resistant polyethylene closed-cell foam.

All seams of the insulation shall be sealed.

Insulation shall not be bonded to the service tubing.

End Seals:

The piping manufacturer will supply all EPDM rubber end caps with water-stop seal. EPDM rubber end caps are to be installed on each end prior to connecting the service pipes and insulating the field joints.

The EPDM end caps will seal onto the tubing and outer jacket forming a watertight seal.

Fitting Products for 3-inch and Smaller Pipe per AWWA C901:

Butt Fusion Fittings - Fittings shall be made of 3408 Polyethylene material (PE3408), PE3608 or PE3454. Butt Fittings shall meet the requirements of ASTM D3350, CSA B137.1, NSF 14 and NSF 61. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. All fittings shall meet the requirements of AWWA C901.

Electrofusion Fittings - Fittings shall be PE 3408, PE3608 or PE3454 and meet requirements of ASTM D3350, CSA B137.1, NSF 14 and NSF 61. Fittings shall have a pressure rating of equal to the pipe unless otherwise specified in the plans.

Flanges and Mechanical Joint Adapters - Flanges and Mechanical Joint Adapters shall be made of PE 3408, PE3608 or PE3454 and meet requirements of ASTM D3350, CSA B137.1, NSF 14 and NSF 61. Flanges and Mechanical Joint Adapters shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

Service connections shall be electrofusion saddles with a brass or stainless steel threaded outlet, electrofusion saddles, sidewall fusion (branch) saddles, tapping tees or mechanical saddles.

For electrofusion saddles with threaded outlet, the size of the outlet shall be 1-inch IPS unless a larger size is shown on the plans and shall be made of materials stated above (Article number 2.03.E.2).

For sidewall fusion saddles, the size of the saddle shall be as indicated on the plans. The saddle can be made according to ASTM D3350, ASTM D3261 or ASTM F2206. After installation, approximately 1/4-inch of the PE pipe shall be visible beyond the saddle to confirm that proper surface preparation occurred. Saddle faces that do not provide 1/4-inch of area beyond the saddle are not acceptable.

Tapping tees shall be made to ASTM D3261 or D2683.

Mechanical strap-on saddles can only be used when approved by mechanical saddle manufacturer. The body of the saddle shall be stainless steel or brass. The gasket material and design must be acceptable for PE pipe. The outlet shall be threaded for 1-inch IPS unless a larger size is shown on the plans. Mechanical strap-on saddles will be installed according to manufacturer's instructions.

Heat fusion is the preferred method for joining these pipes. All buried fittings will be installed, insulated and sealed in accordance with the instructions of the manufacturer.

Fitting Products for 4-inch and Larger Pipe per AWWA C901:

Butt Fusion Fittings - Fittings shall be made of HDPE material that has been NSF

certified SDR-11 with a minimum material designation code of PE3408. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All fittings shall meet the requirements of AWWA C906.

Electrofusion Fittings - Fittings shall be made of HDPE material that has been NSF certified SDR-11 with a minimum material designation code of PE3408.

Electrofusion fittings shall have a manufacturing standard of ASTM F1055 and shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and have nominal burst values of four times the Working Pressure Rate (WPR) of the fitting. Markings shall be according to ASTM F1055.

Flanges and Mechanical Joint Adapters - Flanges and Mechanical Joint Adapters shall have a material designation code of PE3408 or higher and meet requirements of ASTM D3350, CSA B137.1, NSF 14 and NSF 61. Flanges and Mechanical Joint Adapters shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

Service connections shall be electrofusion saddles with a brass or stainless steel threaded outlet, electrofusion saddles, sidewall fusion (branch) saddles, tapping tees or mechanical saddles.

For electrofusion saddles with threaded outlet, the size of the outlet shall be 1-inch IPS unless a larger size is shown on the plans and shall be made of materials stated above (2.03/E/2).

For sidewall fusion saddles, the size of the saddle shall be as indicated on the plans. The saddle can be made according to ASTM D3350, ASTM D3261 or ASTM F2206. After installation, approximately 1/4-inch of the PE pipe shall be visible beyond the saddle to confirm that proper surface preparation occurred. Saddle faces that do not provide 1/4-inch of area beyond the saddle are not acceptable.

Tapping tees shall be made to ASTM D3261 or ASTM D2683.

Mechanical strap-on saddles can only be used when approved by mechanical saddle manufacturer. The body of the saddle shall be stainless steel or brass. The gasket material and design must be acceptable for HDPE pipe. The outlet shall be threaded for 1-inch IPS unless a larger size is shown on the plans. Mechanical strap-on saddles will be installed according to manufacturer's instructions.

Heat fusion is the preferred method for joining these pipes. All buried fittings will be installed, insulated, and sealed in accordance with the instructions of the manufacturer.

Pipe and Fitting Identification: The pipe shall be marked in accordance with the standards to which it is manufactured.

Color identification by the use of stripes on pipe to identify pipe service shall be optional. If used, stripes or colored exterior pipe product shall be blue for potable water, green for wastewater/sewage, or purple for reclaimed water.

Tracing wire shall be placed parallel and 18 inches above, but separate from, the pipe and shall be 10 AWG.

Accessories: Use accessories associated with the installation of the piping system as recommended by or available from the manufacturer.

Insulation Kits: Insulation kits will be manufactured of ABS shells or HDPE sleeves, will feature equal thickness of closed-cell PEX insulation as the pipe, and sealed watertight.

Connection Vaults:

The piping manufacturer will provide the connection vaults when required by the project construction.

Connection vaults shall be constructed of rotationally molded composite polyethylene and PE foam, providing a structurally sound and thermally insulated chamber.

Heat shrink seals as provided by the tubing manufacturer shall be installed to prevent introduction of water into the vault.

Anchors: The project engineer will determine the use of anchors, if required, within the distribution system.

4. ASTM ECOFLEX POTABLE PEX DISTRIBUTION SYSTEM

Design Requirements: The potable PEX-a service tubing is USA manufactured and tested in accordance with ASTM F876, ASTM F877, CSA B137.5 and NSF-pw. The potable PEX-a service tubing has hydrostatic ratings in accordance with the temperatures and pressures listed in the ASTM standard. The hydrostatic ratings are:

200 degrees F (93 degrees C) at 80 PSI (551 kPa).

180 degrees F (82 degrees C) at 100 PSI (689 kPa).

73.4 degrees F (23 degrees C) at 160 psi (1102 kPa).

Performance Requirements: Provide a pre-insulated potable distribution system that is USA manufactured, fabricated and installed to comply with regulatory agencies and authorities with jurisdiction, and that maintains performance criteria stated by the tubing manufacturer without defects, damage or failure.

Show compliance with ASTM F876 for Crosslinked Polyethylene (PEX) Tubing.

Show compliance with ASTM F877 for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.

Show compliance with NSF 61 regarding Drinking Water System Components.

Show compliance with CSA B137.5 regarding Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.

Show compliance with ASTM F1960 regarding Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing.

Show compliance with NSF-pw to indicate that the product complies with the Health-effects Requirements of NSF/ANSI Standard 61 for Materials Designed for Contact with Potable Water.

Service Tubing:

Material: Crosslinked polyethylene (PEX) is manufactured to PEX-a or Engel-method standard and NSF-certified SDR-9.

Material Standard: Materials are manufactured in accordance with ASTM F876, F877, CSA B137.5 and NSF-pw.

Pressure Ratings: Hydrostatic design and pressure ratings are in accordance with the ASTM standard.

Nominal Inside Diameter: Provide tubing with nominal inside diameter in accordance with ASTM F876, as indicated. Note: Numbers in brackets are the metric equivalent pipe size.

1 inch (25mm).

1-1/4 inch (32mm).

1-1/2 inch (40mm).

2 inch (50mm).

3 inch (75mm).

Outer Jacket:

Material: Corrugated seamless high-density polyethylene (HDPE)

The HDPE jacket completely encompasses and protects the insulation from moisture and damage.

Outer jacket shall be extruded directly over the insulation and is flexible.

The outer jacket shall contain 2 percent carbon black, finely divided and thoroughly dispersed to provide protection from UV degradation.

Minimum Bend Radius:

1 inch pre-insulated potable tubing with 5.5-inch (140mm) jacket has a bend radius of 10 inches (254mm).

1-1/4 inch pre-insulated potable tubing with 5.5-inch (140mm) jacket has a bend radius of 12 inches (304mm).

1-1/2 inch pre-insulated potable tubing with 6.9-inch (175mm) jacket has a bend radius of 16 inches (406mm).

2 inch pre-insulated potable tubing with 6.9-inch (175mm) jacket has a bend radius of 18 inches (457mm).

3 inch pre-insulated potable tubing with 7.9-inch (200mm) jacket has a bend radius of 32 inches (812mm).

Insulation:

The insulation shall be layered expanded cross-linked water-resistant polyethylene closed-cell foam.

All seams of the insulation shall be sealed.

Insulation shall not be bonded to the service tubing.

End Seals:

The piping manufacturer will supply all EPDM rubber end caps with water-stop seal. EPDM rubber end caps are to be installed on each end prior to connecting the service pipes and insulating the field joints.

The EPDM end caps will seal onto the tubing and outer jacket forming a watertight seal.

Cold Expansion Fittings for PEX-a Service Tubing:

For system compatibility, use fittings offered by the tubing manufacturer.
Fittings must comply with the performance requirements of ASTM F877.
Fittings are to be manufactured in accordance with ASTM F1960.
The fitting assembly consists of a barbed adapter and an applicable-sized PEX ring.
All buried fittings will be installed, insulated, and sealed in accordance with the instructions of the piping manufacturer.

Pipe and Fitting Identification: The pipe shall be marked in accordance with the standards to which it is manufactured.

Color identification by the use of stripes on pipe to identify pipe service shall be optional. If used, stripes or colored exterior pipe product shall be blue for potable water, green for wastewater/sewage, or purple for reclaimed water.
Tracing wire shall be placed parallel and 18 inches above, but separate from, the pipe and shall be 10 AWG.

Accessories: Use accessories associated with the installation of the piping system as recommended by or available from the manufacturer.

Insulation Kits: Insulation kits will be manufactured of ABS shells or HDPE sleeves, will feature equal thickness of closed-cell PEX insulation as the pipe, and sealed watertight.

Connection Vaults:

The piping manufacturer will provide the connection vaults when required by the project construction.
Connection vaults shall be constructed of rotationally molded composite polyethylene and PE foam, providing a structurally sound and thermally insulated chamber.
Heat shrink seals as provided by the tubing manufacturer shall be installed to prevent introduction of water into the vault.

Anchors: The project engineer will determine the use of anchors, if required, within the distribution system.

5. ASTM ECOFLEX PRE-INSULATED THERMAL SINGLE DISTRIBUTION SYSTEM

Design Requirements: The PEX-a service tubing is USA manufactured and tested in accordance with ASTM F876, ASTM F877, ASTM F1960, CSA B137.5 and NSF-rfh. The PEX service tubing has hydrostatic ratings in accordance with the temperatures and pressures listed in the ASTM standard. The hydrostatic ratings are:

200 degrees F (93 degrees C) at 80 PSI (551 kPa).
180 degrees F (82 degrees C) at 100 PSI (689 kPa).
73.4 degrees F (23 degrees C) at 160 psi (1102 kPa).

Performance Requirements: Provide a pre-insulated distribution system that is USA manufactured, fabricated and installed to comply with regulatory agencies and authorities with jurisdiction, and that maintains performance criteria stated by the tubing manufacturer without defects, damage or failure.

- Show compliance with ASTM F876 regarding Crosslinked Polyethylene (PEX) Tubing.
- Show compliance with ASTM F877 regarding Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems.
- Show compliance with DIN 4726 regarding Oxygen Diffusion.
- Show compliance with ASTM F1960 regarding Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Tubing.
- Show compliance with CSA B137.5 regarding Crosslinked Polyethylene (PEX) Tubing Systems for Pressure Applications.
- Show compliance with NSF-rfh regarding Radiant Floor Heating Applications

Service Tubing:

Material: Crosslinked polyethylene (PEX) manufactured to PEX-a or Engel-method standard

Material Standard: Manufactured in accordance with ASTM F876 and F877

Pressure Ratings: Hydrostatic design and pressure ratings are in accordance with the ASTM standard. Operating limits are as follows.

-58 degrees F to 203 degrees F at 80 psi (-50 degrees C to 95 degrees C at 551 kPA).

The PEX service tubing in the Ecoflex Thermal Single pipe has an oxygen diffusion barrier that does not exceed an oxygen diffusion rate of 0.10 grams per cubic meter per day at 104 degrees F (40 degrees C) water temperature in accordance with German DIN 4726.

Nominal Inside Diameter: Provide tubing with nominal inside diameter in accordance with ASTM F876, as indicated. Note: Numbers in brackets are the metric equivalent pipe size.

- 1 inch (25mm).
- 1-1/4 inch (32mm).
- 1-1/2 inch (40mm).
- 2 inch (50mm).
- 2-1/2 inch (63mm).
- 3 inch (75mm).
- 3-1/2 inch (90mm).
- 4 inch (110mm).

Outer Jacket:

Material: Corrugated seamless high-density polyethylene (HDPE)

The HDPE jacket completely encompasses and protects the insulation from moisture and damage.

Outer jacket shall be extruded directly over the insulation and is flexible.

The outer jacket shall contain 2 percent carbon black, finely divided and thoroughly dispersed to provide protection from UV degradation.

Minimum Bend Radius:

1 inch pre-insulated tubing with 5.5-inch (140mm) jacket has a bend radius of 10 inches (254mm).

1-1/4 inch pre-insulated tubing with 5.5-inch (140mm) jacket has a bend radius

- of 12 inches (304mm).
- 1-1/2 inch pre-insulated tubing with 6.9-inch (175mm) jacket has a bend radius of 16 inches (406mm).
- 2 inch pre-insulated tubing with 6.9-inch (175mm) jacket has a bend radius of 18 inches (457mm).
- 2-1/2 inch pre-insulated tubing with 6.9-inch (175mm) jacket has a bend radius of 30 inches (762mm).
- 3 inch pre-insulated tubing with 7.9-inch (200mm) jacket has a bend radius of 32 inches (812mm).
- 3-1/2 inch pre-insulated tubing with 7.9-inch (200mm) jacket has a bend radius of 44 inches (1117mm).
- 4 inch pre-insulated tubing with 7.9-inch (200mm) jacket has a bend radius of 48 inches (1219mm).

Insulation:

The insulation shall be layered expanded cross-linked water-resistant polyethylene closed-cell foam.

All seams of the insulation shall be sealed.

Insulation shall not be bonded to the service tubing.

End Seals:

The piping manufacturer will supply all EPDM rubber end caps with water-stop seal. EPDM rubber end caps are to be installed on each end prior to connecting the service pipes and insulating the field joints.

The EPDM end caps will seal onto the tubing and outer jacket forming a watertight seal.

Cold Expansion Fittings for PEX-a Service Tubing:

For system compatibility, use fittings offered by the tubing manufacturer.

Fittings must comply with the performance requirements of ASTM F877.

Fittings are to be manufactured in accordance with ASTM F1960.

The fitting assembly consists of a barbed adapter and an applicable-sized PEX ring.

All buried fittings will be installed, insulated, and sealed in accordance with the instructions of the piping manufacturer.

Pipe and Fitting Identification: The pipe shall be marked in accordance with the standards to which it is manufactured.

Color identification by the use of stripes on pipe to identify pipe service shall be optional. If used, stripes or colored exterior pipe product shall be blue for potable water, green for wastewater/sewage, or purple for reclaimed water.

Tracing wire shall be placed parallel and 18 inches above, but separate from, the pipe and shall be 10 AWG.

Accessories: Use accessories associated with the installation of the piping system as recommended by or available from the manufacturer.

Insulation Kits: Insulation kits will be manufactured of ABS shells or HDPE sleeves, will feature equal thickness of closed-cell PEX insulation as the pipe, and sealed watertight.

Connection Vaults:

The piping manufacturer will provide the connection vaults when required by the project construction.

Connection vaults shall be constructed of rotationally molded composite polyethylene and PE foam, providing a structurally sound and thermally insulated chamber.

Heat shrink seals as provided by the tubing manufacturer shall be installed to prevent introduction of water into the vault.

Anchors: The project engineer will determine the use of anchors, if required, within the distribution system.

9. EXECUTION

1. EXAMINATION

Site Verification of Conditions: Verify that site conditions are acceptable for installation of the hydronic piping distribution system. Do not proceed with installation until unacceptable conditions are corrected.

2. INSTALLATION

Install hydronic piping according to approved shop drawings or coordination drawings.

Comply with manufacturer's product data, including product technical bulletins, installation instructions and design drawings, including the following.

Uponor Pre-insulated Pipe Systems Design and Installation Manual, current edition.

Below-grade Installation:

Pre-insulated piping shall be installed in accordance with manufacturer's recommendations and the details as shown on the contract drawings.

The system will be installed with the fewest number of underground joints as possible. The system does not require expansion loops, expansion joints or compensators of any type.

An EPDM rubber end cap shall be applied at all terminations of the piping system, including all fitting locations, to form a watertight seal.

All buried fittings will be installed, insulated and sealed in accordance with the piping manufacturer's instructions.

Connection Vaults or Insulation Kits are required for all below-grade installations.

Backfill:

The pre-insulated piping system will be backfilled with clean sand material.

Minimum vertical distance from the bottom of the tubing to the trench floor is 4 inches (100 mm).

Minimum lateral distance from the side of the tubing to the trench wall is 6

inches (150 mm).

Install a minimum of 12 inches (300 mm) of clean fill over the top of the potable pre-insulated piping.

The balance of the trench can be backfilled with native soil void of stone greater than 2 inches (50mm) in diameter.

PEX-a Piping:

PEX-a Piping Hanger Spacing: Install hangers for PEX-a piping with the following maximum spacing:

1 inch and below: Maximum span, 32 inches.

1-1/2 inch and above: Maximum span, 48 inches.

PEX-a Piping Hanger Spacing with PEX-a Support Channel: Install hangers for PEX-a piping with horizontal support channel in accordance with local jurisdiction and manufacturer's recommendations, with the following maximum spacing:

Maximum span, 8 feet.

PEX-a Riser Supports: Install CTS riser clamps at the base of each floor and at the top of every other floor. Install mid-story guides between each floor.

Pipe Joint Connections: Install per manufacturer's recommendations. Use manufacturer-recommended cold-expansion tool for F1960 connections.

3. FIELD QUALITY CONTROL

Site Tests: To ensure system integrity, pressure-test the tubing before and during backfilling of the piping. The service tubing will be air tested at 1 1/2 times the operating pressure for a minimum of 1 hour prior to system burial

4. CLEANING

Remove temporary coverings and protection of adjacent work areas.

Repair or replace damaged installed products.

Clean the installed products in accordance with manufacturer's instructions prior to Owner's acceptance.

Remove construction debris from project site and legally dispose of debris

5. DEMONSTRATION

Demonstrate operation of the piping distribution system to Owner's personnel.

6. PROTECTION

Protect installed work from damage caused by subsequent construction activity on the site

END OF SECTION

23 21 23 **HYDRONIC PUMPS**

23 21 23 – Hydronic Pumps

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

A. Provide pumps and required system trim for heating, chilled water, and dual temperature water systems including all related appurtenances for a complete and operating systems.

1.02 SECTION INCLUDES

A. Wet Rotor, Inline Pump

1.03 RELATED SECTIONS

A. Drawings and general provisions of the contract, including general and supplementary Conditions and Division 1 Specification Sections, apply to these

Sections.

- Section *** - Mechanical General Requirements
- Section *** - Supports, Anchors, and Sleeves
- Section *** - Motors and Starters
- Section *** - Drives
- Section *** - Mechanical Identification
- Section *** - Vibration Isolation
- Section *** - Piping Insulation
- Section *** - Equipment Installation
- Section *** - Hydronic Piping and Specialties
- Section *** - Testing, Adjusting, and Balancing
- Section *** - Meters and Gauges
- Section *** - Electrical

1.04 REFERENCES

A. HI - Hydraulic Institute. B. ANSI - American National Standards Institute. C. OSHA - Occupational Safety & Health Administration. D. ASHRAE - American Society of Heating, Refrigeration and Air-Conditioning Engineers. E. NEMA - National Electrical Manufacturers Association. F. UL - Underwriters Laboratories. G. ETL - Electrical Testing Laboratories. H. CSA - Canadian Standards Association. I. NEC - National Electric Codes. J. ISO - International Standards Organization.

K. IEC - International Electrotechnical Commission. L. ASME - American Society of Mechanical Engineers.

1.05 SUBMITTAL

A. Submit each item in this article according to the Conditions of the Contract and Division 1 Specification

Sections.

B. Submit manufacturer's installation instructions under provisions of General Conditions and Division 1.

- Operation and Maintenance Data: Include installation instructions, assembly views, and replacement parts lists.
- Under provisions of

commissioning documentation, testing of pumps, as well as training of owner's operation and maintenance personnel may be required in cooperation with the commissioning consultant.

C. Product Data including published performance curves and rated capacities of selected model, shipping weights, furnished specialties, and accessories. Indicate

pump's operating point on curves. D. Complete Package information:: • System summary sheet (where applicable) • Shop drawing indicating dimensions, required clearances and location and size of each field connection

• Power and control wiring diagram • System profile analysis including pump curves, system curve, and variable speed pump curves

(where applicable) • Pump data sheets - Rated capacities of selected models and indication of pump's operating point on curves.

• Submittals on furnished specialties and accessories • Submittals must be specific to this project. Generic

submittals will not be accepted E. Hanging and support requirements should follow therecommendations in the manufacturer's installation

instructions.

1.06 QUALITY ASSURANCE

A. All equipment or components of this specification section shall meet or exceed the requirements and quality of the items herein specified, or as denoted on the drawings.

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B. Ensure that pump operates at specified design conditions without vapor binding and cavitation, is

non-overloading in parallel or individual operation,

and operates to ANSI/HI 9.6.3.1 standard for Preferred Operating Region (POR) unless otherwise approved by

the engineer.

C. Ensure pump pressure ratings are at least equal to system's maximum operating pressure at point where installed but not less than specified. D. Equipment

manufacturer shall be a company specializing in manufacture, assembly, and field performance of provided equipment with a minimum of 20 years experience.

E. Equipment provider shall be responsible for providing certified equipment start-up

and, when noted, an in the field certified training session. New pump start-up shall be for the purpose of determining pump alignment, lubrication, voltage, and amperage readings. All proper electrical connections, pump's balance, discharge and suction gauge readings, and adjustment of head, if required. A copy of the start-up report shall be made and sent to both the contractor and to the engineer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the site in such a manner as to protect the materials from shipping and handling damage. Provide materials on factory provided shipping skids and lifting lugs if required for handling.

Materials which could be damaged by the elements should be packaged in such a manner that they could withstand short-term exposure during transportation.

B. Store materials in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage.

C. Use all means necessary to protect equipment before, during, and after installation. D. All scratched, dented, and otherwise damaged units shall be repaired or replaced as directed by the Architect Engineer.

1.08 WARRANTY:

A. Provide a minimum 18 month warranty on materials and installation under provision of Section 01 78 36

PART 2 – PRODUCTS

2.01 MANUFACTURERS

A. The specifying engineer reserves the right to specify a primary supplier / lead spec manufacturer on all supplied schedule and specification documents. These primary suppliers have led their respective industry in research and development and their products

have had proven track records in the field. These primary suppliers, in the opinion of this engineering firm, produce a superior product to the alternately listed manufacturers. The contractor may choose to supply equivalent equipment as manufactured by the alternately specified manufacturer. This alternately

specified equipment shall be supplied on a deduct alternate basis and based on the approval of the supplied alternate manufacturer's submittals. The use of a primary supplier and deduct alternates protects

the specifying engineer's design concept, but allows for a check-and-balance system to protect the post-

commissioning owner.

B. Contractor shall furnish and install new wet rotor inline pump for hydronic radiant and geothermal heating and cooling systems as indicated on the drawings. Pumps shall be ecocirc XL as manufactured by Bell & Gossett, a Xylem Company, under base bid. Equivalent units as manufactured by other manufacturers may be submitted as deduct alternates. Pumps shall meet types, sizes, capacities, and characteristics as scheduled on the Equipment Schedule and drawings. Pump substitutions shall be provided with connection sizes equal to those scheduled. Pump connections shall not be downsized. Pump substitutions shall not be provided at efficiencies less than those scheduled.

2.02 COMPONENTS

A. The pumps shall be a wet rotor inline pump, in cast iron or lead free bronze body construction specifically designed for quiet operation. Suitable standard operations at 230° F and 175 PSIG working pressure. The pump internals shall be capable of being serviced without disturbing piping connections. B. The pump internals shall be capable of being serviced without disturbing piping connections. C. Pump shall be equipped with a water-tight seal to

prevent leakage.

D. Pump volute shall be of a cast iron design for heating systems or lead free bronze for domestic water systems. The connection style on the cast iron and bronze pumps shall be flanged. E. Flange to Flange dimension shall be standard Bell & Gossett booster sizes such as 6-3/8" , 8-1/2" , 11-1/2" , and 12" . Flange dimensions shall be HVAC industry standard 2 or 4 bolts sizes. F. Motor shall be a synchronous, permanent-magnet (PM) motor and tested with the pump as one unit. Conventional induction motors will not be acceptable. G. Each motor shall have an Integrated Variable Frequency Drive tested as one unit by the

manufacturer.

H. Integrated motor protection shall be verified by UL to protect the pump against over/under voltage, overtemperature of motor and/or electronics, over current, locked rotor and dry run (no load condition). I. Pump shall have MODBUS or BACnet

connections built into the VFD as standard options. J. Analog inputs, such as 0-10V and 4-20mA, are standard inputs built into the VFD. K. Pumps shall be UL 778 listed and bear the UL Listed Mark for USA and Canada with on-board thermal overload protection.

SP-A162

Page 3

L. Pumps shall be UL 778 listed and bear the UL Listing Mark for USA and Canada with on-board thermal

overload protection. M. Each pump shall be factory performance tested before shipment.

2.03 OPERATING MODES

A. Proportional Pressure – The differential pressure will continuously increase or decrease along a linear curve

based on the flow demand. B. Constant Pressure – The pump maintains a constant differential pressure set by the user at any flow demand until the maximum speed is reached.

C. Constant Speed – The pump maintains a constant speed at any flow rate. D. Night Set Back – The pump will recognize a 10°C water temperature reduction and will switch to nighttime operation.

E. T-Constant – This control will use a PI algorithm to vary the speed of the pump in order to maintain a constant

temperature of the fluid media. F. Delta-T Constant – This control mode will use a PI algorithm to vary the speed of the pump in order to maintain a constant differential temperature

between the built-in temperature sensor and external temperature sensor.

G. Delta-P-T – This control mode is paired with proportional or constant pressure mode. The nominal differential pressure setpoint will vary according to the

fluid temperature. H. Delta-P-Delta-T – This control mode is paired with proportional or constant pressure mode. The nominal differential pressure setpoint will vary according to the differential temperature between the built-in

temperature sensor and external temperature sensor.

2.04 TWO PUMP CONTROL

A. Backup – This mode will start the second pump in case of failure to the master pump.

B. Alternate Operation – This mode will run one pump at a time. The working time is switched every 24 hrs.

C. Parallel Operation – In this mode, both pumps run simultaneously at the same set point. The master pump determines the behavior of the full system and is able to optimize the performance. To guarantee the required performance with the minimum power

consumption the master pump starts or stops the second pump depending on the head and the

flow required.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install equipment in accordance with manufacturer's instructions.

B. Reduction from line size to pump connection size shall be made with eccentric reducers attached to the pump with tops flat to allow continuity of flow and to avoid air pockets.

C. Furnish and install a line size shut-off valve on the suction and discharge sides of the pumps.

D. Provide temperature and pressure gauges where and as detailed or directed.

E. Provide an adequate number of isolation valves for service and maintenance of the system and its components.

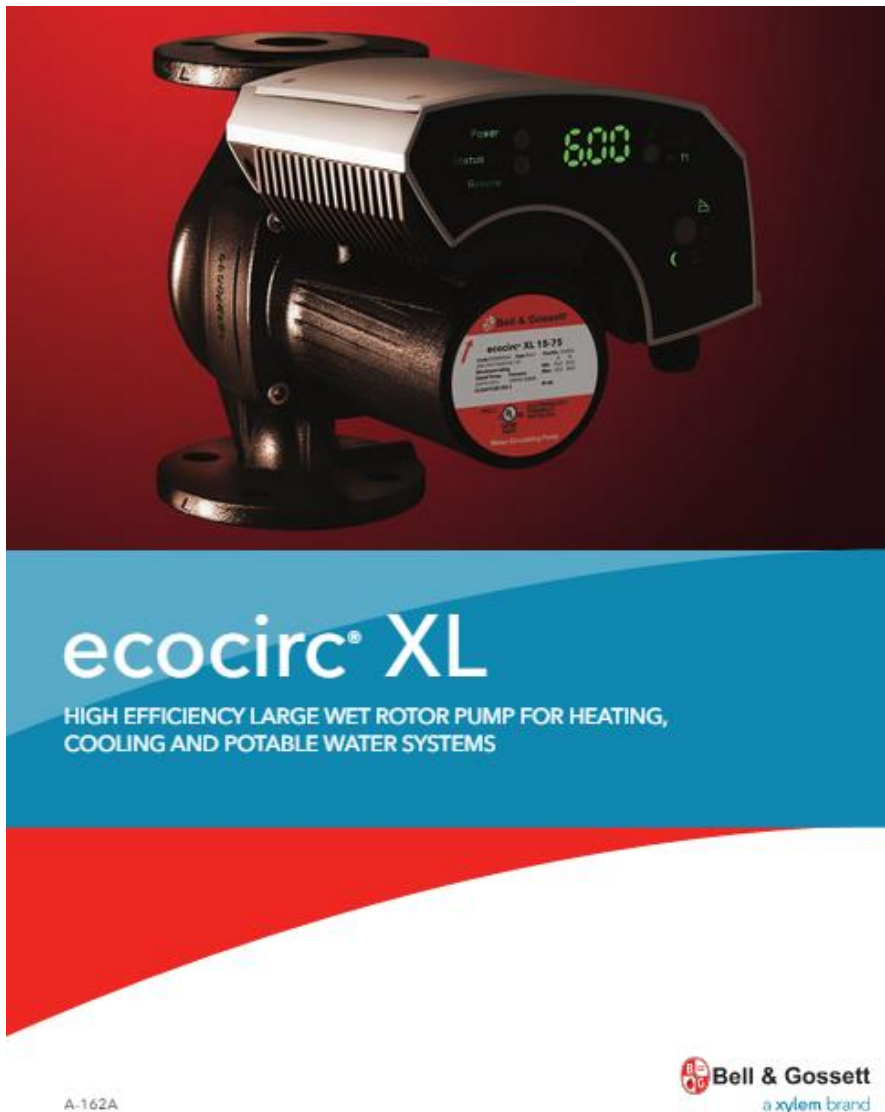
F. Circulating pump shall have sufficient capacity to circulate the scheduled GPM against the scheduled external head (feet) with the horsepower and speed as scheduled and/or as denoted on the drawings. Motor shall be of electrical characteristics as scheduled, denoted and/or as indicated on the electrical plans and specifications.

G. All piping shall be brought to equipment and pump connections in such a manner so as to prevent the possibility of any load or stress being applied to the

connections or piping.

H. Power wiring, as required, shall be the responsibility of the electrical contractor. All wiring shall be performed per manufacturer's instruction and per applicable state,

federal, and local codes.I. Control wiring for remote mounted switches and sensor / transmitters shall be the responsibility of the control' s contractor. All wiring shall be performed per manufacturer' s instructions and applicable state, federal, and local codes.J. Power and control wiring shall run in separate channel. K. Pumps are supplied with an integrated VFD and should not be used with any external VFDs.L. Pumps shall NOT be run dry to check rotation.
END OF SECTION



23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: For each type of product indicated, including color charts for factory finishes.

PART 2 – PRODUCTS

2.1 Return Air Grille

A. Fixed-Face Grille LIVINGROOM RETURN

1. Material: metal
 2. Finish: Color selected by Architect
 3. Mounting: Concealed or Lay in
- B. Fixed-Face Grille LIVINGROOM RETURN
1. Material: metal
 2. Finish: Color selected by Architect
 3. Mounting: Concealed or Lay in

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install return air grilles level and plumb.
- B. Wall-Mounted Outlets and Inlets: Drawings indicate general arrangement of Fan coil face plates and return air grilles. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel unless otherwise indicated. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.
- C. After installation, adjust grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 233713

23 71 16 CHILLED WATER THERMAL STORAGE

PART 1 GENERAL

1.01 SYSTEM HARDWARE OVERVIEW:

- A. See 23 09 93 for list of equipment descriptions for hydronic system (Including thermal storage components).
- B. See Drawings M-001 and M-002 for specific scheduling of HVAC equipment and piping.
- C. Control valves, isolation valves, fittings, and other balance-of-system components shall be specified and furnished by the installer.
- D. Thermal Storage Tank
 - 1. The thermal storage tank furnished may be different than the model specified in the schedule, but the alternate must meet the equivalent dimensions, material capacity, and fittings sizing.
 - 2. The tank must either be able to be encased or wrapped in a vapor barrier and insulation, or come pre-insulated with minimum R-10 insulation.
- E. A thermal storage tank temperature array shall be included that provides a minimum of 5 temperature read points distributed evenly between the two diffusers.
- F. The top and bottom diffusers shall be designed and fabricated in accordance with ASHRAE design standards.

1.02 SYSTEM OPERATION AND CONTROL OVERVIEW

- A. See 23 09 13 and 23 09 93

PART 2 EQUIPMENT

2.01 ACCEPTIBLE BIDDERS

A. The specifications for the Chilled Water Thermal Storage System are open-ended such that any qualified companies or persons may provide a detailed bid. Preference shall be given towards:

- 1) Low Cost
- 2) Simplicity
- 3) Open-source/freeware software or hardware
- 4) interactability/interface capability with the HVAC and home electronics systems already chosen.

END OF SECTION 237116

23 82 19 - FAN COIL UNITS

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, accessories, and color charts for cabinet finishes.
2. Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

PART 2 – PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

2.2 DUCTED FAN COIL UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Chiltrix, CXI 85 and CXI 34 models
 - B. Description: Factory-packaged and -tested units rated according to AHRI 440, ASHRAE 33, and UL 1995.
 - C. Coil Section Insulation: Shall comply with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
 1. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - D. Main and Auxiliary Drain Pans: Plastic or Insulated galvanized steel with plastic liner formed to slope from all directions to the drain connection as required by ASHRAE 62.1.

- E. Chassis: Galvanized steel where exposed to moisture.
- F. Cabinet: Steel with baked-enamel finish in manufacturer's standard paint color.
- G. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch (2.5 mm), rated for a minimum working pressure of 200 psig (1378 kPa) and a maximum entering-water temperature of 220 deg F (104 deg C). Include manual air vent and drain valve.
- I. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels and painted-steel or galvanized-steel fan scrolls.
 - 1. Motor to comply with NEMA MG 1 unless otherwise indicated. Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.
- J. Accessories:
 - 1. integral eliminators and insect screen.
 - 3. Permanently lubricated, multispeed motor.
 - 4. Steel hanging brackets for mounting fan-coil units into ceiling or wall.
- K. Basic Unit Controls:
 - 1. Control voltage transformer.
 - 2. Thermostat may be wall mounted, or unit-mounted with the following features:
 - a. Heat-cool-off switch.
 - b. Fan on-auto switch.
 - c. Fan-speed switch.
 - d. Automatic changeover.
 - e. Adjustable deadband.

PART 3 – EXECUTION

3.1 INSTALLATION

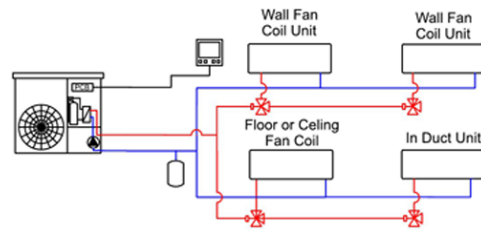
- A. Install fan-coil units to comply with NFPA 90A.
- B. Install units 1-3 degrees from level to assist in condensate drainage, and firmly anchored.
- C. Connect to supply and return piping with shutoff valve and union at each connection.
- D. Connect units to wiring systems and to ground.



High Efficiency Chiller Fan Coil Units

CXI DC Inverter Fan Coil Units

3,379 BTU to 14,778 BTU Cooling
3,347 BTU to 11,672 BTU Heating
High Efficiency DC-Inverter Motors



DC-Inverter

The Chiltrix DC-Inverter FCUs (Fan Coil Units) are available in five different styles including ceiling mount, free-standing floor mount, and wall mount versions as shown above. The DC-Inverter FCUs are the most efficient fan coils available on the market. DC Inverter motors use far less energy at any given speed than a standard fan motor, and the ability to adjust the speed of the motor without compromising efficiency is a crucial additional benefit. Designed for the Chiltrix CXI30 series chillers of ultra-efficient chillers, these fan coils are compatible with all chiller systems.

Super-Slim

The Chiltrix DC-Inverter FCUs are an incredible 5.1" thin. These fan coil units can attach flat against the ceiling, stand on the floor, or mount flat on a wall. These units are the thinnest fan coils available yet produce more BTU/CFM per watt of power than any standard fan coil unit.

Quiet & Long Lasting

DC-Inverter fan motors last longer and produce far lower sound levels than a standard fan motor with sound levels as low as 24dB. The Chiltrix fan motors are hermetically sealed brushless DC motors that use permanent rare-earth magnets. The DC motors are essentially vibration-free and avoid the 60Hz "hum" of conventional motors. Get more BTU/CFM per decibel than from any available unit. Standing next to the unit you cannot hear the motor operating, even on high speed.



Chiltrix Model	Cooling BTU*	Heating BTU*	Water GPM	Pressure Drop PSI	Air CFM Volume	Noise dB High	Noise dB Low	Power Watts	Power Supply	Net Dimensions Inches
CXI148	14,778	11,672	3.2	4.09	381	41	30	27	115v 60Hz	59W x 5.1D x 26.4H
CXI120	11,877	9,727	2.4	4.05	340	39	28	22	115v 60Hz	51.2W x 5.1D x 26.4H
CXI85	8,498	8,079	1.8	3.98	270	37	28	21	115v 60Hz	43.3W x 5.1D x 26.4H
CXI65	6,451	5,666	1.6	1.89	188	32	27	18	115v 60Hz	35.4W x 5.1D x 26.4H
CXI34	3,379	3,347	1.2	1.57	94	30	24	14	115v 60Hz	27.6W x 5.1D x 26.4H
HW72	7,200	7,200	1.9	3.62	512	46	35	90	220 50/60Hz	43W x 13D x 8.85H

*Maximum values. See capacity test data for varying conditions at www.chiltrix.com/documents/CXI-capacity-test.pdf



www.chiltrix.com





High Efficiency Chiller Fan Coil Units

CXI DC Inverter Fan Coil Units

3,379 BTU to 14,778 BTU Cooling
3,347 BTU to 11,672 BTU Heating
High Efficiency DC-Inverter Motors

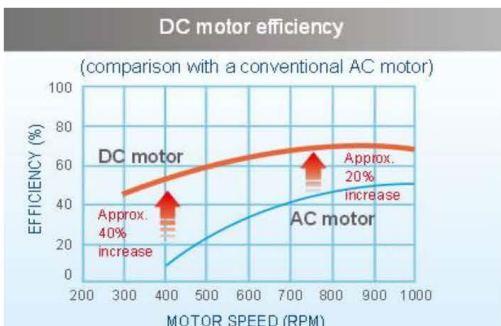
DC-Inverter FCU
110-130v AC 60Hz
HW72 FCU
208-240 50/60Hz



Super Thin DC-Inverter Fan Coil Units

Meet the thinnest, quietest, longest lasting, and most energy efficient chiller fan coil units ever built. Only 5.1". Did we mention Efficiency? Runs on as few as 8 watts power, see below left.

Model	Cooling (Input, W)			Heating (Input, W)		
	High	Med	Low	High	Med	Low
CXI34	14	10	8	14	10	9
CXI65	18	11	9	18	12	9
CXI85	21	13	10	22	14	10
CXI120	22	13	9	22	14	11
CXI148	26	17	12	27	18	13



High-Wall Mini-Split Fan Coil Units



CE

If the super-thin, ultra-efficient DC Inverter units are not the style or type you are looking for, we also offer standard high-wall ductless fan coil unit shown above. Model HW72 has the same appearance as a standard mini-split indoor unit. 208-240v 50/60Hz power compatibility means you can use this model anywhere in the world. Uses standard fan motor & includes remote control. Power L/M/H 46w/72w/90w

Distributed By:

hotspot energy

HotSpot Energy Inc.
2133 Smith Ave.
Chesapeake VA 23320
www.hotspotenergy.com

info@hotspotenergy.com
1-800-916-2067



www.chiltrix.com



END OF SECTION 23 82 19

23 82 23 – UNIT VENTILATORS

PART 1 – GENERAL

1.2 SECTION REQUIREMENTS

A. Submittals:

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, accessories, and color charts for cabinet finishes.
2. Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

PART 2 – PRODUCTS

ERV

BATHROOM VENT

2.1 PERFORMANCE REQUIREMENTS

- ##### A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

2.2 DUCTED FAN COIL UNITS

A. MANUFACTURER:

Vento Maxx GmbH

Tippelweg 3

D-84028 Landshut

PH: +49 (0) 871-95 34 06-0

Website: www.ventomaxx.de

Email: info@ventomaxx.de

PART 3 – EXECUTION

3.1 INSTALLATION

A. Install vents to comply with NFPA 90A.

B. Install vents to comply with manufacturers

THE DECENTRALIZED HUMID ROOMS VENTILATION

for integration in ventilation concepts according to DIN 1946 - Part 6
measured according to DIN EN 20140-10 (ehem. DIN 52210)
measured according to EN ISO 717-1; Prüfstand nach EN ISO 140-1
Tested in accordance with the principles of sound recognized by the building inspection
in consultation with the NABau UA DIN 4109 Supplement 1 00.71.02.



safety note

*For your safety, please read before starting to use your ventilation unit
the information specified carefully. You get it important
Instructions for the proper use and maintenance of your new Room fan.
Ventomaxx-International is not liable if the following instructions are not followed*

ECO COMFORT Plus

MOUNTING INSTRUCTIONS
USER MANUAL

Ventomaxx®-International GmbH • Herzog Georg Platz 4 • 84028 Landshut • www.ventomaxx-international.de

VENTO **MAXX**[®]

Subject to technical modifications 01.2015 © Ventomaxx - International GmbH

ECO COMFORT Plus

- **safety instructions** (Page 2)
- **mounting instructions** (Page 3 - 6)
 - Page 3 General installation requirements
 - Page 4 Mounting template to prepare the wall opening
 - Page 5 Assembly of the Rough construction-ring module set, Mounting Type LAW, straight through the wall
 - Page 6 Mounting the Rough construction ring Module Set Mounting Type LAL, concealed within the soffit
- **electrical installation** (Page 7-10)
 - Page 7 Final assembly room side - Electrical connection
 - Page 8 Final assembly room side / group settings
 - Page 9 Insert filter / close unit
 - Page 10 Sets the operating function
- **User manual** (Page 11-18)
 - Page 11 warranty
 - Page 12 Device configuration / control panel
 - Page 13 program functions
 - Page 14 status reports
 - Page 15 Units care / filter change
 - Page 16/18 Commissioning protocol / service / customer services

- **safety instructions**



Attention!

**Protect it from wetness and moisture!
Before opening, disconnect the appliance from the mains!**

All persons who have to do with the installation, commissioning and maintenance of the unit must be qualified. This manual must be followed exactly! Probably missing documents we will send you on request at short notice.

First check the perfect condition of the package and the individual accessories. Pay attention to the perfect condition of the power cord and the current-carrying wire to the fan unit. It is absolutely ensure that no kinks and damage are present in it.

The device can be connected directly to the mains supply. When the mains plug design of the device must only be connected to power outlets whose voltage and frequency with the nameplate of the unit exactly

The cable entries on / in Do not strain by pulling! There must always be out sufficient cable to the device. Otherwise, the cable may be damaged, which can lead to a fatal electric shock.

When cleaning or revision of the device that needs to be taken out of operation; more dirt in and at the device should only be removed by a professional; the circuit must be interrupted to all poles.

The cleaning of the room-side cover must only be carried out with a damp cloth. The penetration of water or other liquids enter the device must be avoided. If this should should happen, immediately disconnect the power by unplugging the power cord or turn off the device fuse. Do not turn the power back on and secure it so that no unauthorized Can be carried out commissioning.

ECO COMFORT Plus



The ECO COMFORT Plus is an exhaust fan, equipped with a highly efficient sound insulation. The ECO COMFORT Plus rounds so that the device series of sound-insulated supply and exhaust air devices, with and without heat recovery off. The ECO COMFORT Plus is mainly designed for comfortable ventilation of odor and moisture contaminated living rooms. Please make sure that the air inlet is open and not covered by any objects. A liability for other use can not be accepted. To avoid moisture damage or human health impair, be absolutely sure that a sufficient ventilation is guaranteed. Depending on the room use are supportive window ventilation (eg push ventilation one the day) in addition to the planned ventilation concept required (eg in the same room as the other Ventomaxx ventilation units).

For proper operation of the decentralized ventilation system is shutoff the availability requires of existing combustion air lines.
Except changing the filter / equipment cleaning, no further maintenance is required. Please consult before any Filter change the power plug or switch off the unit without power by turning off the fuse.

If the unit does not function properly, you should contact a qualified technician for.

• mounting instructions

General installation requirements

ECO COMFORT Plus Ventilation devices can be in all standard constructions easy to fit and close when installed inside and outside nearly flush.

The system has a modular design, allowing the use of equipment already been in the construction phase in the desired mounting design (eg LAW, straight through the wall; LAL, concealed within the soffit) can be prepared.

The ECO COMFORT Plus can to a trouble-free AC power with 85-260V, 50/60 Hz are securely connected (default). The device is also available with a 1.5 meters or 3 meters cable for connecting the Power outlet (S1.5 / S3.0).

Please note:

For insertion of the fan within the wall apertures to the outside are on-site manufacture in accordance with the following description. The required wall opening is to be provided with diameter of 200 mm. These installation instructions describe the installation of the fan part in a monolithic exterior wall. Please determine which wall structure is present and only use specified by the manufacturer fasteners for the wall.

Dependent on its condition the wall, different regulations / safety precautions must be observed (eg with an asbestos-containing facade, etc).

The assembly is therefore in principle be carried out by specialist companies. If you are not sure which Gewerk for the installation of the question or what tools and resources for professional installation is required, please contact us!

During the execution of all work with machinery and equipment, the instructions of the machine supplier / equipment manufacturer must be observed. All work must be performed with the recommended protective clothing (eg, mouth, eye protection, gloves, etc.)!

When choosing your installation situation, note the following:

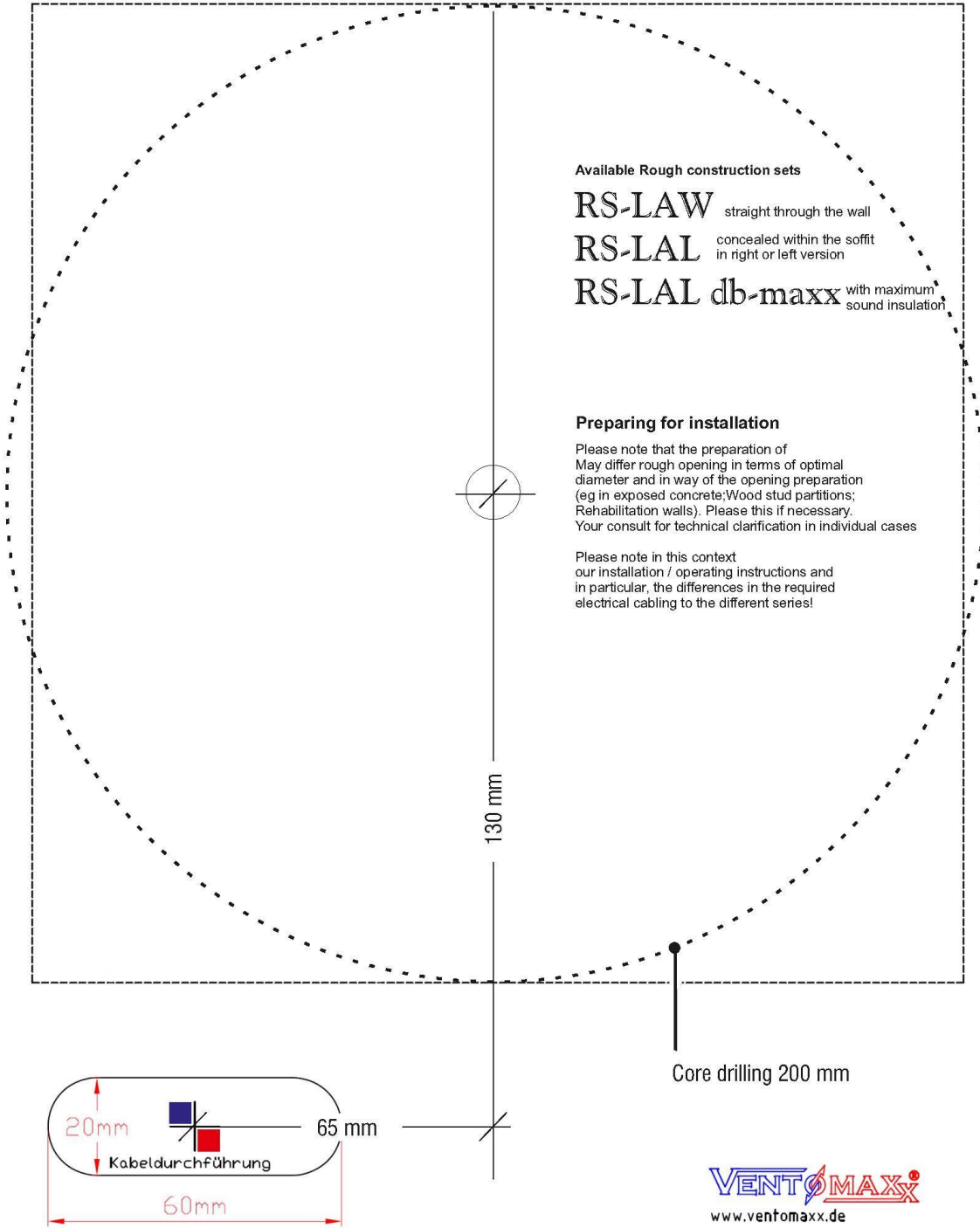
At the drilling no supply lines must pass;

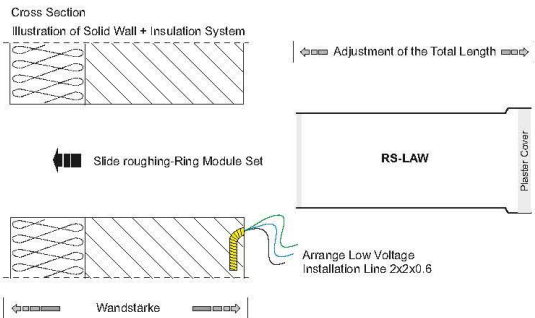
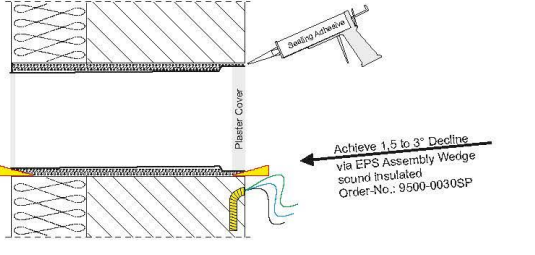
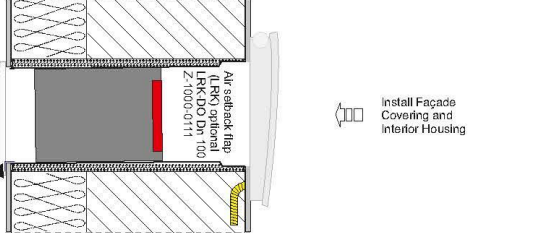
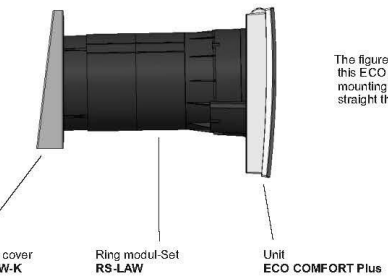
For multi-layered construction is to make sure that the pierced vapor barrier is sealed according to the manufacturer's instructions; in weather- acted upon areas is on the outside of the fan to provide a weather protection (sh. to also provide information on each mounting).

The room side arrangement of the housing must be chosen so that the accessibility to the revision of the device is always possible. The air exit on the unit must remain free in the range of about 25-30 cm long and must not be obstructed by furniture or handicapped etc..

Preparation wall opening and electrical connection

Plus-Series

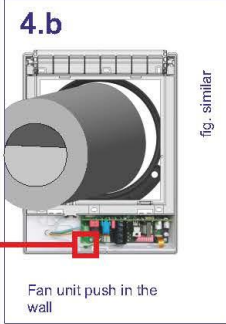
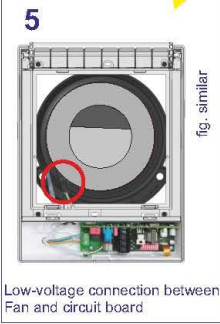




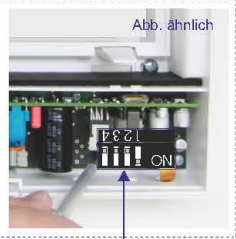
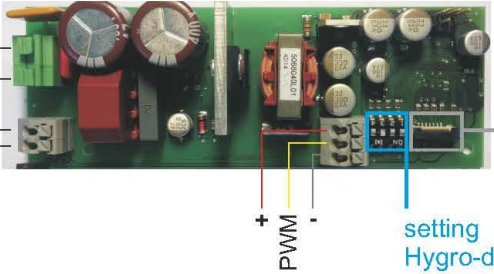




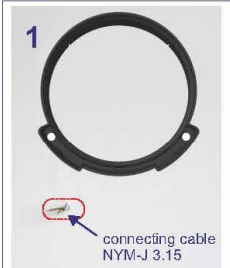
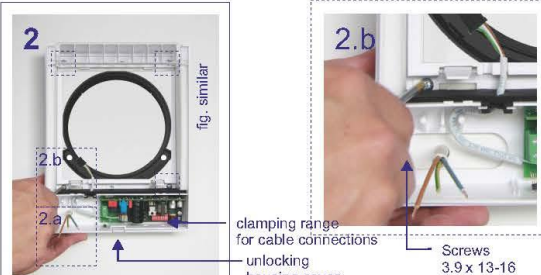
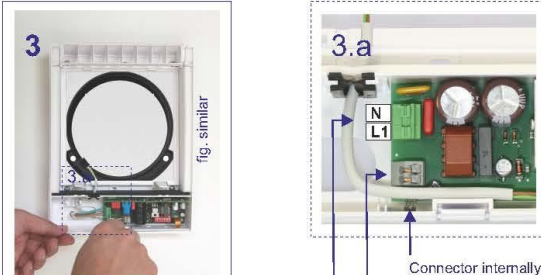
Mounting of the rough-Ring Module Set	
Mounting Type LAW (straight through the wall)	Comments
<p>Cross Section Illustration of Solid Wall + Insulation System</p>  <p>Adjustment of the Total Length</p> <p>Slide roughing-Ring Module Set</p> <p>RS-LAW</p> <p>Plaster Cover</p> <p>Arrange Low Voltage Installation Line 2x2x0.6</p> <p>Wandstärke</p> <p>Outside</p> <p>Inside</p>	<p>1. Creation of the wall opening</p> <p>a) Opening 200 mm or square H / B 200 x 190 mm establish or prepare in shell</p> <p>b) prepare an empty tube or place a low voltage installation line 2x2x0.6 to the central control unit!</p> <p>2. Making overall length with ring modules (wall thickness incl. insulation system and Plastering)</p> <p>The ring module set is for use in Wall thicknesses from 300 mm designed; CAUTION: reduction only on the outside!</p> <p>3. Ring Module Set slide into the wall, adjusting it and fixing it without tension</p> <p>a) depending on the desired place for the interior cover (air outlet on top or bottom), the electric cable has to be installed like the pattern shows you (the standard air outlet is on top)</p> <p>b) by adjusting the ring module sets the Wall thickness, are still present connection wall thickness the connection joints have to be sealed diffusion resistant with VX-FK</p> <p>c) at LAW-assembly is a slope of Rough construction-ring module sets plan at 1,5-3° decline of your telescope unit from inside to outside</p> <p>4. Insulate bigger opening or hollow spaces additionally with mineral wool professionally</p> <p>5. Framed fixing in the wall with two component polyurethane foam VX-2K</p> <p>a) seal room-sided opening gap between wall and channel diffusion resistant and permanently elastic (Ventomaxx Installation Sealing Adhesive VX-FK)</p> <p>6. Protecting the Ventilation Unit from Dirt</p> <p>a) therefore use the included protective cover during the whole construction phase (plaster cover of RS-LAW)</p> <p>b) in order to avoid any kind of damage to the ventilator during the construction phase, store them in a well-protected place until the final assembly</p> <p>7. Install Façade Cover after the completion of plaster and painting works</p> <p>8. Install interior housing right before the completion of the construction phase</p> <p>a) fix the room- sided housing right on the intended fixing points of the telescope unit</p> <p>b) to avoid deformations on the housing tighten screws gently and uniformly</p>
 <p>Sealing Adhesive</p> <p>Plaster Cover</p> <p>Achieve 1,5 to 3° Decline via EPS Assembly Wedge sound Insulated Order-No.: 9500-0030SP</p> <p>Outside</p> <p>Inside</p>	<p>9. Electronic Installation must be carried out by a professional!</p> <p>a) before you start working always pull the plug or switch off the flush</p> <p>b) connect up to 6 ventilation devices to the central control unit using the attached connection scheme</p> <p>c) initiate the devices via the central control unit following the instruction</p> <p>d) after completion of the electronic installation clip the electronic protection cover and hinge the front panel</p> <p>e) the device is now ready for operation in accordance with the operating instructions</p> <p>f) further specialties should be cleared project based early enough; we kindly offer you support after a request</p>
 <p>Air setback flap (LRK optional Z=7000-04111)</p> <p>LRK-DO DN 100</p> <p>Install Façade Covering and Interior Housing</p> <p>Outside</p> <p>Inside</p> <p>In the lower part is an on-site seal between Rough construction ring Module Set and base plate facade cover required (eg aluminum adhesive tape; Ventomaxx sealing adhesive VX-FK); at the top of the hood and sides of a seal on the facade is necessary. Please note Mounting instructions for facade cover!</p>	<p>9. Electronic Installation must be carried out by a professional!</p> <p>a) before you start working always pull the plug or switch off the flush</p> <p>b) connect up to 6 ventilation devices to the central control unit using the attached connection scheme</p> <p>c) initiate the devices via the central control unit following the instruction</p> <p>d) after completion of the electronic installation clip the electronic protection cover and hinge the front panel</p> <p>e) the device is now ready for operation in accordance with the operating instructions</p> <p>f) further specialties should be cleared project based early enough; we kindly offer you support after a request</p>
 <p>facade cover FA-LAW-K</p> <p>Ring modul-Set RS-LAW</p> <p>Unit ECO COMFORT Plus</p> <p>The figure shows this ECO COMFORT Plus mounting version LAW, straight through the wall</p>	<p>9. Electronic Installation must be carried out by a professional!</p> <p>a) before you start working always pull the plug or switch off the flush</p> <p>b) connect up to 6 ventilation devices to the central control unit using the attached connection scheme</p> <p>c) initiate the devices via the central control unit following the instruction</p> <p>d) after completion of the electronic installation clip the electronic protection cover and hinge the front panel</p> <p>e) the device is now ready for operation in accordance with the operating instructions</p> <p>f) further specialties should be cleared project based early enough; we kindly offer you support after a request</p>





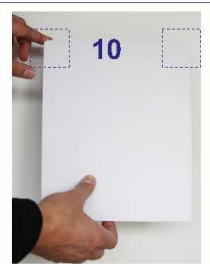

Mounting of the rough-Ring Module Set		
Mounting type LAL (concealed within the soffit)		Comments
<p>section vertical representation Solid wall + insulation system</p> <p>Adjust fan nominal length</p> <p>View from the side</p> <p>Outside</p> <p>RS-LAL</p> <p>Plaster Cover</p> <p>Slide the fan Unit</p> <p>Wall Thickness</p> <p>Installation cables Provide NYM-J 3x1.5 #</p> <p>Inside</p>		
<p>section vertical</p> <p>Outside</p> <p>Sealing Adhesive</p> <p>Plaster Cover</p> <p>Achieve 1.5 to 3° Decline via EPS Assembly Wedge sound insulated Order-No.: 9500-0030SP</p> <p>Inside</p> <p>Flat-channels in "dB-maxi-execution" are towards with >= 20 mm mineral wool to insulate the exterior wall. For plaster facades we recommend a flat Channel insulation of 30 mm.</p>		
<p>section vertical</p> <p>Outside</p> <p>Air setback flap LRSK optional LRSK-DO Dr 104 Z-1000-0111</p> <p>Install Façade Covering and Interior Housing</p> <p>Inside</p>		
<p>Ring modul-Set RS-LAL</p> <p>Flat duct holder FKH</p> <p>façade connection with integrated condensate drain</p> <p>Unit ECO COMFORT Plus</p> <p>Façade Covering FA-LAX 37</p> <p>The figure shows the ECO COMFORT Plus Mounted version LAL for concealed integration inside the soffit</p>		

- 1. Creation of the wall opening**
 - a) Opening 200 mm or square H / B 200 x 190 mm establish or prepare in shell.
 - b) prepare an empty tube or place a low voltage installation line 2x2x0,6 to the central control unit!
- 2. Making overall length with ring modules** (wall thickness incl. insulation system and Plastering)

The ring module set is for use in Wall thicknesses from 330 mm designed; **CAUTION:** reduction only on the outside!
- 3. Ring Module Set slide into the wall, adjusting it and fixing it without tension**
 - a) depending on the desired place for the interior cover (air outlet on top or bottom), the electric cable has to be installed like the pattern shows you (the standard air outlet is on top)
 - b) by adjusting the ring module sets the Wall thickness, are still present connection wall thickness the connection joints have to be sealed diffusion resistant with VX-FK
 - c) at LAVV-assembly is a slope of Rough construction-ring module sets plan at 1,5-3° decline of your telescope unit from inside to outside, for flat channel is 5 ° (degrees)
 - d) Flat duct flush on the outside Soffit level adjust; Shorten if necessary; by matching Fix flat duct holder on the outside wall
- 4. Insulate bigger opening or hollow spaces additionally with mineral wool professionally**
- 5. Framed fixing in the wall with two component polyurethane foam**
 - a) seal room-sided opening gap between wall and channel diffusion resistant and permanently elastic (Ventomaxx Installation Sealing Adhesive VX-FK)
- 6. Flat duct system within the covering insulation level**
 - a) the adjustable Soffit connection embeddable for later plaster level of Soffit corner adjusted / taping all around
 - b) Interface between flat duct, insulation flat and plaster connection with ilmod tape seal
- 7. Protecting the Ventilation Unit from Dirt**
 - a) this is the included, room-side protection cover during the construction phase to use; In addition, we recommend the use set the VX-LAL-plaster cover for the flat channel
 - b) so that the system support unit with fan during the construction phase not be damaged, should these to final assembly of a protected area is temporarily stored.
- 8. Install Façade Cover after the completion of plaster and painting works**
- 9. Install Façade Cover after the completion of plaster and painting works**
 - a) fix the room- sided housing right on the intended fixing points of the telescope unit use plaster cover RS-LAL for flat duct.
 - b) to avoid deformations on the housing tighten screws gently and uniformly
- 10. electrical connection**
 - a) Before starting work, switch off the fuse / Pull out the plug! Further steps as in Mounting Type LAW; see also the following pages

Installation instructions / electrical installation		VENTOsonic[®] <i>the sound ahead.</i>																					
Final assembly room side		Comments																					
<p>4.b</p>  <p>fig. similar</p> <p>Fan unit push in the wall</p>	<p>5</p>  <p>fig. similar</p> <p>Low-voltage connection between Fan and circuit board</p>	<p>4. Slide system unit into the wall</p> <p>a) den von der Platine kommenden Stecker (links unten am raumseitigen Plus-Gehäuse) nach unten legen um Platz für den Einschub zu schaffen</p> <p>b) Als Erstes die Ventilatoreinheit in das Rohr einschieben (bis kurz vor Rohrende)</p> <p>c) danach ggf. zugehörige Schalldämmelemente einsetzen.</p> <p>5. Lüfteranschluss</p> <p>a) Der Niedervolt-Lüfter (24V Gleichspannung) wird über eine Schnellsteckverbindung mit der Platine verbunden (sh. weißen Kreis)</p> <p>b) das von der Platine kommende Niedervolt-Rundkabel in die rechte Kabelkerbe am Gehäuse eindrücken</p> <p>c) das Gerät ist nun in den Werkeinstellungen betriebsbereit</p>																					
<p>6.a</p> 	<p>6.b</p> 	<p>6.c</p> 	<p>6. Geräte mit internem HYGRO (Option)</p> <p>Die Geräte sind nach wie vor stromlos!</p> <p>a) Die Steckverbindung für das HYGRO-Modul befindet sich links unten an der Platine</p> <p>b) Stecken Sie das Hygro-Modul auf die Platine</p> <p>c) Der Hygro-Sensor zeigt dabei in Richtung der Fühler-Öffnung im Plus-Gehäuse</p> <p>d) Stellen Sie jetzt bitte den gewünschten, Feuchte-Richtwert gemäß Tabelle links unten ein.</p>																				
<p>6.d</p>  <p>fig. similar</p> <p>Setpoints for internal HYGRO make in DIP switch</p>	<p>Abb. ähnlich</p>  <p>DIP-Switch 4-polig</p>	<p>7. HYGRO-Funktionen (Option)</p> <p>Die Wahlmöglichkeiten hierzu erfahren Sie weiter hinten unter „Programmfunktionen“</p>																					
<table border="0"> <tr> <td>OFF</td> <td>40%</td> <td>OFF</td> <td>50%</td> <td>OFF</td> <td>60%</td> <td>OFF</td> <td>70%</td> <td>OFF</td> <td>80%</td> </tr> <tr> <td>ON</td> <td>40%</td> <td>ON</td> <td>50%</td> <td>ON</td> <td>60%</td> <td>ON</td> <td>70%</td> <td>ON</td> <td>80%</td> </tr> </table>		OFF	40%	OFF	50%	OFF	60%	OFF	70%	OFF	80%	ON	40%	ON	50%	ON	60%	ON	70%	ON	80%		
OFF	40%	OFF	50%	OFF	60%	OFF	70%	OFF	80%														
ON	40%	ON	50%	ON	60%	ON	70%	ON	80%														
<p>circuit boards connections</p> <p>L1</p> <p>N</p> <p>potential-free contact</p>		 <p>flat ribbon connection membrane keyboard</p> <p>setting Hygro-desired values</p> <p>PWM</p>																					

Assembly instructions / electrical installation		VENTOsonic[®] the sound ahead.
Final assembly room side		Comments
 <p>Press the unlocking device here</p>	 <p>Set the screwdriver here</p>	<p>Preparation of the room sided housing</p> <ul style="list-style-type: none"> a) Press the unlocking device at the housing and lift the front design cover b) Remove the inserted isolation c) Set the screw driver like shown in the illustration and snap the electronic cover with soft pressure
 <p>1</p> <p>connecting cable NYM-J 3.15</p> <p>Wall telescope unit and Grid connection are prepared</p>		<p>1. Disconnect the power supply from current</p> <ul style="list-style-type: none"> a) reduce connection cable for Landline connection and wire stripping; it is only the phase and the Neutral needed b) case of mains plug version unit is not in the Plug Power outlet
 <p>2</p> <p>fig. similar</p> <p>2.a</p> <p>2.b</p> <p>clamping range for cable connections</p> <p>unlocking housing cover</p> <p>Screws 3.9 x 13-16</p> <p>Design-Casing at the Wall / screw it to the RS</p>		<p>2. Mounting of the room-sided housing</p> <ul style="list-style-type: none"> a) pull the low voltage line through the opening of the device on the backside. b) connect the housing and telescope unit by fastening the screws at the intended fixing points.
 <p>3</p> <p>fig. similar</p> <p>3.a</p> <p>Clamp the voltage connection</p> <p>Connector internally. Hygro-Sensor</p> <p>Potential free contact In terminal block 2-pole, green</p>		<p>3. Electrical connection</p> <p>The unit has an international Wide range input</p> <p>U: 90 - 260 V Kabelanschluss: f: 50 / 60 Hz A: 0,75 - 1,6 mm²</p> <ul style="list-style-type: none"> a) The connection of the fan is controlled by the green terminal block with N and L1 b) alternatively, the unit is already be provided with plug-in connector from factory <p>The power supply of the device via a Ring line provided with its own fuse.</p>

<p style="text-align: center;">Assembly instructions</p>	<p style="text-align: center;">VENTOsonic[®] <i>the sound.ahead .</i></p>
<p style="text-align: center;">Final assembly room side</p>	<p style="text-align: center;">Comments</p>
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Close electric cover</p> </div> <div style="text-align: center;">  </div> </div>	<p>7. Close the cover of electrical devices Hook the cover on the housing bottom and the separation pad press until he noticeably snaps</p>
<div style="text-align: center;">  <p>Put in the Filter</p> </div>	<p>8 - 11 Put in the Filter a) Slide the filter frame at the top of the two filter connections (fig. 8a) b) Then filter frame by pressing Clip the latching hook successively below (fig. 9)</p> <p>The filter change is done in reverse Order on the unlocking of the two clips and removal of the Filter frame at the central fastening.</p>
<div style="text-align: center;">  <p>Filter in both latching hooks left lock / right</p> </div>	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Hang the unit cover and click tight</p> </div> <div style="text-align: center;">  </div> </div>	<p>10. Place the room-side housing cover a) Hook the cover in the area of the roll and snap on the opposite side on the housing</p> <p>The ventilation devices can now as to described the following page, in Operation are taken</p> <p>For this purpose, units with fixed mains connection, through switch the fuse on and get electrical power</p> <p>Units with power plug can now in the Power outlet be plugged</p>

ECO COMFORT Plus

• Operating Guidelines

General Operating Instructions / Warranty

The ECO COMFORT Plus you have a high-quality energy-efficient ventilation unit decided which was designed for continuous operation. In the event that you ever want to take the warranty service, please contact with the dealer, from whom you purchased the product. Please read the instructions carefully before order to exclude that the error was not caused by incorrect adjustment or operation.

All Ventomaxx products are subject to the implied warranty of **two years**. It contains material and production defects. The warranty starts with the date on which the product was purchased respectively installed. You have to submit the evidence for the purchase or the installation. For this we ask you for a voucher a receipt where the dates can be found in. Ventomaxx reserves the right to reject the warranty if the evidence for the purchase and/or installation is not provided.

In the case of a justified warranty defect, which is due to a lack of materials or faulty manufacturing, Ventomaxx will either repair the product, Replace defective parts or replace the product.

The warranty is excluded for the following cases if:

- the assembly and operating guidelines have been ignored
- the assembly/ installation was carried out wrong
- the device was improper handled/ willfully or deliberately damaged or destroyed
- intervention(s) on the device were not carried out by expert staff
- components are affected that are exposed to normal, foreseeable stress
- No original spare parts are used

Caution

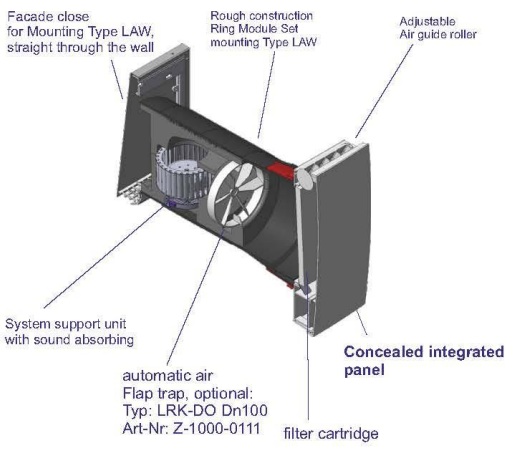

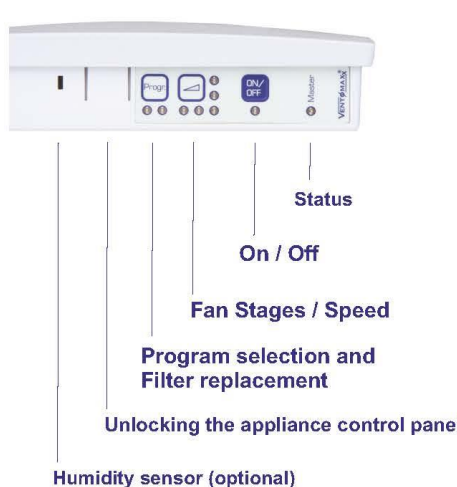
Do not remove the cover of the electrical part yourself in order to avoid a the risk of an electric shock. There are no parts behind the cover of the electrical part and the base plate that need to be maintained by the customer. Please let expert staff carry out electrical interventions.


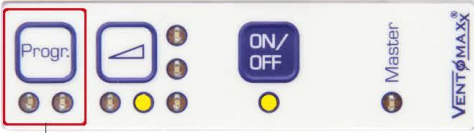



Cleaning and Care

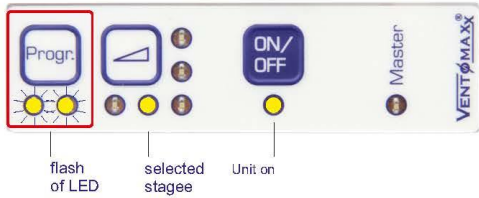
The housing towards the room side respectively the room- sided cover is easiest to clean with a humid cloth. In order to avoid damages of the surface only use water and a little detergent. Always make sure that no water can ingress.



Filter Exchange

In order to guarantee a consistent quality of fresh air, please check the condition of the filter and the components that conduct air flow regularly. Please exchange the filter at least once a year.

User manual	
Unit Design / control panel	Comments
  	<p>The adjacent figure shows the Unit Design for mounting type LAW, straight through the wall. Operate other types of mounting this series is done the same.</p> <p>All functions in ECO COMFORT Plus can be carried out on site.</p> <p>There are three buttons for the user operation available..</p> <ul style="list-style-type: none"> - On / Off - Program selection - Choice of fan speed <p>The LEDs indicate only the current Program state and the selected Air power stage and the due date for Filter change (see also page 14 LED display)</p> <p>Initial start-up</p> <p>The unit is named after the connection to the Current network (fixed or plug) immediately ready for use..</p> <p>Always make sure that the device is operated with an open air guide roller!</p> <p>ON / OFF</p> <p>When you press the button, the station is on or off.</p> <p>The unit starts to operate of preset program function in which preselected power stage on.</p> <p>After restarting the device goes to the last active mode.</p> <p>Fan Stages</p> <p>To set the desired air flow rate There are 10 levels. the stages be by pressing the "Speed button" forwarded. The respective stage signaled by the corresponding LED. About the luminous intensity of the Speed LED two power levels are displayed.</p> <p>Program selection</p> <p>The program selection is on the page following described.</p>

User Manual	
Program functions	Comments
<p>Programm "Speed" Unit on</p>  <p>Prog. 1</p>  <p>Prog. 2</p>  <p>Prog. 3</p>  <p>Prog. 4</p>	<p>There are 4 programs to choose from</p> <p>1. permanent ventilation The ventilation unit operates continuously on the preset ventilation level (eg for ventilation concepts with sound-proof external air diffusers Series Air-Control) The left Program LED will illuminate.</p> <p>2. Moisture protection "static"(Option) Demand air (with internal hygrometer Sensor, optional). Once the preset Humidity is achieved, start of exhaust air operation on the selected fan speed until the RH is 10% lower than the preset humidity setpoint. The clamping of an external sensor (hygrometer, Thermostat, CO2 sensor, etc.) allows the Exhaust-operation on the selected by the user to the ventilation unit power level. Both program LEDs are off.</p> <p>3. Moisture protection "dynamic"(Option) How before, however, the air starts only when the pre-set humidity level within the last 10 minutes to more than 10% RH rises above the predetermined maximum value. It runs this unit 3 levels above the selected fan speed, and on when the "set humidity" to the specified user-ventilation level back. The unit will now continue at this level until the RH to about 10% below the humidity setpoint. Both program LEDs are on.</p> <p>4. pulse ventilation The EcoComfort Plus runs every 6 hours for 15 minutes for the selected fan speed The rights program LEDs are on</p>
 <p>Prog. 2</p>	<p>external control</p> <p>The clamping a external sensor on the potential free contact the circuit board allows needs-based external fan control at the preset power level. The optional internal hygro sensor is in this case automatically disabled. Both program LEDs are off.</p>

User Manual	
Status-Message	Comments
 <p>flash of LED selected stagee Unit on</p>	<p>Filter change indicator</p> <p>A filter change is required after about 4000 hours of operation. In this case, the flashing of the LEDs indicates the program impending filter changes.</p> <p>Carried out reset the filter change status directly by RESET at the Unit</p> <p>For this purpose press the program button until the flashing is extinguished.</p>
<p>Uninstall</p> <p>The uninstal of the module is performed by the specialist. On effect at the time of disposal standards and guidelines must be observed.</p>	<p>„Sleep-Modus“ LED-display</p> <p>As soon as you no more entries on the control panel makes , the LEDs after a short time off; as soon as you the described press any key, the current selected parameter reappears (LED light up again).</p> <p>When changing the mounting situations or when using optional accessories deviations are possible in the effective air power.</p>

User Manual / Unit Maintenance											
Comments											
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>1</p> <p>Press release of the housing cover; Remove the front cover</p> </div> <div style="text-align: center;">  <p>2</p> <p>Filter on the two tabs Unlock and remove</p> </div> </div>	<p>Only a clean air handling unit is a guarantee for a hygienic air exchange. Because the operating environment and device run times can differ from case to case, we recommend that you clean the filter and the system supporting unit in the first months of use once more as recommended below, to check for proper condition.</p> <p>Thus, the filter change is not overlooked, your Ventomaxx ventilation unit is equipped with a filter change indicator.</p> <p>The ventilation unit otherwise no other maintenance is required by the user.</p>										
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>3</p> <p>Put the filter in pickup device Clip the behind both tabs</p> </div> <div style="text-align: center;">  <p>4</p> <p>Hang the casing cover and lock</p> </div> </div>	<p>Filter replacement is performed as follows:</p> <ol style="list-style-type: none"> a) Remove the front cover on the unit; to middle unlocking on the housing pressures; Cover by tightening unhook (Figure 1) b) The filter frame is two retaining clips in held device housing; by pressing the tabs the filter frame can at central web without tools be removed (Figure 2) c) New filter in the reverse Sequence in the housing Insert; Front cover Hook and up to Slightly click press down. 										
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Section Mounting Type LAW</p> </div> <div style="text-align: center;">  <p>Section Mounting Type LAL</p> </div> </div> <p>When replacing the filter system supporting unit should be removed and be checked for contamination. It lends itself to it, at the same time units inside dust Suck out and wipe damp.</p>	<p>Please note that depending on the location of the object to change the filter approximately every 6-8 months may be required. An examination of the filter for possible contamination should be done regularly. Regardless of the degree of pollution filter for hygienic reasons, must be replaced at least once a year.</p>										
<p>Ventomaxx replacement filter for the ECO COMFORT Plus You can obtain under the following article number from us:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2">Replacement filter AIRstatic G3</td> </tr> <tr> <td>Article-Number</td> <td style="text-align: right;">1500-1903VX</td> </tr> <tr> <td colspan="2"> </td> </tr> <tr> <td colspan="2">Allergic-replacement filter F6</td> </tr> <tr> <td>Article-Number</td> <td style="text-align: right;">1500-1906VX</td> </tr> </table>	Replacement filter AIRstatic G3		Article-Number	1500-1903VX	 		Allergic-replacement filter F6		Article-Number	1500-1906VX	
Replacement filter AIRstatic G3											
Article-Number	1500-1903VX										
Allergic-replacement filter F6											
Article-Number	1500-1906VX										

Technical Data

Eco Comfort Plus

Series / device design	Exhaust air unit soundproofed	Eco Comfort Plus
Control		internal / on the device
Air capacity 10-stage, in ³ m /h	Performance is based on 5 steps further 5 levels can be selected as an intermediate stage	~ 15 / 30 / 45 / 55 / 70
Program function	Permanent operation at the preset ventilation stage Needs-based exhaust air in combination with optional internal hygro sensor or external switch actuator (eg. Hygro / thermostat, CO2 sensor, etc.) Needs-based exhaust air in combination with optional internal hygro sensor with auto. Priority switching with rapidly rising humidity (eg after bathing or showering) every 6 hours for 15 minutes on the selected fan speed	Permanent Ventilation <small>linke Programm-LED leuchtet</small> Moisture protection stat. <small>both Program-LEDs are off</small> Moisture protection dyn. <small>both Program-LEDs are on</small> pulse ventilation <small>right Program-LEDs illuminated</small>
Fan type		EC, radial, digital
Fan power consumption	Fan Stage 1 bis 5 (Stage max. ca. 8,5 Watt)	ca. 1 - 1,8 Watt
Supply voltage (control), at 50/60 Hz		90-260 Volt - AC
Operating voltage (Unit)		230V AC / 24V DC
electricity connection		Fixed line / ^{optional} power plug
Sound pressure level / relaxation room suitable **	Fan Stage 1 bis 5 (Stage max ca. 41 dB(A))	~ 17 - 27 dB
sound insulation (from outside noise)*** depending on device type	Norm sound level difference	48 - 60 dB, Dnew
Filter quality	F5/F6 optional	G3
Cover Room side	similar RAL 9003	ABS white
Housing Dimensions HxWxD		ca. 280x218x55 mm
Facade close	conform to the system made of stainless steel or Aluminum with condensate drain	optional, Color on choice
nominal length (with optional add-on module VLE 150)	modularly expandable shortened on site	380 mm
Weight		ca. 3-4 kg

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The right rough opening (about 185-200 mm) is a project basis (round or square) set so that this is always covered sufficiently by the selected units aperture during the final assembly. We will gladly provide you with the necessary dimensional drawings on request.

01-2015

**Surface sound pressure level L_{pf}
***measured according to EN 140-10 / EN ISO 140-2 / EN ISO 717; in accordance with test certificate IIT-Rosenheim

... the sound ahead.

www.ventomaxx-international.de

Your local contractor

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Eco Comfort Plus

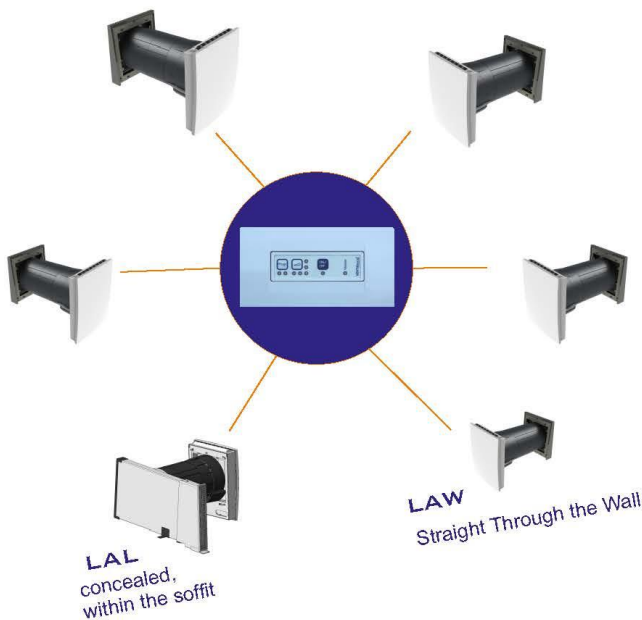


DECENTRALIZED ROOM VENTILATION

according to DIN 1946- Part 6
 measured according to DIN EN 20140-10 (former DIN 52210)
 measured according to EN ISO 717-1; test bed according to EN ISO 140-1
 tested in accordance with the principles of the building supervision's conventions
 for the sonic test beds; in agreement with NABau UA DIN 4109 Beiblatt 1 00.71.02.
 General building supervision approval No. Z-51.3-247

WITH A CENTRAL CONTROL UNIT

to control from 1 up to 6 devices



Safety Indication

Please read the following instructions carefully before the first operation of Z-WRG Plus. You will gain important information in order to operate and service your new room ventilator correctly. Ventomaxx excludes his liability, if the following references are neglected.

Z-WRG RONDO Plus ASSEMBLY INSTRUCTION OPERATING GUIDELINES

Ventomaxx® GmbH • Tappelweg 3 • 84028 Landshut • www.ventomaxx.de



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Z-WRG RONDO Plus

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- **Security Advices**



Caution!

**Save Device From Moisture and Wetness!
Always Remove the Electronic Connection Before You Open the Device!**

All persons that are involved in the assembly, installation and maintenance of the device have to be qualified appropriately. Observe these operating guidelines and the general approval from the construction supervision strictly! Missing documents will be sent to you quickly after a request.

First approve that the packaging and the single accessories are in a perfect condition. Especially have a close look on the external power cable and the power cable towards the ventilation unit. They also have to be in a perfect condition. There must not be any kinks or damages.

The ventilation device is operated with low voltage. The control unit is connected right to the grid. The control of the device must only be connected to the planned electrical voltage and frequency that fits the description on the nameplate of the device exactly.

The cables entry/entries of the UP Control must not be loaded on tension! Towards the device there has to be enough cable length. Otherwise the cable can be damaged which can lead to a fatal electric shock.

For cleaning and revision the device has to be turned off and all operations with it have to be stopped. Bigger dirt in as well as on the device must only be cleared up by a specialist. The electric circuit has to be interrupted on all poles.

The cleaning of the room sided cover must only be carried out with a wet cloth. The ingress of water or other liquids into the device must be avoided. If this happens however, immediately disconnect the power from the grid by pulling the power plug or switching off the fuse of the device. Don't reactivate the device and ensure that no unauthorized activation can happen.

Z-WRG RONDO Plus



Z-WRG RONDO Plus is constructed for the ventilation of dry interior rooms. The air outflow must not be covered by any kind of object. A warranty for other usage cannot be guaranteed. In order to avoid damages by moisture or health damages, always be aware of appropriate room ventilation. Depending on the usage of the room it might be necessary to support the ventilation effect with additional window openings (e.g. brief and intensive airing out for five to ten minutes) or the installation of an alliance of several Z-WRG Plus devices.

For the correct operation of the decentralized room ventilation system WRG Plus it is a prerequisite that the combustion air lines have a closure capability.

Besides the exchange of the filter or the cleaning of the device no further maintenance operations are necessary. Always disconnect the power from the grid or switch off the fuse of the device.

If the device does not operate correctly please consult an authorized specialist.

• Assembly / Installation Instruction

General Prerequisites

Z-WRG RONDO Plus room ventilation devices are easy to install in all common wall structures and end almost flush on the inside as well as on the outside due to a correct assembly and installation.

The system is modular, allowing the use of equipment already in the construction phase in the desired mounting design (eg LAW, straight through the wall; LAL, concealed within the soffit) can be prepared.

Das Z-WRG Konzept basiert auf einer zentralen Ansteuerung der einzelnen Stationen. Dabei wird die Zentralsteuerung fest an die Wechselstrom-Netzspannung mit 85-260V, 50 / 60 Hz angeschlossen. Die einzelnen Geräte werden mit je einer Klingelleitung (2x2 x 0,6) sternförmig mit der Zentralsteuerung verbunden. Die weiteste Entfernung zwischen Steuerung und Gerät sollte 50 Meter nicht überschreiten.

Please note:

The integration of the ventilation device into the wall requires openings in the outside wall that have to be built during the construction. The required opening has to fulfill the requirements of the upcoming figure. It has to be 200mm high and 190mm wide. This assembly and installation instruction shows the integration of a ventilation device in a monolith composition of the outside wall. Please check which kind of composition the relevant wall has. Besides, only use the clamping elements that the producer dictates.

Depending on the attributes of the wall different prescription or rules have to be observed. (e.g. for a façade that contains rockwood, etc.). Thus the installation has to be carried out by a specialized firm. If you are not sure, which craft can be considered for the assembly or which tools or auxiliary means are necessary for a professional installation, please contact Ventomaxx! Always consider the notes of the device manufacturer/ machine supplier while using them. Do not forget to wear the recommended protective clothing and equipment (e.g. a mask, eye guards, gloves, etc.)

Consider with the selection of the installation place:

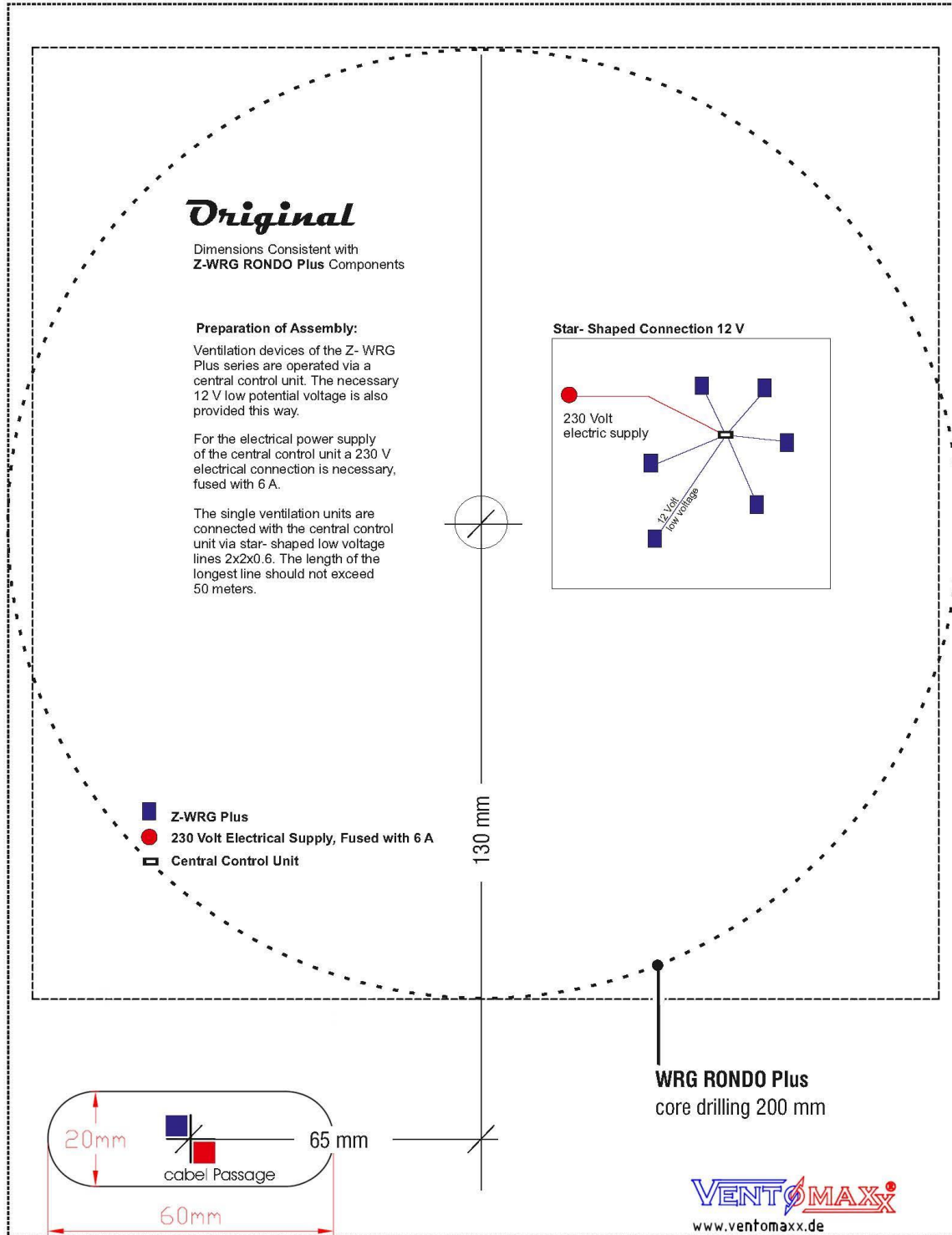
Supply lines must not take course on/behind the borehole locations;
Multishell structures: Always consider that the damaged vapour barrier is tightly sealed after the prescriptions of the manufacturer.

Weathering stressed areas: on the outside of the ventilation unit a weather protection has to be installed (Also consider the Notes to the corresponding installation types).

The ventilation device has to be positioned on the inside in a way that a revision of the device is possible at any time. The air outlet must remain free in an area of ca. 25- 30cm. It must not be blocked or impeded by furniture, etc..





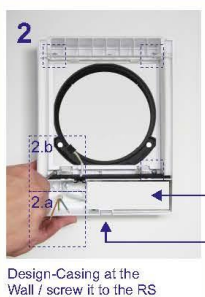
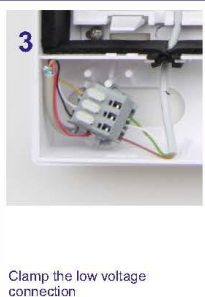
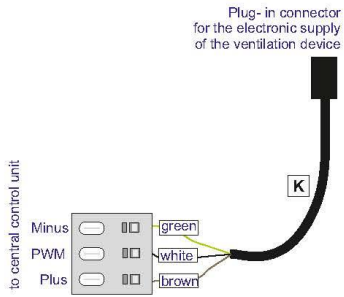
WRG RONDO Plus

PREPARATION OF THE WALL OPENING/ELECTRICAL CONNECTION



Z-WRG RONDO Plus Assembly Instruction of the rough-Ring Module Set		VENTOsonic® <i>ahead of the sound.</i>
Assembly Type LAW (straight through the wall)		Comments
<p>Cross Section Illustration of Solid Wall + Insulation System</p>	<p>1. Creation of the wall opening a) Opening 200 mm or square H / B 200 x 190 mm establish or prepare in shell b) prepare an empty tube or place a low voltage installation line 2x2x0,6 to the central control unit!</p> <p>2. Making overall length with ring modules (wall thickness incl. insulation system and Plastering) The ring module set is for use in Wall thicknesses from 300 mm designed; CAUTION: reduction only on the outside!</p> <p>3. Ring Module Set slide into the wall, adjusting it and fixing it without tension a) depending on the desired place for the interior cover (air outlet on top or bottom), the electric cable has to be installed like the pattern shows you (the standard air outlet is on top) b) by adjusting the ring module sets the Wall thickness, are still present connection wall thickness the connection joints have to be sealed diffusion resistant with VX-FK c) at LAW-assembly is a slope of Rough construction-ring module sets plan at 1,5-3° decline of your telescope unit from inside to outside</p> <p>4. Insulate bigger opening or hollow spaces additionally with mineral wool professionally</p> <p>5. Framed fixing in the wall with two component polyurethane foam VX-2K a) seal room-sided opening gap between wall and channel diffusion resistant and permanently elastic (Ventomaxx Installation Sealing Adhesive VX-FK)</p> <p>6. Protecting the Ventilation Unit from Dirt a) therefore use the included protective cover during the whole construction phase (plaster cover of RS-LAW) b) in order to avoid any kind of damage to the ventilator during the construction phase, store them in a well-protected place until the final assembly</p> <p>7. Install Façade Cover after the completion of plaster and painting works</p> <p>8. Install interior housing right before the completion of the construction phase a) fix the room- sided housing right on the intended fixing points of the telescope unit b) to avoid deformations on the housing tighten screws gently and uniformly</p> <p>9. Electronic Installation must be carried out by a professional! a) before you start working always pull the plug or switch off the flush b) connect up to 6 ventilation devices to the central control unit using the attached connection scheme c) initiate the devices via the central control unit following the instruction d) after completion of the electronic installation clip the electronic protection cover and hinge the front panel e) the device is now ready for operation in accordance with the operating instructions f) further specialties should be cleared project based early enough; we kindly offer you support after a request</p>	
<p>Outside</p>	<p>Outside</p> <p>In the lower part is an on-site seal between Rough construction ring Module Set and base plate facade cover required (eg aluminum adhesive tape; Ventomaxx sealing adhesive VX-FK); at the top of the hood and sides of a seal on the facade is necessary. Please note Mounting instructions for facade cover!</p>	<p>Inside</p>

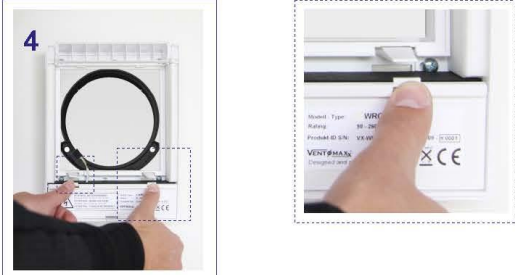

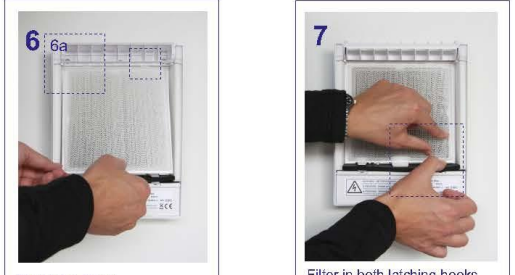
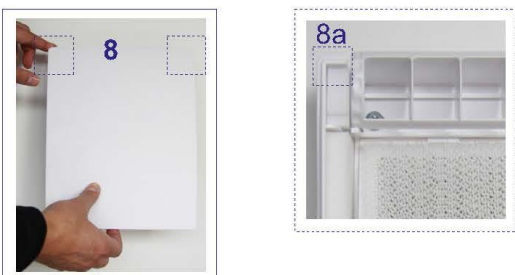
<p>Z-WRG RONDO Plus Assembly Instruction of the rough-Ring Module Set</p>	<p>VENTOsonic® <i>ahead of the sound.</i></p>
<p>Assembly Type LAL (inside the soffit)</p>	<p>Comments</p>
	<p>1. Creation of the wall opening a) Opening 200 mm or square H / B 200 x 190 mm establish or prepare in shell. b) prepare an empty tube or place a low voltage installation line 2x2x0,6 to the central control unit!</p> <p>2. Making overall length with ring modules (wall thickness incl. insulation system and Plastering) The ring module set is for use in Wall thicknesses from 330 mm designed; CAUTION: reduction only on the outside!</p> <p>3. Ring Module Set slide into the wall, adjusting it and fixing it without tension a) depending on the desired place for the interior cover (air outlet on top or bottom), the electric cable has to be installed like the pattern shows you (the standard air outlet is on top) b) by adjusting the ring module sets the Wall thickness, are still present connection wall thickness the connection joints have to be sealed diffusion resistant with VX-FK c) at LAW-assembly is a slope of Rough construction-ring module sets plan at 1,5-3° decline of your telescope unit from inside to outside, for flat channel is 5° (degrees) d) Flat duct flush on the outside Soffit level adjust; Shorten if necessary; by matching Fix flat duct holder on the outside wall</p>
	<p>4. Insulate bigger opening or hollow spaces additionally with mineral wool professionally</p> <p>5. Framed fixing in the wall with two component polyurethane foam a) seal room-sided opening gap between wall and channel diffusion resistant and permanently elastic (Ventomaxx Installation Sealing Adhesive VX-FK)</p>
	<p>6. Flat duct system within the covering insulation level a) the adjustable Soffit connection embeddable for later plaster level of Soffit corner adjusted / taping all around b) Interface between flat duct, insulation flat and plaster connection with illmod tape seal</p> <p>7. Protecting the Ventilation Unit from Dirt a) this is the included, room-side protection cover during the construction phase to use; In addition, we recommend the use set the VX-LAL-plaster cover for the flat channel</p>
	<p>b) so that the system support unit with fan during the construction phase not be damaged, should these to final assembly of a protected area is temporarily stored.</p> <p>8. Install Façade Cover after the completion of plaster and painting works</p> <p>9. Install Façade Cover after the completion of plaster and painting works a) fix the room- sided housing right on the intended fixing points of the telescope unit use plaster cover RS-LAL for flat duct. b) to avoid deformations on the housing tighten screws gently and uniformly</p> <p>10. electrical connection a) Before starting work, switch off the fuse / Pull out the plug! Further steps as in Mounting Type LAW; see also the following pages</p>

<p>Z-WRG RONDO Plus Assembly instructions / electrical installation</p>	<p>VENTOsonic® <i>ahead of the sound.</i></p>
<p>Final assembly room side</p>	<p>Comments </p>
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Press the unlocking device here</p> </div> <div style="text-align: center;">  <p>Set the screwdriver here</p> </div> </div>	<p>Preparation of the room sided housing</p> <ol style="list-style-type: none"> Press the unlocking device at the housing and lift the front design cover Remove the inserted isolation Set the screw driver like shown in the illustration and snap the electronic cover with soft pressure
<div style="display: flex;"> <div style="flex: 1;"> <p>1</p>  <p>1.a</p> <p>connecting cable Low voltage 2x2x0.6</p> <p>Wall telescope unit and Grid connection are prepared</p> </div> <div style="flex: 1; padding-left: 20px;"> <p>1. Low voltage line at the ventilation unit</p> <ol style="list-style-type: none"> Shorten the low voltage power cable 2x2x0.6 to ca. 15cm and strip it. Only three cable are needed. <p>2. Montage of the room-sided housing</p> <ol style="list-style-type: none"> pull the low voltage line through the opening of the device on the backside. connect the housing and telescope unit by fastening the screws at the intended fixing points. </div> </div>	
<div style="display: flex;"> <div style="flex: 1;"> <p>2</p>  <p>2.a</p> <p>2.b</p> <p>Design-Casing at the Wall / screw it to the RS</p> </div> <div style="flex: 1; padding-left: 20px;"> <p>damping range for cable connections</p> <p>unlocking housing cover</p> </div> </div>	
<div style="display: flex;"> <div style="flex: 1;"> <p>3</p>  <p>Clamp the low voltage connection</p> </div> <div style="flex: 1; padding-left: 20px;"> <p>Plug-in connector for the electronic supply of the ventilation device</p>  <p>to central control unit</p> <p>Minus green</p> <p>PWM white</p> <p>Plus brown</p> </div> </div>	<p>3. Low-voltage connection of the station</p> <ol style="list-style-type: none"> The cable plug "K" with the terminal block is now with the pre-installed Low-voltage line (which to the central control leads) to connect according to the wiring diagram the laying on of wires is by short Pressing down the white plug connection enables


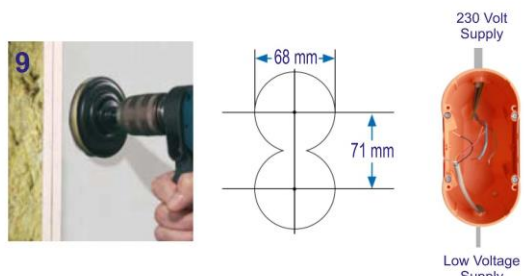

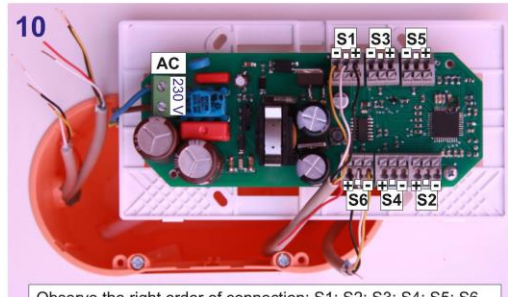
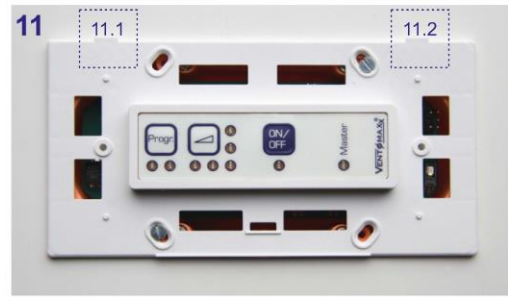


Z-WRG RONDO Plus
Assembly instructions

VENTOsonic[®]
ahead of the sound.

Page 8

Final assembly room side	Comments
 <p>4</p> <p>Close electric cover</p>	<p>4. close the cover of electrical devices Hook the cover on the housing bottom and the separation pad press until he noticeably snaps</p>
 <p>5.b</p> <p>Slide Heat exchanger in the housing</p> <p>5.c</p> <p>Slide fan unit in the housing</p>	<p>5) Slide support system in the wall</p> <p>a) the plug coming from the control (bottom left of the room-side plus housing) put down to make room for the insertion</p> <p>b) First, the ceramic heat exchanger Slide in the tube (just before the pipe end)</p> <p>c) then the fan unit until it stops Slide the heat exchanger; The fan screen shows the room's side</p> <p>d) The low voltage fan (12V DC) is a quick plug connection the low voltage line with the Central control connected (Fig. 3)</p> <p>It may be useful to the process 3a to 3d to execute only in the context of the final assembly. The devices remain disconnected</p>
 <p>6</p> <p>Put in the Filter</p> <p>7</p> <p>Filter in both latching hooks left lock / right</p>	<p>6. / 7. Put in the Filter</p> <p>a) Slide the filter frame at the top of the two filter connections (Abb. 6a)</p> <p>b) Then filter frame by pressing Clip the latching hook successively below (Abb. 7)</p> <p>The filter change is done in reverse Order on the unlocking of the two clips and removal of the Filter frame at the central fastening.</p>
 <p>8</p> <p>Hang the unit cover and click tight</p> <p>8a</p>	<p>8. Place the room-side housing cover</p> <p>a) Hook the cover in the area of the roll and snap on the opposite side on the housing.</p>

Assembly instruction- Z-WRG Plus - End/Assembly Room- Side

<p>Z-WRG RONDO Plus Assembly instructions</p>	<p>VENTOsonic[®] <i>ahead of the sound.</i></p>
<p>Electrical installation of central control</p>	<p>Comments </p>
<p>9</p> 	<div style="border: 1px solid black; padding: 5px;">  <p>ATTENTION MAINS VOLTAGE! Installation has to be carried out by expert staff</p> </div> <p>9. Installation of the central control unit in gypsum plasterboards or flush mounted</p> <ol style="list-style-type: none"> create a wall opening in the drywall or masonry (ca. 75mm deep) you can choose whether to montage the central control unit horizontally or vertically If you fix it vertically we recommend you to supply the 230 V cable from above If you choose the horizontal montage it may be advantageous to supply it from the left side.
<p>10</p>  <p>Observe the right order of connection: S1; S2; S3; S4; S5; S6</p>	<p>10. Electrical Connections</p> <ol style="list-style-type: none"> first approve that your connections or connections spots are switched to zero potential apply 230 V alternating current (AC) to the feeder clamp AC apply station 1 to 6 to the low voltage feeder clamps, hereby always observe the right polarity in reference to the connector cable K in the station: <ul style="list-style-type: none"> <input checked="" type="checkbox"/> leads to connector cable „brown“ <input type="checkbox"/> leads to connector cable „weiß“ <input type="checkbox"/> leads to connector cable „green“
<p>11</p> 	<p>11. Screwing the base plate</p> <ol style="list-style-type: none"> during the inserting of the base plate with the circuit board, ensure that no damages arise. before the screws are tightened the base plate can still be moved within the slotted holes. Afterwards tighten screws moderately. <p>12. Clipping the frame trim</p> <ol style="list-style-type: none"> Hang up the frame trim of the central control unit into the hooks on the base plate and let it snap into place using soft pressure Use a screw driver to remove the frame trim (Fig. 12.1).
<p>12</p> 	 <p>12.1</p> <p>The ventilation devices can now be put into operation. The upcoming page gives an instruction how to do it</p> <p>Devices with a mains connection can now be supplied with power via switching on the flush</p> <p>Devices with power plug can now be plugged into the outlet.</p>

Z-WRG RONDO Plus

• Operating Guidelines

General Operating Instructions / Warranty

With the purchase of the Z- WRG Plus you decided to buy a particularly high- quality product that is designed for permanent operation. In case you have to make use of the warranty service, please contact the firm you bought the device from.

Previously read the operating guidelines carefully. That way you can exclude that the mistake did not arise from incorrect setting or handling.

All Ventomaxx products are subject to the implied warranty of two years. It contains material and production defects. The warranty starts with the date on which the product was purchased respectively installed. You have to submit the evidence for the purchase or the installation. For this we ask you for a voucher a receipt where the dates can be found in. Ventomaxx reserves the right to reject the warranty if the evidence for the purchase and/or installation is not provided.

In case of a justified defect covered by the warranty, that is due to a material defect or faulty production, Ventomaxx will either repair the product or replace defective components respectively the whole product.

The warranty is excluded for the following cases if:

- the assembly and operating guidelines have been ignored
- the assembly/ installation was carried out wrong
- the device was improper handled/ willfully or deliberately damaged or destroyed
- intervention(s) on the device were not carried out by expert staff
- components are affected that are exposed to normal, foreseeable stress
- No original spare parts are used

Caution

Do not remove the cover of the electrical part yourself in order to avoid a the risk of an electric shock. There are no parts behind the cover of the electrical part and the base plate that need to be maintained by the customer. Please let expert staff carry out electrical interventions.

„Winter Operation Mode“ / Increased Frost Protection

During "winter operation mode" with high moisture and/or low temperatures outside the system carrier unit can be turned around by 180° in order to make the ventilator show to the room side. Of course, this position can be kept in summer, but the advantage of the "standard summer operation constitutes in a lower noise level. Thus it is up to the user to run the device in "winter operation" or "summer operation".

All WRG Plus devices are frost- resistant up to -20°C because of the cyclic air intake and exhaust. In contrast to conventional cross- flow or counterflow heat exchangers that have to start with defrosting operations already at 0°C, ZWRG Plus devices always ensure a maximal heat recovery efficiency in the program mode " Permanent Operation".




Cleaning and Care


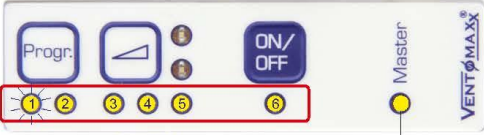
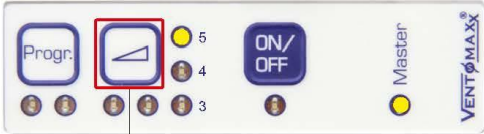
The housing towards the room side respectively the room- sided cover is easiest to clean with a humid cloth. In order to avoid damages of the surface only use water and a little detergent. Always make sure that no water can ingress.

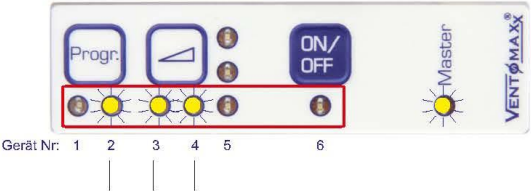
Filter Exchange






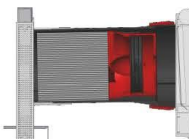
In order to guarantee a consistent quality of fresh air, please check the condition of the filter and the components that conduct air flow regularly. Please exchange the filter at least once a year.

<p>Z-WRG RONDO Plus Operational Guidelines</p>	<p>VENTOsonic[®] ahead of the sound.</p>
<p>Design of the Device / Control Panel</p>	<p>Comments</p>
<div> </div> <div> <p>Central Control Unit ZS-Plus</p> </div>	<p>The illustration on the left side shows the design of the device in montage type LAW-straight through the wall. The operation of other montage types of this series is identical.</p> <p>Startup / Initial Commissioning All connected devices are ready to use in respect to the predefined factory setting right after switching them on.</p> <p>Firmware to ZS-Plus: You ordered your central control unit with one of the following program functions that have an influence on the described functions of the device. Please check before via your receipt which kind is installed at your place!</p> <p>ZS-Plus Vers. 2.01 (Standard) Is equal to the following description.</p> <p>ZS-Plus Vers. 12.01 (permanent ON) Is equal to the following description without the function of the ON/OFF button.</p> <p>Operation via central control unit ZS-Plus</p> <p>All Z- WRG ventilation devices are controlled via the central control unit. At the same time the operating states are displayed at the LEDs of the central control unit ZS- Plus. Three buttons are available for the operation by the user:</p> <ul style="list-style-type: none"> - <u>ON / OFF function</u> - <u>Program selector</u> - <u>Selection of the ventilation stage</u> <p>The LEDs show the current program state as well as the preselected power stage and the operation state. Other functions can be set using the configuration mode.</p> <p>ON / OFF Switching ON/OFF of all devices. For the user's information the active devices are displayed during switching on.</p> <p>Ventilation Stages The user can choose between five different power stages. The stages are selected by frequently pressing the "speed button" as often as the user needs to select the right stage. The selected stage can be reviewed watching the associated LED.</p> <p>Program Selection The program selection is described on the following page.</p>

<p>Z-WRG RONDO Plus Operational Guidelines</p>	<p>VENTOsonic® <i>ahead of the sound.</i></p>
<p>Operation Mode</p>	<p>Comments</p>
 <p>Station 1-6</p>	<p>By pressing the ON/ OFF button for a short time you switch on the device.</p> <p>During switching on the active stations are shown briefly (2 sec.) via the corresponding LED.</p> <ul style="list-style-type: none"> -LED off device not connected/existing -LED on device connected and active -LED weak station connected but inactive
<p>ATTENTION During the winter months always has to work in permanent operation!</p>  <p>Prog. 1 Ventilation Stage 2 „Speed Display“</p> <p>Prog. 2</p> <p>Prog. 3</p> <p>Prog. 4</p>	<p>4 different programs are available:</p> <p>1. Moisture Supervision Via the integrated humidity sensor of the ZS- Plus device there is a permanent supervision of the interior humidity. If the relative humidity exceeds the level of 55% at the humidity sensor all active ventilation devices are put into operation on the preselected ventilation stage (between 1 and 5). The cyclic ventilation operates until the relative interior humidity of ~ 50% is reached (stage 1). <u>Both LEDs are off.</u></p> <p>2. Permanent Ventilation The ventilation devices are operated cyclic on the preselected ventilation stage. Even active devices are driven in differential mode. This way the interior air pressure stays neutral. <u>The left LED shines.</u></p> <p>3. Rush Ventilation The standard program runs for 15 min, afterwards the devices of one group take a 105min break. After 2 hours the cycle restarts again. <u>The right LED shines.</u></p> <p>4. Cross/ Transverse Ventilation In this program mode all devices of one group run permanently without changing between exhausting and supplying air. One half of the group supplies air, the other one exhausts air. <u>Both LED shine.</u></p>
 <p>Press > 7 sek = Change Into Configuration Mode</p> <p>Display of the Configuration Mode</p>	<p>Additional functions concerning the operation of your Z- WRG Plus ventilator can be preset in the configuration mode.</p> <p>A cycle is defined as a 70 seconds lasting recurring predefined change of air supply and air exhaust in one device.</p> <p>Possible configurations can be gathered from the following descriptions.</p>

<p>Z-WRG RONDO Plus Operational Guidelines</p>	<p>VENTOsonic® ahead of the sound.</p>
<p>Configuration Mode</p>	<p>Comments</p>
 <p>Press ON/ OFF Button > 7 sec. = Change into configuration mode</p>	<p>To get to the configuration mode, please press the ON button for about 7 sec.; as soon as you release the button you are in the configuration mode. This can also be observed by the shining Master- LED.</p> <p>You get back to the operation mode automatically about 10 sec. after you pressed the last button. The settings that were made before are saved automatically this way.</p>
<p>Im Konfigurationsmodus dienen die unteren 6 LED's (roter Rahmen) zur Darstellung der 6 Stationen.</p> <p>Beim Einschalten werden kurz die Stationen und ihr Zustand angezeigt.</p>  <p>Station 1-6</p> <p>Shining Master LED gives illustrates active configuration mode</p>	<p>Setting devices active / inactive</p> <p>The ventilation devices are shown via LED: - LED off device not connected/existing - LED on device connected and active - LED weak station connected but inactive</p> <p>By pressing the Progr. Button for a short time in the configuration mode you can switch to the next ventilation device. The associated device LED is flashing; only LEDs of connected ventilation devices are shining.</p> <p>By pressing the ON/ OFF button for a short term you can switch the selected device on/ off. An active device is available for ventilation; a passive device does not take part in the ventilation.</p> <p>You get back to the operation mode automatically about 10 sec. after you pressed the last button. The settings that were made before are saved automatically this way.</p>
 <p>Rolling breaks are active during operation with an odd number of active devices. In order to avoid overpressure or negative pressure another ventilation device stops after each cycle.</p> <p>Speed LED No. 5 is off.</p> <p>By pressing the speed button for about 1 sec. the mode can be deactivated. Then odd numbered devices operate without rolling breaks.</p> <p>A deactivation is evidenced by the shining LED Nr. 5.</p> <p>Prerequisite for the deactivation of a device is the connection of all ventilation devices in uninterrupted order to the ZS-Plus control unit. Please note all safety precautions concerning the operation of the system made in the building supervision's approval.</p>	<p>Activate/ Deactivate rolling breaks if your operating the system with an odd number of ventilation devices.</p> <p>Selection of the configuration mode like described before.</p> <p>By pressing the "Speed Button" for about 1sec. the mode of rolling breaks can be activated or deactivated.</p> <p>The setting is displayed via the Speed LED Nr. 5</p> <ul style="list-style-type: none"> - Speed LED Nr. 5 is off during standard mode (rolling breaks are active if odd number of ventilation devices present) - Speed LED Nr. 5 is shining (Rolling breaks are inactive if odd number of ventilation devices present) <p>You get back to the operation mode automatically about 10 sec. after you pressed the last button. The settings that were made before are saved automatically this way.</p>

<p>Z-WRG RONDO Plus Operational Guidelines</p>	<p>VENTOsonic® <i>ahead of the sound.</i></p>
<p>Status Reports</p>	<p>Comments</p>
 <p>Gerät Nr: 1 2 3 4 5 6</p> <p>Here, a filter exchange is necessary for device 2, 3 and 4</p> <p>Attention: Settings via the configuration mode can only be made after a filter exchange and the corresponding resetting of the filter exchange display!</p>	<p>Filter Exchange Display: After 4000 operating hours a filter exchange is shown by a flashing MASTER-LED.</p> <p>The MASTER_LED is flashing every 5 seconds and displays for a time period of 1.5 seconds the numbers of the ventilation devices (via LED) where the filter has to be exchanged.</p> <p>Now exchange the filter of the affected devices.</p> <p>Afterwards reset the filter exchange display as follows.</p> <p>Press the ON/OFF button for about 20 sec. until MASTER-LED is flashing; afterwards release the ON/OFF button.</p> <p>After 10 sec. the Master-LED is shining; please hold on pressing the Button, until the Master-LED ist flashing.</p> <p>The reset of the filter exchange display was carried out successfully for the concerned devices.</p>
	<p>With a change of the installation place or the application of optional accessory parts it might come to deviations in the effective air performance.</p>

<p>Z-WRG RONDO Plus Operational Guidelines / Cleaning and Care</p>	<p>VENTOsonic[®] <i>ahead of the sound.</i></p>
<p>Comments</p>	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>1</p> <p>Press the release of the housing cover; remove the front cover</p> </div> <div style="text-align: center;">  <p>2</p> <p>Unlock the filter on both straps and remove it.</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">  <p>3</p> <p>Insert the filter into the adaptor; clips it behind the two straps</p> </div> <div style="text-align: center;">  <p>4</p> <p>Hang in the housing cover and snap it in</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">  <p>Sectional type LAW</p> </div> <div style="text-align: center;">  <p>Sectional type LAL</p> </div> </div> <p style="font-size: small; margin-top: 10px;">During the filter exchange the system carrier unit should be removed and inspected for soiling. It is recommended to clean the heat exchanger from time to time with running water or to put it into the dishwasher</p> <p style="margin-top: 20px;">Ventomaxx-replacement filter Z-WRG RONDO Plus Ventilation unit can be ordered from Ventomaxx indicating the article number:</p> <p>Replacement Filter Article Number: 1500-1903VX</p> <p>Replacement Filter F6 for allergy sufferers Article Number: 1500-1906VX</p>	<p>Only a clean ventilation device is able to guarantee a hygienic fresh air supply. Because the operating environment and the device runtimes can differ occasionally, we recommend inspecting the filter and the system carrier unit for proper condition once more than described in the following during the first months of operation. If necessary the ceramic heat exchanger can be cleaned in the dishwasher. Filters are hygiene products and need to be changed if their soiled or dirty. In order to admonish you to exchange the filter, your Z-WRG Plus device is equipped with a filter exchange display (s. p. 14).</p> <p>On the ventilation device there are no maintenance works to do.</p> <p>The filter exchange is carried out as follows:</p> <p>a) remove the front cover of the device; for this press the unlocking in the middle and unhook the cover via light upward movement (fig. 1).</p> <p>b) the filter frame is held by two snaps in the housing of the device ; by pressing the straps it is possible to remove the filter frame without needing a tool (fig. 2).</p> <p>c) Insert the new filter in reverse order into the housing; hang in the front cover again and make it snap in using soft pressure.</p> <p>Please keep in mind that depending of the place of the ventilation device it might be necessary to exchange the filter every 6 to 8 months. An inspection of the filter on dirt or soil thus should be carried out regularly. Independent from the degree of dirt the filters need to be exchanged for hygienic reasons at least once a year.</p>

Z-WRG RONDO Plus

This is the newest generation
communicative Ventilation Equipment
with heat recovery.

RONDO with Z-WRG Plus
realize you requires based
Solutions with the highest comfort.

Please contact us on your
Needs to!

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84028 Landshut
info@ventomaxx.de
www.ventomaxx.de



2_0_EN_Z_WRG_RONDO_Plus_MA_BA_1.0_01 2015

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END OF SECTION 23 82 23

PART 26 - DIVISION 25 - INTEGRATED AUTOMATION

25 00 00 - INTEGRATED AUTOMATION

The automation and monitoring system for the nexushaus focuses primarily on monitoring different parameters of the home and educating and informing the user how to save energy and live more sustainably. NexSmart, or the backbone of the system, is the primary home comfort automation system which controls thermal comfort, security, and monitor various aspects of the home. The second system, eGauge, will be used for monitoring electric consumption and production and will send this data to the NexSmart system. The third component, the weather station, will collect climate data and send it to the NexSmart system. These collected data will allow the user to make educated decisions about their home (turn off the HVAC and open the windows, turn off the lights in the bathroom); the system will also perform automated various functions, such as controlling the HVAC system or lighting to save energy or redirecting energy flow to different parts of the home.

All of this information will be architecturally articulated through a SenseBar, which is a plastic casing inset into the wall which contains the various components of the NexSmart System.

END OF SECTION 25 00 00

25 10 00 - INTEGRATED AUTOMATION NETWORK EQUIPMENT

PART 1- GENERAL

1.01 SUMMARY

A. This section includes description of the equipment and hardware compatible with the automation systems explained in section 25 00 00.

1.02 DESCRIPTION

The NexSmart system is based around a Beagle Bone Black. In this microcontroller we will control all the sensors (PIR, temperature, humidity, CO, etc.). The connections will be local via UART if they are close, or through Bluetooth 4.0. In the latter, we will create a custom Bluetooth 4.0 module that will have an optimal design to connect to any sensor and power/transfer any sensor. The system can connect to a maximum of 7 of these modules at a given time, but the Bluetooth 4.0 modules are designed to have memory storage capabilities and this data can be transferred once there is a connection with the Beagle Bone.

The server will be run with the Beagle Bone Black and being able to retrieve this data for our web based application using Node.js and MongoDB. This web application will be the primary way the user will interact with the automation system. With a web application, it will be easy to access data in a wider range of devices.

Main functions:

- Collect various information about the house using a variety of sensors
- Informs user about different options to reduce energy use
- Monitor appliances

- Data log
- Remotely monitor and control HVAC system

-Optimization of operation

-Remote security monitoring

The user interface will be viewed via a tablet, inset into the wall as a part of the SenseBar (which is the name for the vertical architectural articulation made of plastic for the NexSmart system).

B. Monitoring of the PV panels will be accomplished using the eGauge network which uses an affordable, flexible, secure, web-based electric energy and power meter that can measure up to 12 circuits on up to 3-phases (120V–480V, 50–60Hz). It will be used for monitoring electric consumption and production displayed through any web-enabled device through the built in web-browser, or through BACnet or pushed to a server using a provided XML API. The measurements are recorded in its built-in-solid-state memory and can hold up to 30 years of the most recent data; the data is updated every second and will be uploaded to the NexSmart server.

C. Climate and weather data will be collected via a solar powered personal weather station by Ambient Weather. It will collect the following information: wind speed, wind direction, solar radiation, temperature, humidity, rainfall, and UV data. This data will be fed to the NexSmart computer.

1.03 SECTION REQUIREMENTS

A. Submittals: Product Data

B. Comply with NFPA 70, "National Electrical Code."

PART 2 - GENERAL INFORMATION FOR NexSmart SYSTEM

2.01 SUMMARY

A. This section includes the following:

1. NexSmart system and components (custom system)
2. eGauge
3. Ambient Weather WS-1001-WIFI OBSERVER

2.02 SUBMITTALS

A. Submittals: Product Data

B. Comply with NFPA 70, "National Electrical Code."

PART 3 – PRODUCTS FOR NexSmart

3.01 NexSmart System

A. Main Server

1. BeagleBone Black Rev C
2. <http://beagleboard.org/BLACK>

Feature	
Processor	Sitara AM3358BZCZ100
Graphics Engine	SGX530 3D, 20M Polygons/S
SDRAM Memory	512MB DDR3L 800MHZ
Onboard Flash	4GB, 8bit Embedded MMC
PMIC	TPS65217C PMIC regulator and one additional LDO.
Debug Support	Optional Onboard 20-pin CTI JTAG, Serial Header
Power Source	miniUSB USB or DC Jack 5VDC External Via Expansion Header
PCB	3.4" x 2.1" 6 layers
Indicators	1-Power, 2-Ethernet, 4-User Controllable LEDs
HS USB 2.0 Client Port	Access to USB0, Client mode via miniUSB
HS USB 2.0 Host Port	Access to USB1, Type A Socket, 500mA LS/FS/HS
Serial Port	UART0 access via 6 pin 3.3V TTL Header. Header is populated
Ethernet	10/100, RJ45
SD/MMC Connector	microSD , 3.3V
User Input	Reset Button Boot Button Power Button
Video Out	16b HDMI, 1280x1024 (MAX) 1024x768, 1280x720, 1440x900 , 1920x1080@24Hz w/EDID Support
Audio	Via HDMI Interface, Stereo
Expansion Connectors	Power 5V, 3.3V , VDD_ADC(1.8V) 3.3V I/O on all signals McASP0, SPI1, I2C, GPIO(69 max), LCD, GPMC, MMC1, MMC2, 7 AIN(1.8V MAX), 4 Timers, 4 Serial Ports, CAN0, EHRPWM(0,2), XDMA Interrupt, Power button, Expansion Board ID (Up to 4 can be stacked)
Weight	1.4 oz (39.68 grams)
Power	Refer to Section 6.1.7



B. Microprocessor

1. TI MSP430 Launchpad

2. <http://www.ti.com/ww/en/launchpad/launchpads-msp430-msp-exp430g2.html#tabs>

Specs

Part Number MSP-EXP430G2	BoosterPack connector 20-pin
Featured Microcontroller MSP430G2553	Microcontroller Features <ul style="list-style-type: none">• 16MHz• 16KB Flash• 512B RAM• 8ch 10-bit ADC• Comparator• 2 16-bit Timers• Up to 1 I2C, 2 SPI, 1 UART
Supported Family MSP430 Value Line	Links Tool Folder eStore Page
Why this LaunchPad? <ul style="list-style-type: none">• 20 pin DIP socket for easy breadboarding/prototyping• Great general purpose LaunchPad• Low power operation is great for battery-operated applications	
Price \$9.99	

C. All-in-one Sensor Board (Temperature, Humidity, Light, and Heartrate Sensors)

1. Silicon Labs SENSOR-PUCK

2. <http://www.silabs.com/products/sensors/Pages/environmental-biometric-sensor-puck.aspx>



Sensor Puck

SENSOR PUCK USER'S GUIDE

1. Introduction

The sensor puck demonstrates Silicon Laboratories optical sensor (Si1147-M01) RH and temperature sensor (Si7021) and low power MCU (EFM32G210 "Gecko"). The data is broadcast using a Bluetooth Low Energy (BLE) module and can be displayed on a mobile device (Apple iOS or Android) that supports the BLE protocol.

By using broadcast mode, a connection does not have to be established, making it possible to display the data from several modules at the same time.

2. Evaluation Kit Description



Figure 1. Silicon Labs Sensor Puck

The evaluation kit consists of a sensor puck with a battery and the on/off switch in the off position. Install the battery if it is not installed. The + terminal of the battery faces away from the board towards the + terminal of the battery holder. Remove the pull tab separating the battery from the battery holder if needed. When the switch is turned on, the puck will automatically start taking and broadcasting data. For the puck itself, there is no installation required.

Sensor Puck

The data that is broadcast is generally displayed on a mobile device. To display the data the Silicon Labs Sensor Puck app must be installed on the mobile device. The application is available for no charge from the Apple App Store or the Google Play Store. (Search for Silicon Labs Sensor Puck.)

3. Operation

- Environmental mode
 - Measures ambient light, UV index, ambient temperature, and ambient humidity.
 - This is the default mode of operation and the lowest power.
 - In this mode of operation measurements are taken and broadcast (once per second).
 - The LED flashes green once per measurement cycle.
 - The battery current consumption in this mode is approximately 1.5 mA average, which means that a standard CR2032 battery will last about five days. The battery for this demo is not rechargeable so it must be replaced if it is depleted.
- Biometric mode
 - At the once per second interval for environmental monitoring, the puck checks for the presence of an object over the Si1147-M01 (under the acrylic cover).
 - If an object is detected the puck will go into biometric mode and attempt to measure heart rate.
 - Heart rate is measured by the reflection of IR light from an LED inside the Si1147-M01.
 - The light is reflected from a finger-tip to measure the heart rate.
 - In biometric mode the power consumption goes up to 7 mA, so battery life will decrease to about one day in this mode.
 - In biometric mode, the LED will flash red while it is acquiring the heartbeat and then switches to continuous green once the heartbeat has been acquired.
 - To avoid excessive power drain in case the puck is left on and covered with an object, the puck will exit biometric mode after 90 seconds. In this case, the object must be removed and a finger should be placed over the acrylic cover to start biometric monitoring again.
 - The data from the puck is broadcast over a BLE "advertisement" packet. The mobile device that displays the data does not need to make a connection to the puck. For this reason, it is possible that a single mobile device (i.e. a phone) can display data from multiple pucks.

Sensor Puck

5. Sensor Puck Hardware Description

5.1. Schematics

Figure 7 shows the block diagram of the puck with debug header MCU, the sensors, and the Bluetooth module.

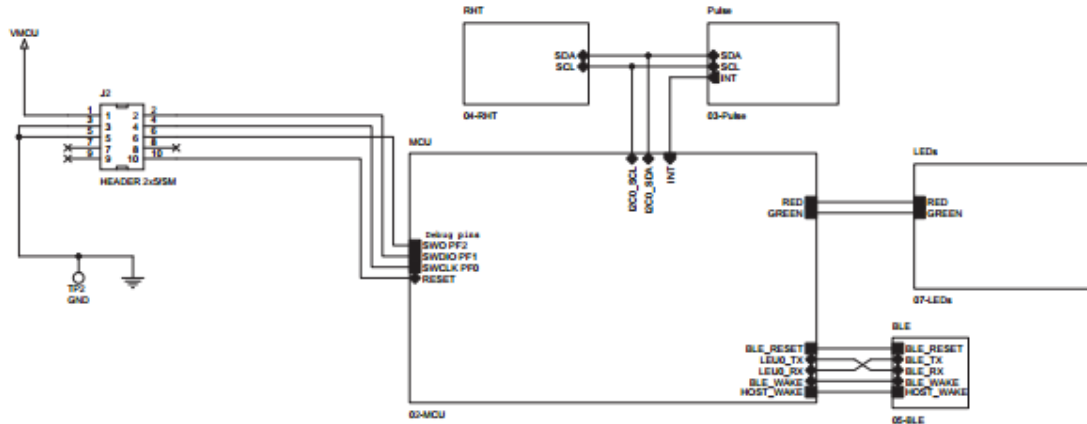


Figure 7. Block Diagram

Figure 8 shows the power section. The CR2032 battery is used to power most of the ICs. A boost converter is used to produce 4.1 V which is used to power the LED of the Si1147 so it can be driven at higher current than is possible with a coin cell battery.

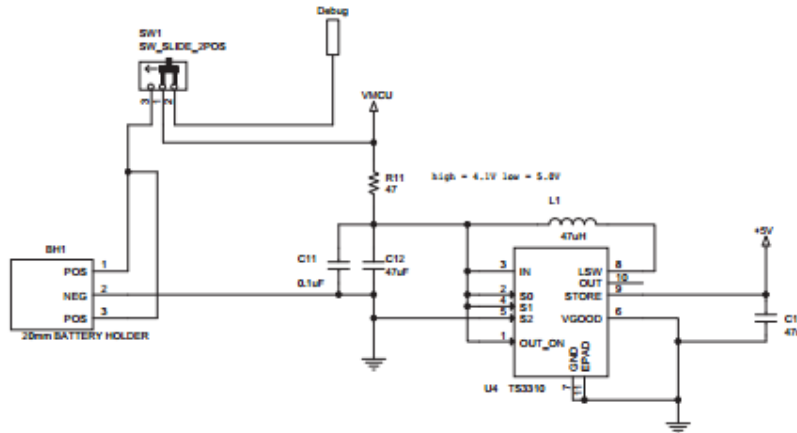


Figure 8. Power Section

Figure 9 shows the EFM32G210 “Gecko” MCU. The 24 MHz clock is only used in active periods. For lower power consumption, the internal 32 KHz R-C clock is used as much as possible. A special calibration routine is used to calibrate the 32 KHz clock against the 24 MHz crystal for accuracy in the UART communication speed while in low power mode.

Sensor Puck

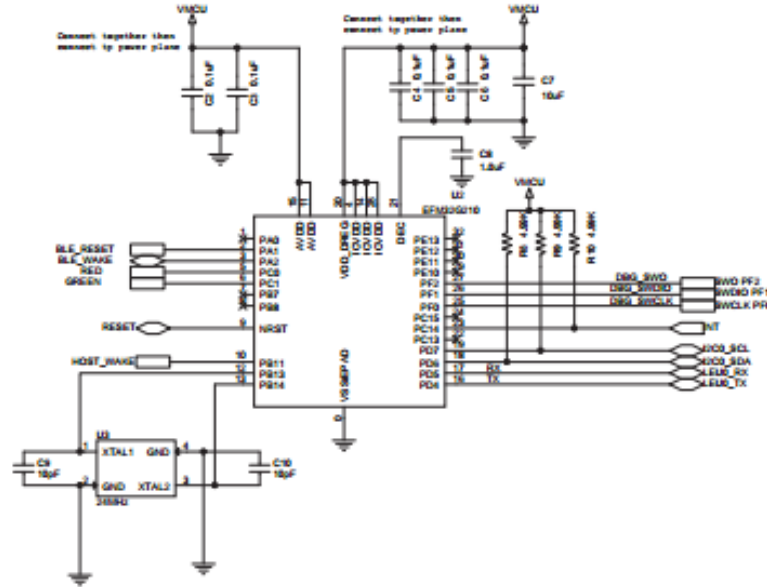


Figure 9. EFM32G210 MCU

Figure 10 shows the Si7021 RH and temperature sensor as well as the Si1147-M01 optical sensor.

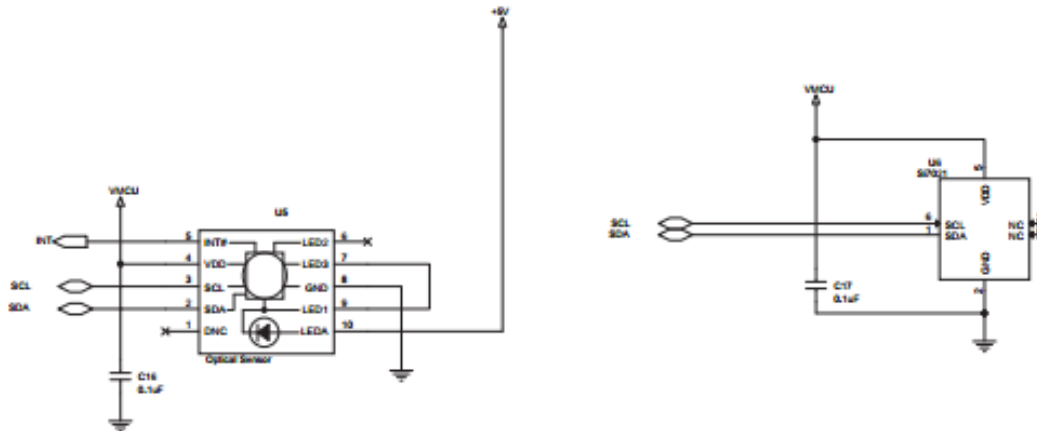


Figure 10. Sensors

Figure 11 shows the BLE module and LEDs.

Sensor Puck

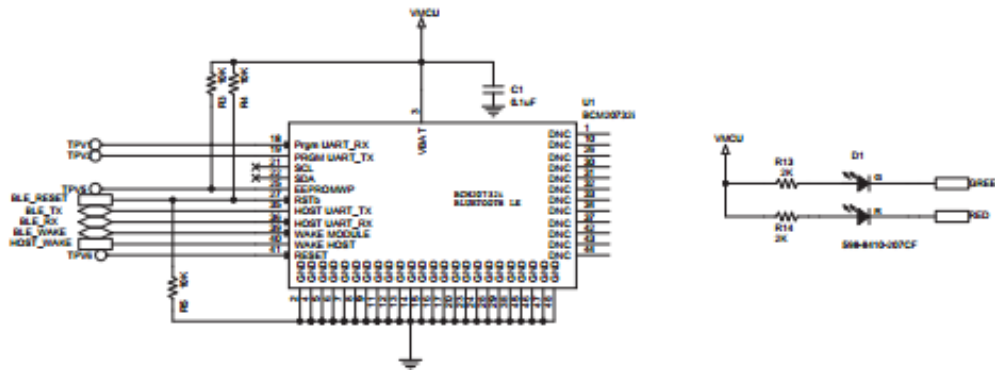


Figure 11. BLE Module and LEDs

5.2. Bill of Materials

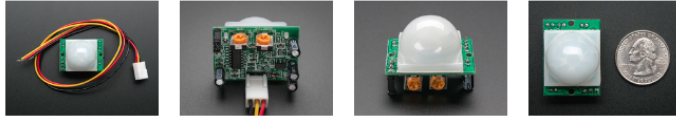
Table 1. Sensor Puck BOM

Quantity	Reference	Value	Voltage	Tol	Manufacturer Part Number	Manufacturer
1	BH1	20 mm BATTERY HOLDER			BAT-HLD-001	LINX TECHNOLOGIES INC.
1	C1	0.1 µF	16 V	±10%	C0402X7R160-104K	Venkel
8	C2,C3,C4,C5,C6,C11 , C16,C17	0.1 µF	10 V	±10%	C0402X7R100-104K	Venkel
1	C7	10 µF	6.3 V	±20%	C0603X5R6R3-106M	Venkel
1	C8	1.0 µF	6.3 V	±10%	C0402X5R6R3-105K	Venkel
2	C9,C10	10 pF	50 V	±5%	C0402C0G500-100J	Venkel
2	C12,C13	47 µF	6.3 V	±20%	C0805X5R6R3-476M	Venkel
1	D1	598-8410-207CF			598-8410-207CF	Dialight
1	J1	Header 2x5 TH			M50-3500542	Harwin
1	L1	47 µH		±20%	NR 3012T 470M	Taiyo Yuden
3	R3,R4,R5	10 K		±1%	CR0402-16W-1002F	Venkel
3	R8,R9,R10	4.99 K		±1%	CR0402-16W-4991F	Venkel

D. Occupancy Sensor

1. PIR (Motion) sensor

2. <http://www.adafruit.com/product/189>



DESCRIPTION

PIR sensors are used to detect motion from pets/humanoids from about 20 feet away (possibly works on zombies, not guaranteed). This one has an adjustable delay before firing (approx 2-4 seconds), adjustable sensitivity **and** we include a 1 foot (30 cm) cable with a socket so you can easily reposition the sensor or mount it using the two drills on either side

Runs on 5V-16V power (if you need to run it off of 3V you can do that by bypassing the regulator, but that means doing a bit of soldering). Digital signal output is 3.3V high/low. Sensing range is about 7 meters (120 degree cone)

For a full tutorial with wiring diagrams, code examples and project ideas, [PIR sensor tutorial page!](#)

TECHNICAL DETAILS

Dimensions:

- Length: 24.03mm/0.94in
- Width: 32.34mm/1.27in
- Screw hole distance: 28mm
- Screw hole diameter: 2mm
- Height (with lens): 24.66mm/0.97in
- Weight: 5.87g/0.2oz

E. Water level sensor

1. Liquid Flow Meter - Plastic 1/2" NPS Threaded

2. <https://www.adafruit.com/products/828>

TECHNICAL DETAILS



Electrical:

- Working Voltage: 5 to 18VDC
- Max current draw: 15mA @ 5V
- Working Flow Rate: 1 to 30 Liters/Minute
- Working Temperature range: -25 to 80°C
- Working Humidity Range: 35%-80% RH
- Maximum water pressure: 2.0 MPa
- Output duty cycle: 50% +-10%
- Output rise time: 0.04us
- Output fall time: 0.18us
- Flow rate pulse characteristics: Frequency (Hz) = 7.5 * Flow rate (L/min)
- Pulses per Liter: 450
- Durability: minimum 300,000 cycles

Mechanical:

- 1/2" NPS nominal pipe connections, 0.78" outer diameter, 1/2" of thread
- Size: 2.5" x 1.4" x 1.4"

E. Touchscreen interface

1. HP Stream 8

2.

<http://store.hp.com/webapp/wcs/stores/servlet/PDPStdView?catalogId=10051&urlLangId=-1&langId=-1&productId=722652&storeId=10151#!&TabName=specs>

Processor	Intel® Atom™ Z3735G Quad Core
Display	8" diagonal HD WVA IPS capacitive multitouch-enabled display (1280 x 800)
Memory	1 GB DDR3L SDRAM
Internal storage	32 GB eMMC
Wireless	4G HSPA+; 802.11b/g/n; Bluetooth® 4.0 + LE
Battery	4000 mAh Lithium polymer
Battery life	Up to 8 hours and 20 minutes
Ports	1 micro USB 2.0 charging; 1 headphone 3.5mm; 1 integrated microphone; 1 micro SIM card
Expansion slots	1 microSD
Audio	Stereo speakers
Sensors	Accelerometer; GPS; SAR
Color	Black licorice
Integrated camera	2 MP FHD 1080p front-facing webcam; 5 MP FHD 1080p rear-facing
Dimensions	8.23 x 4.88 x 0.35 in
Weight	0.9 lb
Warranty	1 Year limited warranty. 90 day limited warranty on software. Optional HP Care Packs extend your protection beyond the standard limited warrantv. Service levels and response times for HP Care

PART 3 - PRODUCTS FOR ELECTRICITY CONSUMPTION AND PRODUCTION MONITORING

3.01 General electricity consumption

A. eGauge System

1. <https://www.egauge.net/overview>

B. Solar panel power acquisition

1. M250 Microinverter
2. Model Number: M250
3. http://enphase.com/global/files/M250_DS_EN_60Hz.pdf

Enphase® M250 Microinverter // DATA

INPUT DATA (DC)		M250-60-2LL-S22/S23/S24	
Recommended input power (STC)	210 - 300 W		
Maximum input DC voltage	48 V		
Peak power tracking voltage	27 V - 39 V		
Operating range	16 V - 48 V		
Min/Max start voltage	22 V / 48 V		
Max DC short circuit current	15 A		
Max input current	10 A		
OUTPUT DATA (AC)		@208 VAC	@240 VAC
Peak output power	250 W	250 W	
Rated (continuous) output power	240 W	240 W	
Nominal output current	1.15 A (A rms at nominal duration)	1.0 A (A rms at nominal duration)	
Nominal voltage/range	208 V / 183-229 V	240 V / 211-264 V	
Nominal frequency/range	60.0 / 57-61 Hz	60.0 / 57-61 Hz	
Extended frequency range*	57-62.5 Hz	57-62.5 Hz	
Power factor	>0.95	>0.95	
Maximum units per 20 A branch circuit	24 (three phase)	16 (single phase)	
Maximum output fault current	850 mA rms for 6 cycles	850 mA rms for 6 cycles	
EFFICIENCY			
CEC weighted efficiency, 240 VAC	96.5%		
CEC weighted efficiency, 208 VAC	96.0%		
Peak inverter efficiency	96.5%		
Static MPPT efficiency (weighted, reference EN50530)	99.4 %		
Night time power consumption	65 mW max		
MECHANICAL DATA			
Ambient temperature range	-40°C to +65°C		
Operating temperature range (internal)	-40°C to +85°C		
Dimensions (WxHxD)	171 mm x 173 mm x 30 mm (without mounting bracket)		
Weight	2.0 kg		
Cooling	Natural convection - No fans		
Enclosure environmental rating	Outdoor - NEMA 6		
FEATURES			
Compatibility	Compatible with 60-cell PV modules.		
Communication	Power line		
Integrated ground	The DC circuit meets the requirements for ungrounded PV arrays in NEC 690.35. Equipment ground is provided in the Engage Cable. No additional GEC or ground is required. Ground fault protection (GFP) is integrated into the microinverter.		
Monitoring	Free lifetime monitoring via Enlighten software		
Compliance	UL1741/IEEE1547, FCC Part 15 Class B, CAN/CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01		

* Frequency ranges can be extended beyond nominal if required by the utility

To learn more about Enphase Microinverter technology, visit enphase.com



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PART 4- GENERAL INFORMATION FOR EGAUGE SYSTEM

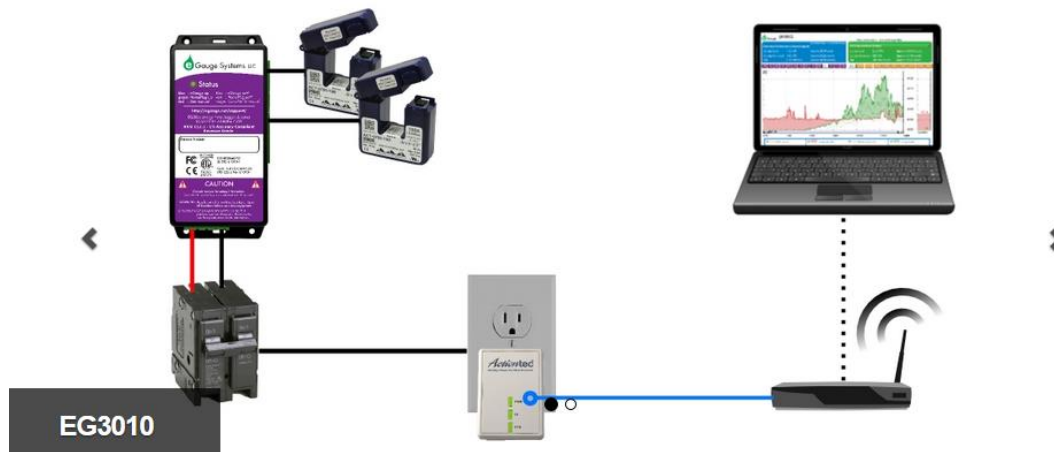


Image from <http://egauge.net/>

4.01 SUMMARY

A. This section includes the following:

1. Ethernet
2. HomePlug AV
3. Split Core CT

4.02 SUBMITTALS

A. Submittals: Product Data

B. Comply with NFPA 70, "National Electrical Code."

4.03 WARRANTY

A. Manufacturer's Product Warranty: eGauge

1. <https://www.egauge.net/policy/>

PART 5 – PRODUCTS FOR EGAUGE SYSTEM

5.01 Power-Line Communication Unit

A. eGauge Main Unit

1. Model number: EG3010
2. <https://www.egauge.net/products/EG3010/>

B. Ethernet and HomePlug AV

1. Model number: HP300
2. <https://www.egauge.net/products/EG3010/>

5.02 CT Sensors

A. Split Core CT

1. Model number: SCT-0750
2. http://egauge.net/docs/sct_0750.pdf

Technical Specifications	
General	
<i>Power usage:</i>	3W typical
<i>Warranty:</i>	2 year or 5 year
Capacity	
<i>Voltage:</i>	Three Channels 85-277 Vrms (L1) 0-277 Vrms (L2, L3)
<i>Current:</i>	12 CT channels
<i>Power:</i>	Any voltage/current combination
Environmental	
<i>Operating temperature:</i>	-30°C – 70°C (-22°F – 158°F)
<i>Max altitude:</i>	4000m (13,000ft)
<i>Max humidity:</i>	80% up to 31°C Derated to 50% at 40°C
<i>Meas. category:</i>	III (fixed installation)
<i>Location:</i>	Indoor or outdoor (with enclosure)
<i>Pollution degree:</i>	2
Enclosure	
<i>Material:</i>	Flame-retardant ABS (UL94-V0)
<i>Size:</i>	176×85×30mm ³ (7'×3.4'×1.2')
<i>Weight:</i>	220g (8oz)
Regulatory	
<i>Safety:</i>	Conforms to UL STD 61010-1 Certified to CAN/CSA STD C22.2 No. 61010-1
<i>FCC:</i>	CISPR 11 Group 1 class B FCC 47CFR part 15 class B
<i>CE:</i>	CISPR 16-1, EN55024, EN61000-4, ENV 50204

Technical Specifications	
General	
<i>Power usage:</i>	3W typical
<i>Warranty:</i>	2 year or 5 year
Capacity	
<i>Voltage:</i>	Three Channels 85-277 Vrms (L1) 0-277 Vrms (L2, L3)
<i>Current:</i>	12 CT channels
<i>Power:</i>	Any voltage/current combination
Environmental	
<i>Operating temperature:</i>	-30°C – 70°C (-22°F – 158°F)
<i>Max altitude:</i>	4000m (13,000ft)
<i>Max humidity:</i>	80% up to 31°C Derated to 50% at 40°C
<i>Meas. category:</i>	III (fixed installation)
<i>Location:</i>	Indoor or outdoor (with enclosure)
<i>Pollution degree:</i>	2
Enclosure	
<i>Material:</i>	Flame-retardant ABS (UL94-V0)
<i>Size:</i>	176×85×30mm ³ (7'×3.4'×1.2')
<i>Weight:</i>	220g (8oz)
Regulatory	
<i>Safety:</i>	Conforms to UL STD 61010-1 Certified to CAN/CSA STD C22.2 No. 61010-1
<i>FCC:</i>	CISPR 11 Group 1 class B FCC 47CFR part 15 class B
<i>CE:</i>	CISPR 16-1, EN55024, EN61000-4, ENV 50204

PART 6 – PRODUCT FOR MONITORING CLIMATE DATA

6.01 Personal Weather Station

A. Ambient Weather WIFI OBSERVER

1. Model number: WS-1001
2. <http://site.ambientweatherstore.com/Manuals/ws1000wifi.pdf>

- **Specifications:**

- Indoor Temperature Range: 32 to 140 °F
- Indoor Temperature Accuracy: ± 2 °F
- Indoor Temperature Resolution: 0.1 °F
- Outdoor Temperature Sensor Range: -40 to 149 °F
- Outdoor Temperature Rechargeable Battery Range: -23 to 140 °F
- Outdoor Temperature Accuracy: ± 2 °F
- Outdoor Temperature Resolution: 0.1 °F
- Indoor Humidity Range: 10 to 99%
- Indoor Humidity Accuracy: ± 5 %
- Indoor Humidity Resolution: 1 %
- Outdoor Humidity Range: 10 to 99%
- Outdoor Humidity Accuracy: ± 5 %
- Outdoor Humidity Resolution: 1 %
- Barometric Pressure Range: 8.85 to 32.50 inHg
- Barometric Pressure Accuracy: ± 0.08 inHg (within range of 27.13 to 32.50 inHg)
- Barometric Pressure Resolution: 0.01 inHg
- Solar Radiation (Light) Range: 0 to 400,000 Lux
- Solar Radiation Accuracy: ± 15 %
- Solar Radiation Resolution: 1 Lux
- UV Range: 0 to 15
- UV Accuracy: ± 1
- UV Resolution: 1
- Rain Range: 0 to 394 in.
- Rain Accuracy: ± 10 %
- Rain Resolution: 0.01 in
- Wind Direction Range: 0 - 360°
- Wind Direction Accuracy: ± 1 °
- Wind Direction Resolution: 1°
- Wind Speed Range: 0 to 100 mph (operational)
- Wind Speed Accuracy: ± 2.2 mph or 10% (whichever is greater)
- Wind Speed Resolution: 0.1 mph
- Wind Speed Calculation: Average wind speed in 16 second update period
- Wind Gust Calculation: Peak wind speed in 16 second update period

- **Power Specifications:**

- Base station: Input 5V DC; 6.5' 120V wall charger included, Power Consumption: 7.5 Watts
- Indoor Remote sensor : 2xAAA batteries (not included)
- Outdoor sensor array: 3xAAA alkaline rechargeable batteries (included)

- **Dimensions:**

- Display Console:
- Frame Dimensions (LxWxH): 7.75 x 5.75 x 0.75"
- LCD Dimensions (LxW): 6.25 x 3.5"
- Sensor Array, appx. (HxLxW): 14 x 12 x 6"
- Indoor thermometer-hygrometer-barometer (HxWxW): 2.5 x 3.5 x 1"

- **Other Features:**

- Includes swedged stub pole for standard pole mounting and straight snub pole for universal pole mounting
- Bubble level for accurate mounting

B. Ambient Weather Weather Station Mount

1. Model: WeatherMount

2. <http://www.ambientweather.com/amwewe.html>

Product Description

Works with all weather stations (except Rainwise, see Monomount), including the new Davis Instruments Vantage Vue.

The WeatherMount Weather Station Mount is a flexible mounting alternative to a mounting pole or tripod. The mounting plate provides a fast and easy installation, and can be mounted on a pitched surface, flat roof or vertical surface, such as a gable.

The WeatherMount is constructed from powder coated steel and includes a galvanized aluminum mast. This mounting system is strong, durable and stable. The slender design is simple, unobtrusive and aesthetically pleasing. The base can be adjusted to mount on any pitched roof. Works great with any weather station.

The small base footprint 4-3/4" W x 7" H (mounting footprint 3.75" W x 6" H) allows four 1-5/8" lag screws (included w/ Tar Pads) to be easily mounted at the apex of your gable. The mount angles 11" in the horizontal direction to allow clearance of eave or roof overhangs.

The total height of the WeatherMount and mast is approximately 50".

Order the WeatherMount2 (WEATHERMOUNT2) to increase the height of the mounting assembly to 81" (reference the "May we also suggest" section below). Or, add additional 35" masts (31" total additional height due to swedge insertion).

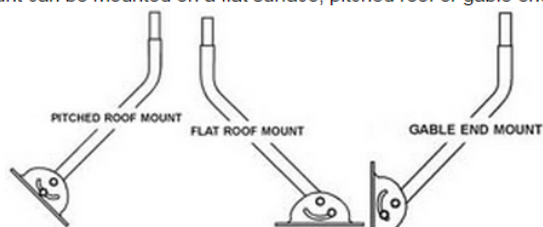
The weather station pictured is not included.

Features

- WeatherMount and mast height is approximately 50"
- Mounts to pitched surface, flat roof or vertical surface
- Small mounting plate footprint (3.75" x 6") allows for easy installation in difficult locations
- 2 x 5" x 1.5" Tar Pads
- Strong, durable and stable rust proof powder coated steel construction
- Add additional masts to extend the height 31" per mast

Mounting Options:

The WeatherMount can be mounted on a flat surface, pitched roof or gable end (vertical surface)



END OF SECTION 25 11 00

PART 27 - DIVISION 26 – ELECTRICAL

26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 –GENERAL INFORMATION

1.01SUMMARY

This section includes the following

Installation of electrical cables rated at 600V or lower (low-voltage electrical power) in accordance with NEC 2014 Article 300

Connections of electrical cables rated at 600V or lower in accordance with NEC 2014 230

1.02SUBMITALS

Complete specifications and product datasheets from manufacturer

1.03COMPLIANCE

Comply with National Electric Code (NEC 2014)

Comply with National Electrical Manufacturers Association (NEMA)

Comply with Underwriters Laboratories, Inc (UL)

Comply with National Fire Protection Association (NFPA) 70

PART 2 –PRODUCTS

2.01 CONDUCTOR AND CABLES

Conductors: Comply with NEC 2014/ NEMA WC 70; shall be annealed copper: stranded for sizes 8AWG and larger, solid for AWG 10 and smaller.

B. Insulation: Comply with NEC 2014/NEMA WC 70, UL 44 and 83

C. Colored Coded in accordance to:

Black/Red: Hot

White: Neutral

Green/Yellow: Ground

Or cables properly phased

Multi-conductor Cable: Comply with NEC 2014/NEMA WC 70

2.02 SPLICES AND CONDUCTORS

A. Comply with UL 486A, C, D, E, and National Electrical Code (NEC)

B. Circuits with AWG 10 and smaller

1. Screw-on, solderless pressure cable type, 600V rated

2. Insulator should completely cover the stripped wire

C. Circuits with AWG 8 and bigger

1. Indent, hex screw, or bolt clamp for high conductivity.

2. Corrosion resistant material to use with aluminum and copper cabling

3. Insulation greater than the joint cable's level

4. Electric Insulating tape, or WAGO connectors.

2.03 CONDUCTOR AND CABLE LUBRICANT

A. Lubricant must be appropriate to cable insulation and conduit. Should maintain its state

PART 3 –EXECUTION

3.01 INSTALATION OF CONDUCTORS AND CABLES

A. Comply with NEC

B. Install all raceway and conduit systems

C. Conceal wiring in ceilings, floors and walls

D. Use approved lubricant where needed without damaging conductor or insulation

E. Identify all conductors with colored-code

END OF SECTION 26 05 19

26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL INFORMATION

1.01 SUMMARY

A. This section includes the following

a. Requirements for grounding and bonding electrical systems for possible ground fault currents.

1.02 SUBMITALS

A. Locate grounding connections, as well as above- and under-ground grounding conductors.

1.03 COMPLIANCE

A. Comply with NFPA 70, NEC 2014 250.0

B. Comply with UL, Inc

PART 2 –PRODUCTS

A. Copper #4 AWG

PART 3 –EXECUTION

A. Assure grounding conductors are hidden from the public

B. Provide conductor from main service panel to utility panel provided by the organizer

Install according to manufacturer indications

END OF SECTION 26 05 26

26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL INFORMATION

1.01 SUMMARY

A. This section includes the following

1. Installation of Raceways, boxes, enclosures, fittings, and electrical wire cabinets

1.02 SUBMITALS

A. Submit complete specifications for equipment and datasheets provided by manufacturer

COMPLIANCE

A. Comply with NFPA and NEC

B. Comply with UL, Inc

PART 2 – PRODUCTS

Conduit

Allied E-Z PULL EMT: Hot galvanized steel, organic corrosion resistant, coating produced in accordance with UL Safety Standard #797 and ANSI C 80.3

Cannot be less than 0.5 inches, unless specified

Electrical Metallic Tubing (EMT) maximum size not to exceed 4 inches and be rated at 600V or less

Galvanized steel conduit is flexible (UL 1) with PVC jacket

Fittings

Meet ANSI, NEMA, and UL requirements

Set-screw type for metallic tubing, and clamp type for flexible metal

Must have insulated throats for concrete and rain

Enclosures

Device boxes must be insulated for low voltage

Cast metal where required by code

Installed with raised covers

PART 3 – EXECUTION

All conduits shall be concealed within finished walls, floors, and ceilings

Damaged conduit is not allowed

EMT used for: Damp or Wet locations, optical fiber and communication wiring

All holes must be cut in advance, and be waterproof in all locations. All continuous runs should be set before pulling cables

Support must be provided independently and on changes of direction at 8ft and 1ft , respectively

Conduit will not have splices.

END OF SECTION 26 05 33

26 11 13 – PRIMARY UNIT SUBSTATIONS

PART 1 – GENERAL

SECTION REQUIREMENTS

Submittals: Product Data.

Comply with NFPA 70, NEC 2014

Due to structure being separated modules there is a need for subpanels in the day module and the mechanical skid.

Both subpanels will be overcurrent protected off the main panel in accordance with NEC 2014 240.40

END OF SECTION 26 11 13

26 21 16 – LOW-VOLTAGE UNDERGROUND ELECTRICAL SERVICE ENTRANCE

PART 1 – GENERAL

SECTION REQUIREMENTS

Submittals: Product Data.

Comply with NFPA 70, NEC 2014 Subsection 215.2

Part 2 – PRODUCTS

2.01

- A. THHN Conductors , appropriately sized and phased
- B. Ridged Conduit using rain-tight connections

END OF SECTION 26 21 16

26 28 16.13 – ENCLOSED CIRCUIT BREAKERS

PART 1 – GENERAL

SECTION REQUIREMENTS

Submittals: Product Data.

Comply with NFPA 70, NEC 2014 210

1. Standard Overcurrent Devices
2. GFCI 210.8
3. AFCI 210.12

END OF SECTION 26 28 16.13

26 51 13 – INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS

PART 1 – GENERAL

SECTION REQUIREMENTS

Submittals: Product Data.

Comply with NFPA 70, NEC 2014 210.24

Lighting will be applicable for use in insulated ceilings

END OF SECTION 26 51 13

26 56 23 – AREA LIGHTING

PART 1 – GENERAL

SECTION REQUIREMENTS

Submittals: Product Data.

Comply with NFPA 70, NEC 2014 210.24

All exterior lighting will have to be on a GFCI breaker in accordance with NEC 2014 210.8

END OF SECTION 26 56 23

26 31 00 – PHOTOVOLTAIC COLLECTORS

PART 1 – GENERAL

SECTION REQUIREMENTS

Submittals: Product Data.

Comply with NFPA 70, NEC 2014 690

Related Sections: 48 19 16 Electrical Power Generation Inverters

Part 2 – PRODUCTS

2.01 PHOTOVOLTAIC MODULES

A. Manufacturer: Solar World

25300 NW Evergreen Road

Hillsboro, OR. 97124

PH: (503) 844 3414 | (855) 467-6527

Website: www.solarworld-usa.com

Model: Sunmodule Plus SW 280-295 Mono (35mm frame)

Power: 290W

2.02 MICRO-INVERTER

A. Manufacturer: Enphase Energy

2388 Walsh Ave

Santa Clara, CA. 95051

PH: (877) 797-4743

Website: www.enphase.com

Model: Enphase M250 Microinverter with integrated grounding

Input Power: 201-300W

Output Power: 240W

Mounting Rack

Manufacturer: Power-Fab

Module Name: Power Rail P4

DC to AC derate factor = 0.87

Recommended input power (STC) 210-300 W

Maximum units per 20 A branch circuit 16 (single phase)

Warranty: up to 25 years

2.03 ACCESSORIES – MOUNTING BRACKET

1. Required to mount PV modules on Roof

A. Manufacturer: Dual Rack

241 N. 10th Street, unit 4

Sacramento, CA 95811

PH: (916) 492-2797

Fax: (916) 492-2874

www.dualrack.net

PART 3 – EXECUTION

3.01 INSTALLATION

- A. Prepare substrate by cleaning, removing projections, filling voids, sealing joints, and as otherwise recommended in photovoltaic mounting clip manufacturer' s written instructions.
- B. Set units level, plumb, and true to line, without warp of shingles and anchor securely in place to torque pressures required in manufacturer' s specifications.
- C. Make connections between the individual shingles as per manufacturer instructions.
- D. Correct deficiencies in or remove and reinstall mountings and modules that do not comply with requirements.
- E. Repair, refinish, or replace mountings and modules damaged during installation or transit, as directed by Architect.
- F. Wire PV system to the Inverter as per manufacturer' s instructions.
- G. Mounting Rack should be in place before mounting in roof to assure there is no damage to roof and it is fully water proofed.
- H. Install micro-inverter on mounting rack and assure ground wire goes from micro-inverter to mounting rack
- I. Connect panel and make sure micro-inverter is completely covered below panel
- J. Bring Enphase Engage Cable to home. Micro-Inverters cannot be connected more than 16 panels in a row.
- L. Installation must comply with NEC, section 690.

Sunmodule Plus

SW 280-295 MONO (33mm frame)



TUV Power controlled:
Lowest measuring tolerance in industry



Every component is tested to meet
3 times IEC requirements



Designed to withstand heavy
accumulations of snow and ice



Sunmodule Plus:
Positive performance tolerance



25-year linear performance warranty
and 10-year product warranty



Glass with anti-reflective coating



World-class quality

Fully-automated production lines and seamless monitoring of the process and material ensure the quality that the company sets as its benchmark for its sites worldwide.

SolarWorld Plus-Sorting

Plus-Sorting guarantees highest system efficiency. SolarWorld only delivers modules that have greater than or equal to the nameplate rated power.

25-year linear performance guarantee and extension of product warranty to 10 years

SolarWorld guarantees a maximum performance digression of 0.7% p.a. in the course of 25 years, a significant added value compared to the two-phase warranties common in the industry, along with our industry-first 10-year product warranty.*

*in accordance with the applicable SolarWorld Limited Warranty at purchase.
www.solarworld.com/warranty

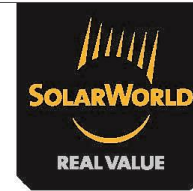


solarworld.com



Sunmodule⁺ Plus

SW 280-295 MONO (33mm frame)



PERFORMANCE UNDER STANDARD TEST CONDITIONS (STC)*

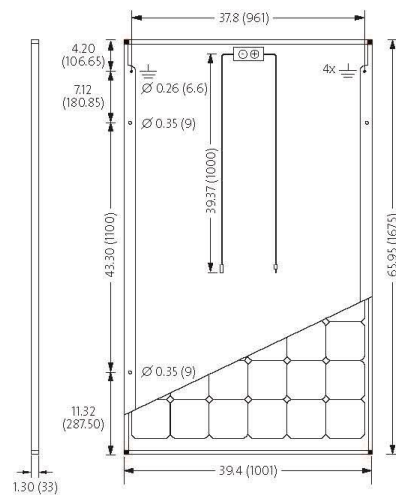
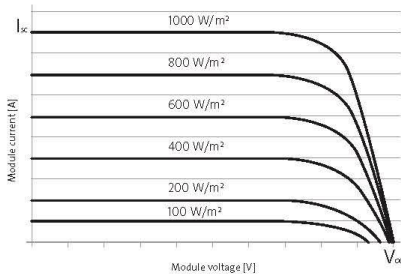
		SW 280	SW 285	SW 290	SW 295
Maximum power	P_{max}	280 Wp	285 Wp	290 Wp	295 Wp
Open circuit voltage	V_{oc}	39.5 V	39.7 V	39.9 V	40.0 V
Maximum power point voltage	V_{mpp}	31.2 V	31.3 V	31.4 V	31.5 V
Short circuit current	I_{sc}	9.71 A	9.84 A	9.97 A	10.10 A
Maximum power point current	I_{mpp}	9.07 A	9.20 A	9.33 A	9.45 A
Module efficiency	η_m	16.70 %	17.00 %	17.30 %	17.59 %

*STC: 1000 W/m², 25°C, AM 1.5

PERFORMANCE AT 800 W/M², NOCT, AM 1.5

		SW 280	SW 285	SW 290	SW 295
Maximum power	P_{max}	209.2 Wp	213.1 Wp	217.1 Wp	220.5 Wp
Open circuit voltage	V_{oc}	36.1 V	36.4 V	36.6 V	36.7 V
Maximum power point voltage	V_{mpp}	28.5 V	28.7 V	28.8 V	28.9 V
Short circuit current	I_{sc}	7.85 A	7.96 A	8.06 A	8.17 A
Maximum power point current	I_{mpp}	7.33 A	7.43 A	7.54 A	7.64 A

Minor reduction in efficiency under partial load conditions at 25°C: at 200 W/m², 100% of the STC efficiency (1000 W/m²) is achieved.



All units provided are imperial. SI units provided in parentheses.
 SolarWorld AG reserves the right to make specification changes without notice.

COMPONENT MATERIALS

Cells per module	60	Front	Low-iron tempered glass with ARC (EN 12150)
Cell type	Mono crystalline	Frame	Clear anodized aluminum
Cell dimensions	6.17 in x 6.17 in (156.75 x 156.75 mm)	Weight	39.7 lbs (18.0 kg)

THERMAL CHARACTERISTICS

NOCT	46°C
TCI_{sc}	0.04 %/K
TCV_{oc}	-0.30 %/K
TCI_{mpp}	-0.41 %/K
Operating temp	-40° C to +85° C

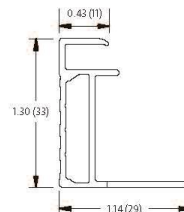
ADDITIONAL DATA

Power sorting	-0 Wp/+5 Wp
J-Box	IP65
Connector	PV wire per UL4703 with H4 connectors
Module fire performance	(UL 1703) Type 1

PARAMETERS FOR OPTIMAL SYSTEM INTEGRATION

Maximum system voltage SC II / NEC	1000 V	
Maximum reverse current	25 A	
Number of bypass diodes	3	
Design loads*	Two rail system	113 psf downward, 64 psf upward
Design loads*	Three rail system	178 psf downward, 64 psf upward
Design loads*	Edge mounting	178 psf downward, 41 psf upward

*Please refer to the Sunmodule Installation Instructions for the details associated with these load cases.



- Compatible with both "Top-Down" and "Bottom" mounting methods
- ⚡ Grounding Locations:
 - 4 locations along the length of the module in the extended flange.

SW-01-7500US 07-2015



www.DualRack.net

EXTENSION LEG KIT



24" EXTENSION



18"-36" ADJUSTABLE

Dual Rack extension leg kit comes in fixed 24" extension leg kit and 18"-36" adjustable extension leg kit, both in silver and black color. Extension leg kit is compatible with most of popular mounting systems and roof attachment products. All stainless steel hardware included for fast installation. 10-year limited product warranty.

PRODUCT LINE

Item#	Product Name
DR-CEL-24	24" Extension Leg Kit - Clear
DR-BEL-24	24" Extension Leg Kit - Black
DR-BEL-AD-18-36	Adjustable Extension Leg Kit - Black
DR-CEL-AD-18-36	Adjustable Extension Leg Kit - Clear

MATERIAL SPECIFICATIONS

Material Designation	6005-T5
Density (ρ)	168.56 lb/ft ³ (2.7 g/cm ³)
Coefficient of Thermal expansion (α_c)	1.306E-05/ ^o F (2.35E-05/ ^o C)
Diffusivity (λ)	200.00 W/m ² K
Modulus of Elasticity (E)	10.152E06 Psi (7,000 kN/cm ²)
Shear Modulus (G)	3.916E06 Psi (2,700 kN/cm ²)

MATERIAL SPECIFICATIONS

Tensile Strength (f_u)	38.0 Ksi (26.0 kN/cm ²)
Tensile Yield Strength (f_y)	35.0 Ksi (24.0 kN/cm ²)
Profile Wall Thickness	(t ≤ 0.39 in/10 mm)

COMPONENT LIST

24" Extension Leg Kit	
24" Extension Leg	01
U-Bracket	02
SS M8-80mm Allen Bolt	02
SS M8 Flange Nut	02
SS Lock Washer	02
SS Spring Washer	02
SS 3/8" - 1 Hex Bolt	01
SS 3/8" Flange Nut	01
SS 3/8" Flat Washer	01

COMPONENT LIST

Adjustable Extension Leg Kit	
18" Outer Extension Leg	01
18" Inner Extension Leg	01
Outer Leg U-Bracket	01
Inner Leg U-Bracket	01
Double Hole Fix Clamp	01
SS M8-25mm Allen Bolt	02
SS Lock Washer	02
SS Spring Washer	02
SS M8-80mm Allen Bolt	02
SS M8 Flange Nut	02
SS 3/8" - 1 Hex Bolt	01
SS 3/8" Flange Nut	01
SS 3/8" Flat Washer	01

WARRANTY

10 Year limited warranty

ORDERING SPECIFICS

Product	24" Extension Leg Kit	Adjustable Extension Leg Kit
Net Weight	1.65 LBS/Set	2.09 LBS/Set
Standard Pack	10 Kits/Box	10 Kits/Box
Standard Pack Weight	16.5 LBS/Box	20.9 LBS/Box
Standard Pack Dimension	26.0"(L) x 13.0"(W) x 4.0"(H)	

Phone: 916-492-2797 - Fax: 916-492-2874



www.DualRack.net



DUAL JACK BASE

Dual Jack Base[®] is designed to specifically use with Dual Jack[®] and Dual Jack Flashing. It is one of the strongest methods for installing solar panels. Dual Jack Base[®] comes with two 5/16" x 4" hex head stainless lag bolts and two EPDM-bonded sealing washers. It allows up to 4 structural attachments when required. Available finishes: (a) Clear Anodized (b) Black Anodized.

ADVANTAGES

- ✓ Compatible with Dual Jack[®] in different sizes
- ✓ Compatible with Dual Jack Flashing to prevent wind-driven rain
- ✓ Allows up to 4 structural attachments when required, to make attachment even stronger
- ✓ Easy installation saves time and labor costs
- ✓ Cost effective
- ✓ Clear and Black anodized product available
- ✓ 10 Year Limited Warranty

PRODUCT LINE

Item#	Product Name
DR-CDJB-01	Dual-Jack Base - Clear
DR-BDJB-01	Dual-Jack Base - Black

MATERIAL SPECIFICATIONS

Material Designation	6005-T5
Density (ρ)	168.56 lb/ft ³ (2.7 g/cm ³)
Coefficient of Thermal expansion (α)	1.306E-05/°F (2.35E-05/°C)
Diffusivity (λ)	200.00 W/m ² K
Modulus of Elasticity (E)	10.152E06 Psi (7,000 kN/cm ²)
Shear Modulus (G)	3.916E06 Psi (2,700 kN/cm ²)

MATERIAL SPECIFICATIONS

Tensile Strength ($f_{u,s}$)	38.0 Ksi (26.0 kN/cm ²)
Tensile Yield Strength ($f_{y,s}$)	35.0 Ksi (24.0 kN/cm ²)
Profile Wall Thickness	(t \leq 0.39 in/10 mm)

COMPONENT LIST

Material	QTY
Dual Jack Base	01
5/16" x 4" SS Hex Lag Bolt	02
Sealing Washer	02

WARRANTY

10 Year limited warranty

ORDERING SPECIFICS

	Qty / Box	Weight / Box	Box Size
Unit Package	1pcs / Box	0.6 lbs / Box	4.5" (L) x 4.5" (W) x 1.5" (H)
Small Box	10pcs / Box	6.0 lbs / Box	25.0" (L) x 10.0" (W) x 1.8" (H)
Bigger Box	40pcs / Box	24.0 lbs / Box	25.0" (L) x 10.0" (W) x 8.5" (H)

INSTALLATION GUIDE



Phone: 916-492-2797 - Fax: 916-492-2874

Enphase® Microinverters

Enphase® M250



The **Enphase® M250 Microinverter** delivers increased energy harvest and reduces design and installation complexity with its all-AC approach. With the M250, the DC circuit is isolated and insulated from ground, so **no Ground Electrode Conductor (GEC) is required for the microinverter**. This further simplifies installation, enhances safety, and saves on labor and materials costs.

The Enphase M250 integrates seamlessly with the Engage® Cable, the Envoy® Communications Gateway™, and Enlighten®, Enphase's monitoring and analysis software.

PRODUCTIVE

- Optimized for higher-power modules
- Maximizes energy production
- Minimizes impact of shading, dust, and debris

SIMPLE

- No GEC needed for microinverter
- No DC design or string calculation required
- Easy installation with Engage Cable

RELIABLE

- 4th-generation product
- More than 1 million hours of testing and millions of units shipped
- Industry-leading warranty, up to 25 years

Enphase® M250 Microinverter // DATA

INPUT DATA (DC)		M250-60-2LL-S22, M250-60-2LL-S25	
Recommended input power (STC)	210 - 310 W		
Maximum input DC voltage	48 V		
Peak power tracking voltage	27 V - 39 V		
Operating range	16 V - 48 V		
Min/Max start voltage	22 V / 48 V		
Max DC short circuit current	15 A		
OUTPUT DATA (AC)		@208 VAC	@240 VAC
Peak output power	250 W	250 W	
Rated (continuous) output power	240 W	240 W	
Nominal output current	1.15 A (A rms at nominal duration)	1.0 A (A rms at nominal duration)	
Nominal voltage/range	208 V / 183-229 V	240 V / 211-264 V	
Nominal frequency/range	60.0 / 57-61 Hz	60.0 / 57-61 Hz	
Extended frequency range*	57-62.5 Hz	57-62.5 Hz	
Power factor	>0.95	>0.95	
Maximum units per 20 A branch circuit	24 (three phase)	16 (single phase)	
Maximum output fault current	850 mA rms for 6 cycles	850 mA rms for 6 cycles	
EFFICIENCY			
CEC weighted efficiency	96.5%		
Peak inverter efficiency	96.5%		
Static MPPT efficiency (weighted, reference EN50530)	99.4 %		
Night time power consumption	65 mW max		
MECHANICAL DATA			
Ambient temperature range	-40°C to +65°C		
Dimensions (WxHxD)	171 mm x 173 mm x 30 mm (without mounting bracket)		
Weight	1.6 kg (3.4 lbs)		
Cooling	Natural convection - No fans		
Enclosure environmental rating	Outdoor - NEMA 6		
Connector type	M250-60-2LL-S22: MC4 M250-60-2LL-S25: Amphenol H4		
FEATURES			
Compatibility	Compatible with 60-cell PV modules		
Communication	Power line		
Integrated ground	The DC circuit meets the requirements for ungrounded PV arrays in NEC 690.35. Equipment ground is provided in the Engage Cable. No additional GEC or ground is required. Ground fault protection (GFP) is integrated into the microinverter.		
Monitoring	Enlighten Manager and MyEnlighten monitoring options		
Compliance	UL1741/IEEE1547, FCC Part 15 Class B, CAN/CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01		

* Frequency ranges can be extended beyond nominal if required by the utility

To learn more about Enphase Microinverter technology,
visit enphase.com



END OF SECTION 26 31 00

1SolTech

1SOLTECH REFLECTION SERIES – 60 CELL WHT Monocrystalline Solar Module (245W - 260W)



1SolTech is a leading American manufacturer of high-quality, cost-effective solar modules. Our low-maintenance, high-performance monocrystalline modules are engineered for high-efficiency and long life. 1SolTech modules are a durable and reliable solution for all residential, commercial and utility applications. Just as important, 1SolTech, which manufactures its modules with primarily American components, is committed to making the US a leading manufacturer in the solar industry. When you choose 1SolTech, you choose America.

INDUSTRY LEADING WARRANTY: 1SolTech solar modules are backed by an industry leading comprehensive 25-year linear performance warranty, in addition to a 10-year warranty against defects in materials or workmanship. Tight power tolerances within +/- 3% of the module nameplate rating.

HIGH WIND AND SNOW MECHANICAL TOLERANCES: 1SolTech solar modules are tested to withstand extreme temperature variations as well as high wind loads and snow loads to 5400 pa. Our heavy duty frames and 4mm thick glass, along with stringent processes, ensure years of reliable performance no matter what terrain.

CERTIFICATIONS:

All 1SolTech modules are:

- ETL approved and certified to meet UL 1703 requirements and standards
- CEC Listed: Modules are approved for California rebates
- FSEC listed: Modules are approved for Florida rebates



MADE IN THE USA

A Quick Overview:

- HIGH-EFFICIENCY/LONG LIFE
- INDUSTRY LEADING WARRANTY
- HIGH SNOW & WIND LOADS
- INDUSTRY LEADING CERTIFICATIONS
- CEC AND FSEC LISTED

Proud to say:

Buy "Made in the USA" products with confidence. All 1SolTech modules are manufactured with pride in our Dallas/Ft Worth, TX facility using 93% components sourced from domestic manufacturers.

1SolTech Modules:

- Qualify under the Buy American Act (BAA)
- Qualify under the American Recovery & Reinvestment Act (ARRA)



1SolTech
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Farmers Branch, TX 75234
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FAX: (972) 231-0873
EMAIL: sales@1soltech.com
www.1SolTech.com



Enphase® M250 Microinverter // DATA

INPUT DATA (DC)	M250-60-2LL-S22/S23/S24	
Recommended input power (STC)	210 - 300 W	
Maximum input DC voltage	48 V	
Peak power tracking voltage	27 V - 39 V	
Operating range	16 V - 48 V	
Min/Max start voltage	22 V / 48 V	
Max DC short circuit current	15 A	
Max input current	10 A	
OUTPUT DATA (AC)	@208 VAC	@240 VAC
Peak output power	250 W	250 W
Rated (continuous) output power	240 W	240 W
Nominal output current	1.15 A (A rms at nominal duration)	1.0 A (A rms at nominal duration)
Nominal voltage/range	208 V / 183-229 V	240 V / 211-264 V
Nominal frequency/range	60.0 / 57-61 Hz	60.0 / 57-61 Hz
Extended frequency range*	57-62.5 Hz	57-62.5 Hz
Power factor	>0.95	>0.95
Maximum units per 20 A branch circuit	24 (three phase)	16 (single phase)
Maximum output fault current	850 mA rms for 6 cycles	850 mA rms for 6 cycles
EFFICIENCY		
CEC weighted efficiency, 240 VAC	96.5%	
CEC weighted efficiency, 208 VAC	96.0%	
Peak inverter efficiency	96.5%	
Static MPPT efficiency (weighted, reference EN50530)	99.4 %	
Night time power consumption	65 mW max	
MECHANICAL DATA		
Ambient temperature range	-40°C to +65°C	
Operating temperature range (internal)	-40°C to +85°C	
Dimensions (WxHxD)	171 mm x 173 mm x 30 mm (without mounting bracket)	
Weight	2.0 kg	
Cooling	Natural convection - No fans	
Enclosure environmental rating	Outdoor - NEMA 6	
FEATURES		
Compatibility	Compatible with 60-cell PV modules.	
Communication	Power line	
Integrated ground	The DC circuit meets the requirements for ungrounded PV arrays in NEC 690.35. Equipment ground is provided in the Engage Cable. No additional GEC or ground is required. Ground fault protection (GFP) is integrated into the microinverter.	
Monitoring	Free lifetime monitoring via Enlighten software	
Compliance	UL1741/IEEE1547, FCC Part 15 Class B, CAN/CSA-C22.2 NO. 0-M91, 0.4-04, and 107.1-01	

STH - 260
260
31.5
8.25
37.5
8.74
15.9%



right to change notice

* Frequency ranges can be extended beyond nominal if required by the utility

To learn more about Enphase Microinverter technology, visit enphase.com



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26 51 00 – INTERIOR LIGHTING

PART 1 – GENERAL INFORMATION

SUMMARY

This section includes the following:

Interior lighting fixtures, lamps, and ballasts.

Exit signs.

Lighting fixture supports

SUBMITTALS

Submit complete specifications and shop drawings

QUALITY ASSURANCE

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.

Comply with NFPA 70.

PART 2 – PRODUCTS

2.01 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

- B. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Incandescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5A
- D. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B
- E. Metal Parts: Free of burns and sharp corners and edges.
- F. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

a. Fixture 1(INEO 90 led, NANO channel): Kitchen / Living / Bedroom / Studio Niches Linear LED Strip

1. Basis-of-Design Product: Product indicated in lighting schedule for comparable product subject to approval
 1. XAL USA, RKI Austin, 13284 Pond Springs Rd. #401, Austin, Texas 78729
 2. Voltage: 120V input; Dimming: Yes
 3. Mounting: Recessed channels furniture
 4. Lamps: LED strips, 3-15W

5. Shielding: semi-opal

b. Fixture 2 (Ledtube): Living / Bedroom / Studio Niches Reading light (4 pcs.)

1. Basis-of-Design Product: Product indicated in lighting schedule for comparable product subject to approval

1. Marset USA, 20 West 22nd Street, Suite 912, NY 10010 New York

2. Voltage: 120V input; Dimming: No

3. Mounting: Recessed mounting, installed vertically or horizontally

4. Lamps: LED, 3W

5. Finish body: white

c. Fixture 3 (Stilieto): Bathroom Wall Sconce (2 pcs.)

1. Basis-of-Design Product: Product indicated in lighting schedule for comparable product subject to approval

1. YLighting - Sonneman

2. Voltage: 120V input; Dimming: Yes

3. Mounting: Wall mounting, installed vertically or horizontally

4. Lamps: LED, 8W

5. Finish body: white

d. Fixture 4 (DL1ZP LEDX): Living, Kitchen, Bedrooms, Hallway Recessed Can (15 pcs.)

1. Basis-of-Design Product: Product indicated in lighting schedule for comparable product subject to approval

1. Lucifer Lighting Company, 3750 IH35 North San Antonio, TX 78219

2. Voltage: 120V input; Dimming: Yes

3. Mounting: Recessed Mounting, installed horizontally

4. Lamps: LED, 14W

5. Finish body: white

2.04 EXIT SIGNS

A. Internally Lighted Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction

1. Lamps for AC Operations: LEDs, 70,000 hours minimum rated lamp life.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.

B. Comply with NFPA 70 for minimum fixture supports

C. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.

2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

D. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.

E. Adjust amiable lighting fixtures to provide required light intensities.

F. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.02 FIELD QUALITY CONTROL

A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.

B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

INEO 90



40



E
Orthogonal luminaire profile made of aluminium with clear or semiopal PMMA cover
Optionally for the vertical and horizontal mounting or buildup (with end caps)
Plug and play system facilitates toolless mounting
2700-4000K with very narrow binning in SDCM-Scale 2-Step MacAdam
0,1W i LED, after 50.000 operating hours with at least 70% luminous flux (L70)

ESP
Perfil ortogonal de aluminio con difusor transparente o semiopalo PMMA
A eleccion para el montaje o empotrado vertical u horizontal (con tapas finales)
Sistema eléctrico con contacto continuo facilita la instalación sin herramientas
2700-4000K tras estrecha selecc. en la esc. SDCM de la elipse MacAdam de 2 steps
0,1W i LED, con flujo luminoso de 70% (L70) después de 50.000 horas de operación

RU
прямоугольный алюминиевый профиль светильника с прозрачным или полупрозрачным PMMA рассеивателем
на выбор для вертикального или горизонтального накладного монтажа или встраивания (с заглушками)
система plug and play упрощает безинструментную сборку
2700-4000K с очень узким биннингом по 2-ступенчатой MacAdam SDCM-шкале
СИД мощностью 0,1W i, после 50 000 часов работы не менее 70% светового потока (L70)

TYPE

INEO 90 RECESSED		i LED	
TYPE	L (MM)	CODE	
3W 203 lm*	305	007-3661###	
6W 406 lm*	605	007-3662###	
9W 609 lm*	905	007-3663###	
12W 812 lm*	1205	007-3664###	
15W 1015 lm*	1505	007-3665###	

Incl. 1,5m power feeder
* Luminous Flux 3000K | clear cover

INEO 90 CEILING incl. end caps		i LED	
TYPE	L (MM)	CODE	
3W 203 lm*	307	007-3671###	
6W 406 lm*	607	007-3672###	
9W 609 lm*	907	007-3673###	
12W 812 lm*	1207	007-3674###	
15W 1015 lm*	1507	007-3675###	

Incl. 1,5m power feeder
* Luminous Flux 3000K | clear cover

LED COLOUR TEMPERATURE | CRI 80+ * per Watt | 20mA | 25°C

Code	Temp	Flux	Step
007-...45_	2700K	98 lm*	2-step
55_	3000K	98 lm*	2-step
65_	4000K	102 lm*	2-step

COLOUR

Code	Material
007-...6	anodised aluminium
8	black

COVER

Code	Material
007-...C	clear
E	semi-opal

LED CONVERTER NON DIMMABLE

LED CONVERTER 24V DC, supply 220-240V AC, ENEC appr.		L/B/H (MM)		CODE	
TYPE					
15W 1x socket light, max. 1,2m		121/45/16		007-1921090	
30W 1x socket light, max. 2,4m		151/41/30		007-1922191	

I Only for t-splitter light and splitter light
incl. power cable 2m and 0,3m plug cable

LED CONVERTER 24V DC, supply 120-240V AC, ENEC UL appr.		L/B/H (MM)		CODE	
TYPE					
75W 6x socket light, max. 6m		180/60/30		007-1945310	
100W 6x socket light, max. 7,8m		270/63/41		007-1922490	

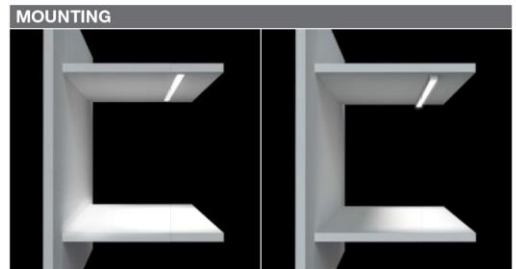
incl. power cable 2m and 0,3m plug light cable

ACCESSORY

SEE PAGE 47 FOR MORE ACCESSORIES
Splitter
Cable

LUMINOUS FLUX lm per meter

INEO	2700K	3000K	4000K
12 W/m CRI 80	750 lm/m	780 lm/m	790 lm/m



LEDTUBE

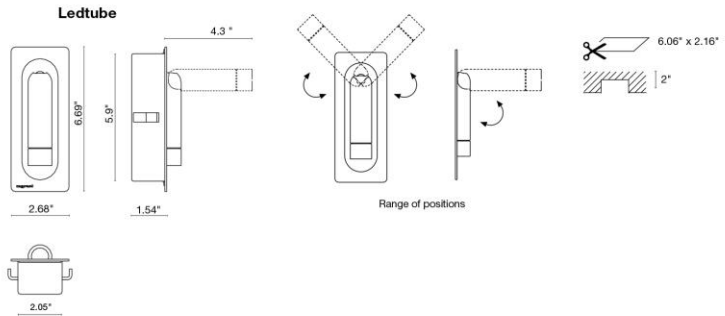
Daniel López, 2009



Injected aluminum structure and a frontal piece of transparent polycarbonate. Incorporated press button to switch on or off when opening or closing the wall lamp.

- Aluminum
- White
- Black

LED 3W 700mA 95lm (included)



 Dry locations only

Range 

Spec Sheet

www.marsetusa.com

marsetusa@marset.com



Stiletto 24-Inch LED Bath Bar

Item Code: SON-STILETTO-24IN-LED-BATH-BAR

Description: **Material(s):** Metal, Aluminum, Acrylic, Plastic

Dimensions:

- 2.75"W X 23.75"H; 3" extension
- Wall Plate: 2.75"W (Dimmable is 4.5"W) X 6.75"H

Lamp Type: LED

Bulbs: 1 X 8W overall wattage 120V LED, 3000K, 80 CRI, 640 lumens (included)

Listing: ETL

Price: Price: \$590.00
+ Free Shipping



Options: **1. Model:**
2340- Stiletto 24-Inch

2. Finish:
.25-- Satin Black Finish
.16-- Bright Satin Aluminum Finish
.03-- Satin White Finish

3. Dimmable:
DIM- Dimmable

Design by Robert Sonneman. Made By SONNEMAN - A Way of Light. Minimal and ultra slim, the Stiletto LED Bath Bar's narrow rectangular profile delivers bright, even and warm LED illumination along its precisely edged and frosted acrylic shade. Stiletto can be slid up and down the mounting box to create the perfect orientation. Available in satin white, bright satin aluminum or satin black finish and in 24-inch or 32-inch lengths. Dimmable. Shown in satin black.



DL1ZP [LEDX]

RECESSED LED DOWNLIGHT (IC, NON-IC, REMODEL)
ROUND FIXED

DL1ZP [LEDX]

TRIM

A LED

Remote phosphor dimmable LED module in aluminum and glass casing

* In certain conditions where lower than standard wattages are required, shallower recess depth may be available. Consult factory for details.

B Special Features

Die-cast aperture with deeply regressed light source; integral Professional Baffle minimizes aperture glare

C Effects Devices

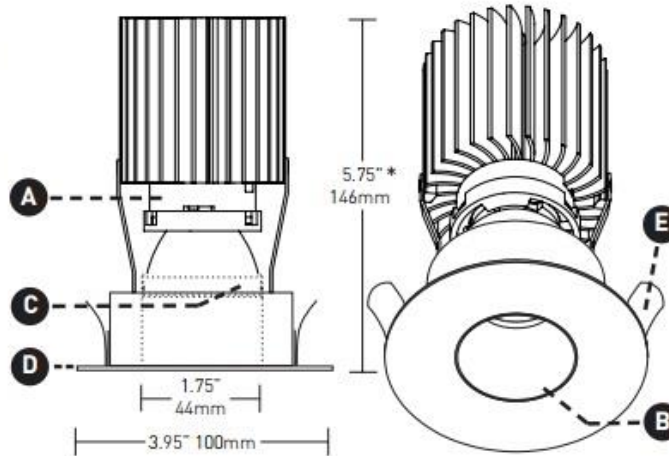
Soft focus lens included; adjustable yoke allows secure placement of up to 2 effects devices; [add .16" to fixture height with use of each effects device]

D Trim Plate

Thickness measures 0.055"; install as zero-sightline or flange overlay

E Retention

Engineered torsion spring clips designed to bear 3 times fixture weight; accommodates varying ceiling thicknesses and ensure snug fit of trim against ceiling



TECHNICAL

CONSTRUCTION

Steel and aluminum; extruded aluminum heat-sink; painted finishes are granulated powder coat; optional chrome and plated finishes.

LED

Xicato LED module available in configurations of 80+ CRI: 700, 1000 and 1300 lumen packages, and 95+ CRI: 500, 700 and 1000 lumen packages. Available color temperatures are 2700K (+/- 40K), 3000K (+/- 50K), 3500K (+/- 60K) and 4000K (+/- 70K), with beam angles of 40° and 60°. Average rated lamp life of 50,000 hours. LED/ heat-sink module field replaceable.

80+ CRI Source lm/w			95+ CRI Source lm/w		
700 lm	1000 lm	1300 lm	500 lm	700 lm	1000 lm
89 lm/w	82 lm/w	73 lm/w	57 lm/w	54 lm/w	46 lm/w

EMERGENCY LIGHTING

Remote emergency batteries available. Consult factory for information.

LED DISTINGUISHING FEATURES

Color Consistency	1x2 SDCM
Phosphor Architecture	Remote Phosphor
Standard Series 80+ CRI	R9=16, R13=81, R15=75
Artist Series 95+ CRI	R9=98, R13=98, R15=98
Construction	Aluminum & Glass; IP66 (module)

DIMMING PROTOCOL

Analog 0-10 and Triac dim to nominal 10% lm output; Lutron dims to nominal 1% lm output. Consult factory on availability of EldoLED systems that dim to nominal 1/10 of 1%, or for guidance on particular systems such as Dali.

LISTING

ETL/ C-ETL listed for dry/damp locations; IP20 rated.

WARRANTY

Five year warranty on LED lamp module and driver. One year warranty on all other Lucifer Lighting provided system components. Consult website for full warranty terms and conditions.

FIXTURE DISTINGUISHING FEATURES

Construction	Die-cast aluminum baffle
Finishes	Granulated powder coat, platings or treated metals
Aperture	Deeply regressed light source and anti-glare baffle
Cut-Off Angle	Minimum 30° to light source
Light Tuning	Accepts up to 2 effects devices

LUCIFER
LIGHTING COMPANY

[112613]

luciferlighting.com

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As part of its policy of continuous research and product development, the company reserves the right to change or withdraw specifications without prior notice.

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page 1

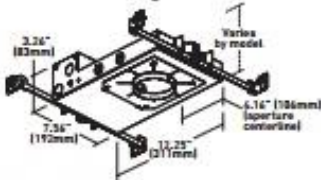
HOUSING AND MOUNTING

DL12P [LEDX]

Do not install in environments where ambient temperatures exceed 40°C. Transformer compartment and all splice connections may be serviced from room side. Hanger bars included with housings and mounting trays.

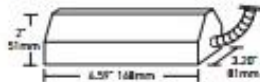
NON-IC MOUNTING TRAY

- For non-IC ceilings
- Metal conduit protected wiring and quick-connect conduit plug between fixture and power supply on tray/ junction box assembly
- Hanger bars may be fitted to short or long side of tray and may be field cut/ narrowed
- Minimum 1/2" (13mm) setback from combustible materials on all sides and top of tray and downlight fixture assembly
- Minimum 3" (76mm) setback from insulation material having max R-Value of 30 on all sides and top of tray and downlight fixture assembly; minimum 6" (152mm) from polycell spray-in foam insulation having max R-Value of 40



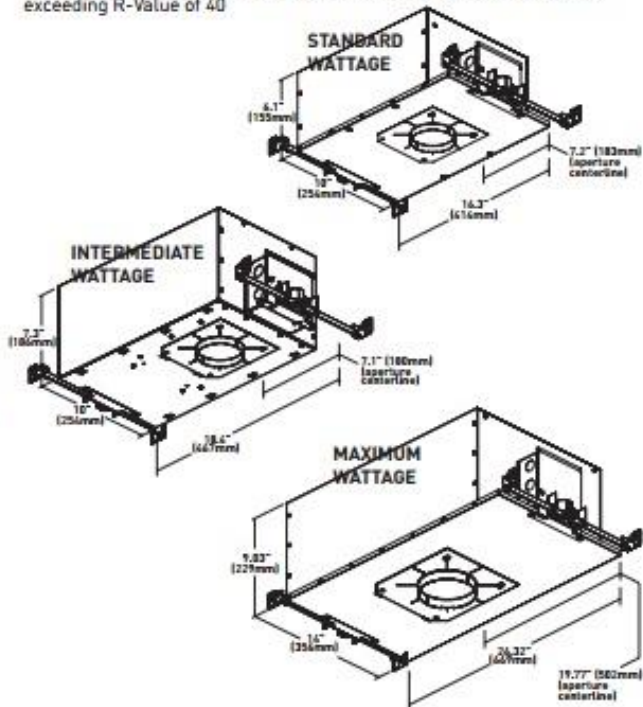
TETHERED POWER SUPPLY

- For non-IC or remodel ceilings
- Mounts without conventional housing using ceiling appliqué or collar
- Tethered power supply/ junction box with metal conduit protected wiring and quick-connect plug between fixture and power supply
- Minimum setback from combustible materials of 6.63" (168mm) radius from fixture centerline; minimum 3" (76mm) from surfaces of power supply/ junction box if not situated within above noted radius from fixture centerline
- Minimum 3" (76mm) setback from insulation material having max R-Value of 30 from any surface of downlight fixture assembly; minimum 6" (152mm) from polycell spray-in foam insulation having max R-Value of 40



IC HOUSINGS (version depends on system configuration)

- For IC, Airtight, CCEA ceilings
- Chicago Plenum & ASTM E283 Airtight rated
- Standard Wattage housing for 8007 or 9505 configurations
- Intermediate Wattage housing for 8010 or 9507 configurations
- Maximum Wattage housing for 8013 or 9510 configurations
- **WARNING:** Polycell spray-in foam insulation having max R-Value of 40 requires setback of 3" (76mm) from all sides and top of IC housing; **NOTE:** Consult factory for spacing requirements for any installations exceeding R-Value of 40

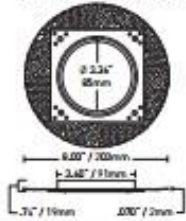


ZERO-SIGHTLINE

When installed according to manufacturer's instructions, and ceiling conditions are met, the fixture is flush with the ceiling plane; appliqué required. (5" / 127mm cutout)

- Mounting trays/ housings use model DLA-APP-Z-RD-3, or optional DLA-APP-Z-RD-5 with thinner profile and smaller diameter for installations where a thinner profile to apply mudding is preferred
- Tethered power supply fixtures use model EDLA-APP-Z-RD

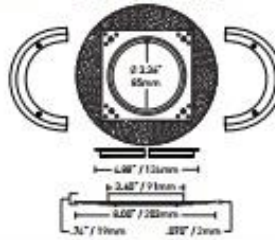
DLA-APP-Z-RD-3



DLA-APP-Z-RD-5



EDLA-APP-Z-RD

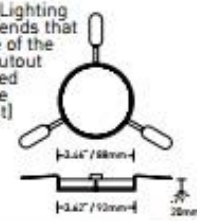


FLANGE OVERLAY

Fixture overlays the ceiling plane. (3.5" / 89mm cutout)

- Mounting trays and housings accommodate flange overlay installation
- Tethered power supply fixtures use model EDL-ZF

(Lucifer Lighting recommends that the edge of the ceiling cutout be beveled to ensure proper fit)



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LIGHTING COMPANY

luciferlighting.com

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As part of its policy of continuous research and product development, the company reserves the right to change or withdraw specifications without prior notice.

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[112613]

page 2

ORDERING

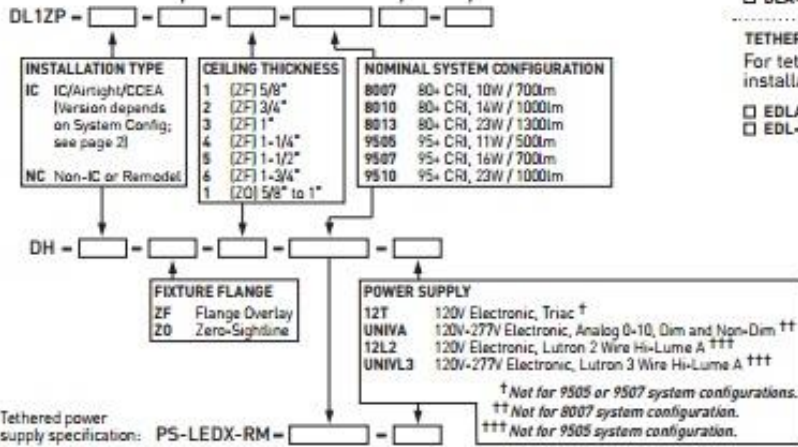
DL12P [LEDX]

IC or Non-IC applications use matching fixture and housing. Tethered power supply (remodel) applications use NC fixture with matching power supply instead of housing.

Fixture Ex. Model No. DL12P-NC-W-1-801330-1
Housing Ex. Model No. DH-NC-ZF-1-8013-UNIVA
RM Power Supply Ex. Model No. PS-LEDX-RM-8013-UNIVA

A range of custom RAL, color matching and metal plate finishes are also available.

FINISH		COLOR TEMPERATURE		OPTIC	
W	Matte White Powder Coat	27	2700K	1	40° Faceted
B	Matte Black Powder Coat	30	3000K	2	40° Smooth
C	Polished Chrome	35	3500K	3	60° Smooth
IG	Industrial Gray (Bead Blasted SS)	40	4000K		
MG	Metallic Gray Powder Coat				
SS	Brushed Stainless Steel				
ABR	Architectural Bronze Powder Coat				
BRP	Polished Oil-Rubbed Bronze Plate				
BRM	Matte Oil-Rubbed Bronze Plate				



ACCESSORIES

ADDITIONAL EFFECTS DEVICES

- AGL-2 Amber Glass Lens
- CGL-2 Clear Glass Lens
- FGL-2 Frosted Glass Lens
- HCL-2 Honeycomb Louver
- LSL-2 Linear Spread Lens
- SGL-2 Spread Lens
- WTL-2 Warm Tone Lens

HOUSING ZERO-SIGHTLINE

For IC or NC zero-sightline (ZO) installations, select appliqué.

- DLA-APP-Z-RD-3 Standard, Recommended
- DLA-APP-Z-RD-5 Minimal, -5 Ceilings

TETHERED POWER SUPPLY FIXTURES

For tethered power supply (remodel) installations, select mounting option.

- EDLA-APP-Z-RD Zero-Sightline Appliqué
- EDL-ZF Flange Overlay Collar

LUTRON PRODUCTS COMPATIBILITY Measured Light Output Range with all listed is 100% - 1%.

Power supply UNIVL3				Power supply 12L2			
Product Family	120V Part No.	277V Part No.	120V	277V	Product Family	Part No.	Fixtures Per Control (120V Only)
NovaT®	NTF-10-	NTF-10-277-	1 + 41	1 + 44	NovaT®	NTLY-600-CPN0199	1 + 8
Nova®	NF-103P-	NF-103P-277-	1 + 20	1 + 33	Maestro Wireless®	MRF2-6ND-120	1 + 8
Vareo®	NF-103P-	NF-103P-277-	1 + 20	1 + 33	RadioRA® 2 1000W	RRD-10ND	1 + 13
SkyLark®	SF-103P-	SF-103P-277-	1 + 20	1 + 33	RadioRA 2 adaptive dimmer	RRD-6NA	1 + 8
Diva®	DVF-103P-	DVF-103P-277-	1 + 20	1 + 33	RadioRA 600W	RA-6ND	1 + 8
Ariadne®	AYF-103P-	AYF-103P-277-	1 + 20	1 + 44	RadioRA 1000W	RA-10ND	1 + 13
Verti®	VTF-6A-		1 + 15	1 + 33	HomeWorks® QS 600W (LED)	HQRD-6ND	1 + 8
Maestro®	MAF-6AM-	MAF-6AM-277-	1 + 15	1 + 33	HomeWorks QS 1000W (LED)	HQRD-10ND	1 + 13
Maestro Wireless®	MRF2-F6AN-DV-		1 + 15	1 + 33	HomeWorks QS adaptive dimmer	HQRD-6NA	1 + 8
RadioTouch®	RTA-RX-F-		1 + 41	1 + 88	HomeWorks QS WPM (LED)	HQRJ-WPM-6D-120	1 + 10 [per output]
Spacer System®	SPSF-6A-	SPSF-6A-277-	1 + 15	1 + 33	HomeWorks 600W dimmer	HRD-6ND	1 + 8
Lynco® Lx	LXF-103PL-	LXF-103PL-277-	1 + 20	1 + 33	HomeWorks 1050W dimmer	HWD-10ND, HRD-10ND	1 + 13
RadioRA® 2	RRD-F6AN-DV-		1 + 15	1 + 33	HomeWorks WPM	HWI-WPM-6D-120	1 + 10 [per output]
HomeWorks® QS	HQRD-F6AN-DV		1 + 15	1 + 33	GRAFIK EYE® QS (fluorescent)	QSGR-, QSGRJ-	1 + 10 [per output]
Interfaces	PHPM-3F	PHPM-3F-DV	1 + 41	1 + 88	GRAFIK EYE 3000 (fluorescent)	GRX-3100, GRX-3500	1 + 10 [per output]
PowPak™ with EcoSystem	GRX-FDBI-16A		1 + 41	1 + 88	RPM-4U module, (LCP, HomeWorks, GRAFIK Systems, Quantum®)	HW-RPM-4U-120, LP-RPM-4U-120	1 + 26 [per output]
Energi Savr Node™ with EcoSystem	RMJ-ECD32-DV-B		32 per EcoSystem link		RPM-4A module, (LCP, HomeWorks, GRAFIK Systems, Quantum) (LED)	HW-RPM-4A-120, LP-RPM-4A-120	1 + 13 [per output]
GRAFIK Eye® QS with EcoSystem	QSN-1ECD-S, QSN-2ECD-S		63 per EcoSystem link		GP panels (LCP, HomeWorks, GRAFIK Systems, Quantum)	Various	1 + 26
Quantum®	QSG-_P120		64 per EcoSystem link		Stanza®	SZ-6ND	1 + 8
	Various		64 per EcoSystem link				

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As part of its policy of continuous research and product development, the company reserves the right to change or withdraw specifications without prior notice.

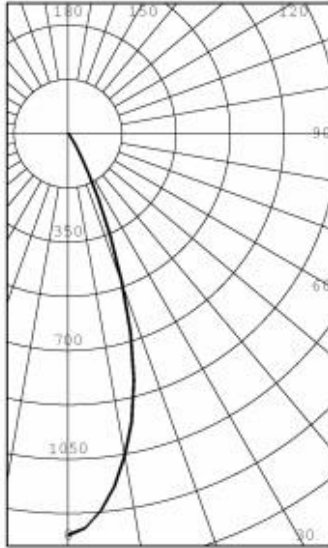
3750 IH35 North
San Antonio, Texas 78219
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[FAX] +1-210-227-4967

[112613]

PHOTOMETRICS

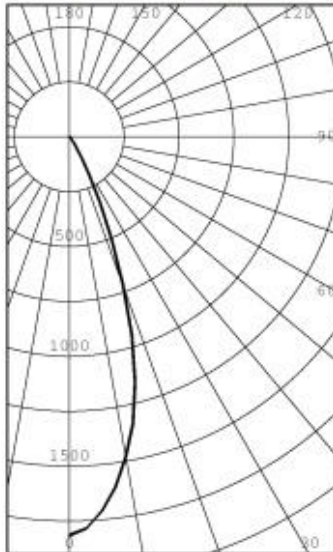
DL1ZP (LEDX)

DL1ZP: Nominal 80+ CRI, 3000K, 14W, 1000 lumen package, *soft focus lens*, 480 delivered lumens.
40° faceted optic. Refer to website for additional photometry, if available.



ANGLE	MEAN CP	LUMENS
0	1295	
5	1220	113
10	1056	
15	823	219
20	506	
25	234	112
30	83	
35	31	23
40	16	
45	10	8
50	7	
55	5	4
60	3	
65	1	1
70	1	
75	1	1
80	0	
85	0	0
90	0	

DL1ZP: Nominal 80+ CRI, 3000K, 23W, 1300 lumen package, *soft focus lens*, 672 delivered lumens.
40° faceted optic. Refer to website for additional photometry, if available.



ANGLE	MEAN CP	LUMENS
0	1815	
5	1710	158
10	1481	
15	1156	308
20	714	
25	331	158
30	117	
35	44	32
40	21	
45	13	10
50	8	
55	6	5
60	3	
65	1	1
70	1	
75	0	0
80	0	
85	0	0
90	0	

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[112613]

END OF SECTION 26 51 00

26 52 00 - EMERGENCY LIGHTING

PART 1 – GENERAL INFORMATION

SUMMARY

This section includes

Emergency Lighting

SUBMITALS

Submit complete specifications and datasheets from manufacturer

Submit drawings of placement of devices

PART 2 –PRODUCTS

2.01 PRODUCTS

Emergency Lighting

Manufacturer: Lithonia Lighting

Module Name: LHQM W1 R RED M4

1-UL Listed


Hardwire/LED

Power: 4 Watts

PART 3 –EXECUTION

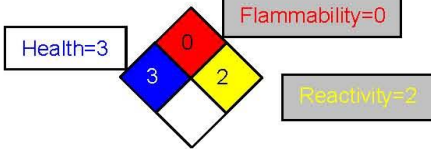
3.01 INSTALLATION

- A. All products must be tested before installing on premises
- B. Install with solid copper conductors rated at low-voltage (600V or less), at 75°C, and insulation that is color coded
- C. Installation must comply with NFPA 70, NFPA 72, NFPA 101

		Material Safety Data Sheet			
GS Battery USA Inc., a subsidiary of JAPAN STORAGE BATTERY CO. LTD.		GS PORTALAC, PE, PX, PXL, and PWL Series VALVE REGULATED LEAD ACID (VRLA) BATTERY, ABSORBED ELECTROLYGE (AGM)			
Section I – Product Identification					
Manufacturer's name GS Battery USA Inc. 1000 Mansell Exchange West Suite 350 Alpharetta GA 30022			Emergency Telephone Number CHEMTREC: (800) 424-9300 Telephone Number for Information GS Battery USA Inc.: (678) 762-4818		
			Date Issued: April 1 2002. Date Updated: May 26, 2004.		
Section II—Hazardous Ingredients/Identity Information					
Components)	CAS Number	Approx wt%	OSHA PEL ($\mu\text{g}/\text{m}^3$)	ACGIH TLV ($\mu\text{g}/\text{m}^3$)	NIOSH ($\mu\text{g}/\text{m}^3$)
Inorganic Lead/Lead Compounds	7439-92-1	65%-75%	50	150	10
Tin	7440-31-5	<.5%	2000	2000	N/A
Calcium	7440-70-2	<0.1%	N/A	N/A	N/A
Electrolyte: Dilute Sulfuric Acid	7664-93-9	14-20%	1000	1000	1000
Case Material: Acrylonitrile Butadiene Styrene	9003-56-9	5-10%	N/A	N/A	N/A
Inorganic lead and electrolyte (sulfuric acid) are the main components of every VALVE REGULATED LEAD ACID battery manufactured by Japan Storage Battery Co. LTD. Other ingredients may be present dependent upon the specific battery type. Contact Japan Storage Battery Co. LTD (JAPAN) or GS Battery USA Inc.(North America) for additional information.					
Section III—Physical/Chemical Characteristics					
ELECTROLYTE (Sulfuric Acid, dilute)					
Boiling Point	203°F-240°F	Specific Gravity (H ₂ O = 1)	1.230 to 1.350		
Vapor Pressure (mm Hg)	10-17	Melting Point	N/A		
Vapor Density (AIR = 1)	Greater than 1	Evaporation Rate (Butyl Acetate = 1)	Less than 1		
Solubility in Water	100%	Appearance and Odor	Electrolyte: Clear liquid with sharp, penetrating, pungent odor.		
Section IV—Fire and Explosion Hazard Data					
Flash Point (Method Used) N/A		LEL 4.1% (H ₂ Gas)	UEL		
Flammable Limits:	LEL = 4.1% (Hydrogen Gas), UEL = 74.2%				
Extinguishing Media:	CO ₂ , foam, dry chemical				
Special Fire Fighting Procedures	If batteries are on charge, shut of power. Use positive pressure, self-contained breathing apparatus. Beware of acid splatter during water application and wear acid resistant clothing, gloves, face and eye protection.				
Unusual Fire and Explosion Hazards	VRLA batteries generate highly flammable hydrogen gas during operation. To avoid risk of fire or explosion, keep sparks and other sources of ignition away from batteries. Do not allow metallic articles to simultaneously contact the negative and positive terminal of the battery.				

Section V—Reactivity Data			
Stability	Unstable		Conditions to Avoid
	Stable	X	Prolonged overcharge on high current, ignition sources
Incompatibility (Materials to Avoid)			
<p>Sulfuric acid: Contact with combustibles and organic materials may cause fire and explosion. Also reacts violently with strong reducing agents, metals, sulfur trioxide gas, strong oxidizers, and water. Contact with metals may product toxic sulfur dioxide fumes and may release flammable hydrogen gas</p> <p>Lead Compounds: Avoid contact with strong acids, bases, halides, halogenates, potassium nitrate, permanganate, peroxides, nascent hydrogen, and reducing agents.</p>			
Hazardous Decomposition or Byproducts			
<p>Sulfuric acid: Sulfur trioxide, carbon monoxide, sulfuric acid mist, sulfur dioxide, and hydrogen sulfide.</p> <p>Lead Compounds: High temperatures above the melting point are likely to produce toxic metal fume, vapor, or dust; contact with strong acid or base or presence of nascent hydrogen may generate highly toxic arsine gas..</p> <p>Hazardous Polymerization</p>			
Section VI—Health Hazard Data			
Route(s) of Entry			
<p>Sulfuric acid: Harmful by all routes of entry.</p> <p>Lead Compounds: Hazardous exposure can occur only when product is heated, oxidized, or otherwise process or damaged to create dust, vapor or fume.</p>			
Inhalation?			
<p>Sulfuric acid: Breathing sulfuric acid vapors and mists may cause severe respiratory.</p> <p>Lead Compounds: Dust or fumes may cause irritation of upper respiratory tract or lungs</p>			
Skin Contact			
<p>Sulfuric acid: Severe irritation, burns and ulceration.</p> <p>Lead Compounds: Not absorbed through the skin.</p>			
Ingestion			
<p>Sulfuric acid: May cause severe irritation of the mouth, throat, esophagus, and stomach.</p> <p>Lead Compounds: May cause abdominal pain, nausea, vomiting, diarrhea, and severe cramping. Acute ingestion should be treated by a physician.</p>			
Eye Contact			
<p>Sulfuric acid: Severe irritation, burns, cornea damage, and possible blindness.</p> <p>Lead Compounds: May cause eye irritation.</p>			
Acute Health Hazards			
<p>Sulfuric acid: Severe skin irritation, burns, damage to cornea may cause blindness, upper respiratory irritation.</p> <p>Lead Compounds: May cause abdominal pain, nausea, headaches, vomiting, loss of appetite, severe cramping, muscular aches and weakness, and difficulty sleeping.</p>			
Chronic Health Hazards			
<p>Sulfuric acid: Possible scarring of the cornea, inflammation of the nose, throat and bronchial tubes, possible erosion of tooth enamel.</p> <p>Lead Compounds: May cause anemia, damage to kidneys and nervous system, and damage to reproductive system in both males and females.</p>			
Carcinogenicity			
<p>Sulfuric acid: The National Toxicological Program (NTP) and The International Agency for Research on Cancer (IARC) have classified .strong inorganic acid mist containing sulfuric acid. as a Category 1 carcinogen, a substance that is carcinogenic to humans. The ACGIH has classified .strong inorganic acid mist containing sulfuric acid. as an A2 carcinogen (suspected human carcinogen). These classifications do not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within a battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product, such as overcharging, may result in the generation of sulfuric acid mist.</p> <p>Lead Compounds: - Human studies are inconclusive regarding lead exposure and an increased cancer risk. The EPA and the International Agency for Research on Cancer (IARC) have categorized lead and inorganic lead compounds as a B2 classification (probable/possible human carcinogen) based on sufficient animal evidence and inadequate human evidence.</p>			

<p>Medical Conditions Generally Aggravated by Exposure Inorganic lead and its compounds can aggravate chronic forms of kidney, liver, and neurologic diseases. Contact of battery electrolyte (acid) with the skin may aggravate skin diseases such as eczema and contact dermatitis. Overexposure to sulfuric acid mist may cause lung damage and aggravate pulmonary conditions.</p>	
<p>Emergency and First Aid Procedures</p> <p>Inhalation:</p> <p>Sulfuric acid: Remove to fresh air immediately. If breathing is difficult, give oxygen Lead Compounds: Remove from exposure, gargle, wash nose and lips, consult physician</p> <p>Ingestion:</p> <p>Sulfuric acid: Do not induce vomiting, consult a physician immediately. Lead Compounds: Consult a physician immediately</p> <p>Eyes</p> <p>Sulfuric acid: Flush immediately with water for 15 minutes, consult a physician. Lead Compounds: Flush immediately with water for 15 minutes, consult a physician</p> <p>Skin:</p> <p>Sulfuric acid: Flush with large amounts of water for at least 15 minutes, remove any contaminated clothing. If irritation develops seek medical attention. Lead Compounds: Wash with soap and water.</p>	
<p>Section VII—Precautions for Safe Handling and Use</p>	
<p>Steps to Be Taken in Case Material Is Released or Spilled</p> <p>There is no release of material unless the case is damaged or battery is misused/overcharged. If release occurs stop flow of material, contain/absorb all spills with dry sand, earth, or vermiculite. Do not use combustible materials. Neutralize spilled material with soda ash, sodium bicarbonate, lime, etc. Wear acid-resistant clothing, boots, gloves, and face shield. Dispose of as hazardous waste. Do not discharge un-neutralized acid to sewer</p>	
<p>Waste Disposal Method</p> <p>Spent Batteries – send to secondary lead smelter for recycling. Follow applicable federal, state and local regulations Neutralize as in preceding step. Collect neutralized material in sealed container and handle as hazardous waste as applicable.</p>	
<p>Precautions to Be Taken in Handling and Storing</p> <p>Store batteries in a cool, dry, well ventilated area that are separated from incompatible materials and any activities which may generate flames, sparks, or heat. Keep all metallic articles that could contact the negative and positive terminals on a battery and create a short circuit condition.</p>	
<p>Section VIII—Control Measures</p>	
<p>Respiratory Protection (Specify Type)</p> <p>None required under normal conditions. If battery is overcharged and concentrations of sulfuric acid are known to exceed PEL use NIOSH or MSHA approved respiratory protection.</p>	
<p>Engineering Controls:</p> <p>Store and handle batteries in a well ventilated area. If mechanical ventilation is used, components must be acid resistant</p>	
<p>Protective Gloves</p> <p>None needed under normal conditions. If battery case is damaged use rubber or plastic gloves with elbow length gauntlet.</p>	<p>Eye Protection</p> <p>None needed under normal conditions. IF handling damaged or broken batteries use chemical splash goggles or face shield.</p>
<p>Other Protective Clothing or Equipment</p> <p>None needed under normal conditions. In case of damaged or broken battery use an acid resistant apron. Under severe exposure or emergency conditions wear acid resistant clothing.</p>	
<p>Work/Hygenic Practices</p> <p>Handle batteries carefully to avoid damaging the case. Do not allow metallic articles to contact the battery terminals during handling. Avoid contact with the internal components of the battery.</p>	

Section IX—Regulatory Information		
NFPA Hazard Rating for sulfuric acid <div style="text-align: center; margin-top: 10px;">  </div>		
Transportation:		
U.S. DOT/IMDG/IATA Shipping information		
Proper Shipping Name:	Batteries, wet, non-spillable	
Hazard Class:	8	
ID Number:	UN2800	
Packing Group:	3	
Label/Placard:	CORROSIVE	
GS Battery USA Inc.'s Portalac series VRLA batteries have been tested and meet the "non-spillable electric storage batteries" criteria as required by DOT CFR 49, 173.159 (d), and IMO/IMDG, and ICAO/IATA packaging instructions 806 and A67, and therefore are non-regulated as long as the following criteria are met:		
1. The batteries must be protected against short circuits and securely packaged. 2. The batteries and their outer packaging must be plainly and durably marked "NON-SPILLABLE" or "NONSPILLABLEBATTERY".		
Contact your GS Battery USA Inc. representative for additional informational regarding the classification of batteries.		
Regulatory Information		
RCRA: Spent lead-acid batteries are not regulated as hazardous waste by the EPA when recycled, however state and International regulations may vary.		
CERCLA (Superfund) and EPCRA:		
(a) Reportable Quantity (RQ) for spilled 100% sulfuric acid under CERCLA (Superfund) and EPCRA (Emergency Planning Community Right to Know Act) is 1,000 lbs. State and local reportable quantities for spilled sulfuric acid may vary.		
(b) Sulfuric acid is a listed "Extremely Hazardous Substance" under EPCRA, with a Threshold Planning Quantity (TPQ) of 1,000 lbs.		
(c) EPCRA Section 302 notification is required if 1,000 lbs. or more of sulfuric acid is present at one site. The quantity of sulfuric acid will vary by battery type. Contact GS Battery USA Inc. for additional information.		
(d) EPCRA Section 312 Tier 2 reporting is required for batteries if sulfuric acid is present in quantities of 500 lbs. or more and/or if lead is present in quantities of 10,000 lbs. or more.		
(e) Supplier Notification: This product contains toxic chemicals, which may be reportable under EPCRA Section 313 Toxic Chemical Release Inventory (Form R) requirements. If you are a manufacturing facility under SIC codes 20 through 39, the following information is provided to enable you to complete the required reports:		
(f)		
Toxic Chemical	CAS Number	Approximate % by Wt.
Lead	7439-92-1	60
Sulfuric Acid	7664-93-9	30
Arsenic	7440-38-2	0.2
If you distribute this product to other manufacturers in SIC Codes 20 through 39, this information must be provided with the first shipment of each calendar year. The Section 313 supplier notification requirement does not apply to batteries, which are "consumer products". Not present in all battery types. Contact GS Battery USA Inc. for additional information.		
TSCA		
Ingredients in GS Battery USA Inc.'s batteries are listed in the TSCA Registry as follows:		
Components	CAS Number	TSCA Status
Electrolyte		
Sulfuric Acid (H2SO4)	7664-93-9	Listed
Inorganic lead Compound:		
Lead (Pb)	7439-92-1	Listed
Lead Oxide (PbO)	1317-36-8	Listed
Lead Sulfate (PbSO4)	7446-14-2	Listed
Arsenic (As)	7440-38-2	Listed
Calcium (Ca)	7440-70-2	Listed
Tin (Sn)	7440-31-5	Listed

26 56 00 EXTERIOR LIGHTING

PART 1 - GENERAL INFORMATION

SUMMARY

This Section Includes the Following:

Exterior Light Fixtures

1.02. SUBMITTALS

A. Submit complete specifications and shop drawings.

QUALITY ASSURANCE

Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.

Comply with NFPA 70.

PART 2 – PRODUCTS

2.01 DELTALIGHT

A. Logic Mini W

1. LED light

2. Concrete box

2.02 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Coordinate this Article with Drawings. See editing instructions No.2 in the Evaluations for discussion of seismic considerations.
- B. Comply with Divisions 26 Sections "Hangers and Supports for Electrical Systems" for channel and angle-iron supports and nonmetallic channel and angle supports.
- C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.88mm).
- D. Rod Hangers: 3/16-inch (5-mm) minimum diameter, cadmium plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

PART 3 – INSTALLATION

3.01 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Comply with NFPA 70 for minimum fixture supports.
- C. Suspended Lighting Fixture Support:
 - 1. Pendants and Rods: Where longer than 48 inches (1200 mm), brace to limit swinging.
 - 2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - 3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

FIELD QUALITY CONTROL

A. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION

PART 28 - DIVISION 27 - COMMUNICATIONS**27 21 29 - COMMUNICATIONS SWITCHES AND HUBS****PART 1 - GENERAL****1.01 SUMMARY**

A. The system for communications switches and hubs will be the same system used for the home automation systems. The information for this section is detailed in the home automation section.

PART 2 PRODUCTS

2.1 SEE SECTION 25 11 16.

PART 3 INSTALLATION

3.01 SEE SECTION 25 11 16.

END OF SECTION 27 21 29

27 21 33 - COMMUNICATIONS WIRELESS ACCESS POINT

PART 1 - GENERAL

1.01 SUMMARY

A. The information for communications wireless access point will be the same information used for the home automation systems. The information for this section is detailed in the home automation section.

PART 2 PRODUCTS

SEE SECTION 25 11 16.

PART 3 INSTALLATION

SEE SECTION 25 11 16

END OF SECTION 27 21 33

27 22 23 – DATA COMMUNICATION DESKTOP

PART 1 - GENERAL

1.01 SELECTION INCLUDES

A. Mini personal computer (for MySQL database, data logging, advanced control and web-based visualization)

1.02 RELATED REQUIREMENTS

A. Data communication switch with wired Ethernet connection

B. Submittals: product data

Comply with NFPA 70, "National Electrical Code."

1.03 SUBMITTALS

A. Product datasheets

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. MSI

2.02 MINI PC WIND BOX DC100

A. AMD® Brazos Dual Core E-450 (1.65GHz)

B. AMD® Radeon™ HD 6320 Discrete Class Graphics

C. Wi-Fi: 802.11 b/g/n

USB x 2 / RJ45 LAN port

VGA out / HDMI out

D: USB x 4

E. Dimensions: 191.8 x 150.93 x 34.94 mm

F. <http://www.msi.com/product/desktop/Wind-Box-DC100.html#hero-specification>

Operating System	Windows 8.1
CPU	AMD® Brazos Dual Core E-450 (1.65GHz)
Chipset	AMD® A50M (Hudson M1)
Graphics	AMD® Radeon™ HD 6320 Discrete Class Graphics
HDD	2.5" SATA II 320GB 5400 RPM
Memory	DDR3 2GB , 1333 MHz (2G*1)/DDR3 SO-DIMM x 1 slot, Max to 4GB
Power	40W
WiFi	802.11 b/g/n
	USB x 2 / RJ45 LAN port
	VGA out / HDMI out
Rear I/O	5.1 Channel Audio + SPDIF out
	Line-out x 1
	Power connector
	6-in-1 Card Reader
Front I/O	Mic-In & Headphone-out
	USB x 4
Color Plan	White
Dimension	191.8 x 150.93 x 34.94 mm, 830g

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Comply with the product installation manual and related NEC codes
- B. Installation shall be executed according to the installation manuals provided by the manufacturer.
- C. Install OS Windows and other applicable SW

Connect the device with the Ethernet switch (wired network connection)

END OF SECTION 27 22 23

PART 29 - DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

28 31 00 - ELECTRONIC DETECTION AND ALARM

PART 1 – GENERAL INFORMATION

1.1 SUMMARY

- A. This section includes
 - a. Heat Sensors
 - b. Smoke detector

1.2 SUBMITALS

- A. Submit complete specifications and datasheets from manufacturer
- B. Submit drawings of placement of devices

PART 2 –PRODUCTS

2.01 PRODUCTS

- A. Heat Sensors/Alarms
 - a. Manufacturer: Kidde
 - b. Model: HD135F
 - c. 1-UL Certified
 - d. 120 V

e. 9V battery backup

B. Smoke Detectors

- a. Manufacturer: FireX
- b. Model: 21007581
- c. 1-UL Listed
- d. 2 Wire connector. 120V
- e. 9V battery backup

PART 3 –EXECUTION

3.01 INSTALLATION

- A. All products must be tested before installing on premises
- B. Install with solid copper conductors rated at low-voltage (600V or less), at 75°C, and insulation that is color coded
- C. Installation must comply with NFPA 70, NFPA 72, NFPA 101

Safety Made Simple

HOME FIRE SAFETY TIPS

Every three hours, someone in America dies in a house fire. The good news is, in most cases, families can help to protect themselves from a home fire by developing a complete fire safety plan.

It only takes a few minutes to install or test a smoke alarm, develop and practice an escape plan, or learn to use a fire extinguisher. Learn what you can do today to protect your family and home, tomorrow.



How to use a fire extinguisher

Using a fire extinguisher is easy. Just remember the **PASS** system.



Pull the pin. Hold unit upright.



Aim at the base of the fire.



Squeeze the handle.



Sweep from side to side.

Resources for fire safety:

www.nfpa.org
www.usfa.dhs.gov
www.homesafetycouncil.org
www.kidde.com

As the world's largest manufacturer of fire safety products, Kidde's mission is to provide solutions that protect people and property from the effects of fire and its related hazards. For more than 90 years industry leaders, the military, airlines and firefighters have relied on Kidde to deliver superior fire detection and suppression.

Consumers will find that same advanced fire safety technology in Kidde's residential and commercial smoke alarms, carbon monoxide alarms, fire extinguishers and other life safety products.



Kidde
1016 Corporate Park Drive
Mebane, NC 27302

Safety Made Simple

HOME FIRE SAFETY TIPS

Smoke Alarms

Studies show, while most homes in America have smoke alarms, approximately 40% of them do not work. This is for the most part due to old age, or dead or missing batteries. A smoke alarm, like any home appliance, should be updated and maintained.

Take these steps to protect your family:

- ✔ Install smoke alarms in every room of the home and especially in or near all sleeping areas.
- ✔ Test your smoke alarms quarterly and change batteries every six months to make sure they are working properly.
- ✔ Replace smoke alarms that are at least 10 years old.

Consider installing wireless interconnected smoke alarms, such as those in the Kidde Wireless System. The alarms are linked, so when one sounds, all will sound.



Fire Extinguishers

Results from a nationwide research study show that only one in three (34%) American households have more than one fire extinguisher while nearly four out of five (78%) have more than one television. Having a fire extinguisher within reach can help you create a path to safety, and may even help put out a small, contained fire. Be safer in your home by learning more about fire extinguishers.

- ✔ Place a fire extinguisher within easy reach in rooms where fires are more likely to start such as the kitchen, living room and laundry room. Place a fire extinguisher in the bedroom for use in case you need to create a path to safety. Nearly half of all fatal fires occur during late night and early morning hours, when families are asleep.
- ✔ Choose a multipurpose extinguisher that is large enough to put out a small fire but not too heavy to handle.
- ✔ Learn to use a fire extinguisher properly.
- ✔ Always call the fire department before you try to extinguish a fire yourself.



Other Fire Safety Tips

- ✔ Make sure everyone in your home knows how to call 9-1-1 in case of fire or emergency.
- ✔ Practice a home fire escape plan regularly with the entire family. Practice during the day and night. Be aware of who may not wake to the sound of an alarm and assign an adult to assist that person during an emergency.
- ✔ Be safe if you smoke by dousing cigarette and cigar butts with water before dumping them.
- ✔ Use caution not to overload electrical outlets, extension cords or power strips. Check all wires and cords for damage regularly.





120V AC Wire-In Smoke Alarm

Slide Load Front Battery Door

Model i4618



- Ionization Sensing Technology
- Battery Backup (batteries included)
- Hush® Button
- Alarm Memory Indicator
- New 360° Mounting Plate with Tamper Resistance
- Front Load Battery Door

Description

The Kidde i4618 is an AC/DC powered, ionization smoke alarm that operates on a 120V power source with 9V battery backup.

This alarm uses ionization sensing technology. Ionization sensing alarms may detect invisible fire particles (associated with flaming fires) sooner than photoelectric alarms. Photoelectric sensing alarms may detect visible particles (associated with smoldering fires) sooner than ionization alarms.

Kidde strongly recommends that both ionization and photoelectric smoke alarms be installed to help insure maximum detection of the various types of fire that can occur within the home.

The front-loading battery door allows user to change the battery without removing the alarm from the mounting bracket making battery replacement easy and convenient. This smoke alarm is available in a 6-piece cut case with tray for easy display as well as a 6-piece bulk pack for contractors and property owners. This unit is a UL Listed product with a 5-year limited warranty.

Install Confidence:

Easy Installation

- Front battery pull tab allows battery activation without removing alarm from mounting bracket.
- Large mounting base makes mounting easier, protects surface paint from dirt and covers imperfections.
- Pre-stripped wiring harness with easy off cap does not require stripper tool. Tinned strands increase conductivity and wire nut grip.

Fewer Callbacks

- Large centrally located Test/Hush® alarm control button.
- Dust cover protects sensor from contaminants during construction reducing nuisance alarms.

User-Friendly Features

- Easy access front loading battery door.
- Battery backup provides protection in case of power failure.
- Interconnectable with up to 24 devices (of which 18 can be initiating) including smoke, CO and heat alarms. See user's guide for complete instructions.



120V AC Wire-In Smoke Alarm
Slide Load Front Battery Door

Model i4618

Architectural and Engineering Specifications

The smoke alarm shall be Kidde Model i4618 or approved equal. It shall be powered by a 120VAC, 60Hz source along with a 9V battery back-up. The unit shall incorporate an ionization sensor with nominal sensitivity of 0.50 to .92%/ft. The temperature operating range shall be between 40°F and 100°F (4°C and 38°C) and the humidity operating range shall be up to 85% relative humidity.

The smoke alarm can be installed on any standard single gang electrical box, up to a 4" octagon junction box. The electrical connection (to the alarm) shall be made with a plug-in connector. A maximum of 24 Kidde devices can be interconnected in a multiple station arrangement. The interconnect system must not exceed the NFPA (National Fire Protection Association) limit of 18 initiating devices, of which 12 can be smoke alarms. With 18 initiating devices (Smoke, heat, CO, etc), interconnected, it is still possible to interconnect 6 strobe lights and/or relay modules. The alarm shall provide optional tamper resistance that deters removal of the unit from the wall or ceiling. No additional pieces shall be required to activate this feature.

The alarm shall include an easy access battery compartment that is opened and closed by sliding the battery door. The 9V battery carrier will ensure proper battery backup protection by not allowing the battery door to close if the battery is placed in the unit incorrectly or if a battery is not present.

The unit shall include a piezoelectric horn that is rated at 85 decibels at 10 feet. The unit shall include the Smart Hush™ feature that silences the unit for approximately 8 minutes if a nuisance condition occurs.

The unit shall incorporate red and green LED indicators. The green LED (when illuminated) indicates the presence of AC power. The red LED (located under the TEST/Hush button) has four modes of operation:

Standby Condition: The red LED will flash every 30-40 seconds to indicate that the smoke alarm is operating properly. **Alarm Condition:** When the alarm senses products of combustion and goes into alarm the red LED will flash one flash per second. The flashing LED and pulsating alarm will continue until the air is cleared. When units are interconnected, only the red LED of the alarm that senses the smoke or is being tested (the originating unit) will flash. All other units in the interconnected system will sound an alarm but their red LED's will NOT flash. **Alarm Memory:** This smoke alarm is equipped with an alarm memory, which provides a visual indication when an alarm has been activated. The red LED will illuminate for about 1.5 seconds every 16 seconds to indicate the memory condition. **Smart Hush™ Mode:** The red LED will illuminate for 1.5 seconds every 8 seconds, indicating the smoke alarm is in the Smart Hush™ Mode.

The unit shall at a minimum meet the requirements of UL217, NFPA72, and (chapter 11), The State of California Fire Marshall, NFPA101 (One and two family dwellings), Federal Housing Authority (FHA), Housing and Urban Development (HUD).

Ordering Information

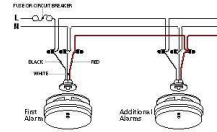
Model i4618

Ordering Number	UPC	12F5	Pack Quantity	Dimensions (w x d x h inches)	Weight	Skid
21007581	0-47871-07581-2	100-47871-07581-9	Cut Case (6 units)	6.63 x 13.25 x 6.25	3 lbs	1008
21007584	0-47871-07584-3	100-47871-07584-0	Bulk Pack (36 units)	13.25 x 19.5 x 19.5	18 lbs	1296
21007585	0-47871-07585-0	100-47871-07585-7	Cut Case (4 units)	7.94 x 13.38 x 11.75	2 lbs	390
21007588	0-47871-07588-1	100-47871-07588-8	Bulk Pack (4 units)	6.5 x 9 x 6.5	2 lbs	720
21007583*	0-47871-07583-6	100-47871-07583-3	Cut Case (6 units)	6.63 x 13.25 x 6.25	3 lbs	1008

*Comes with alkaline battery

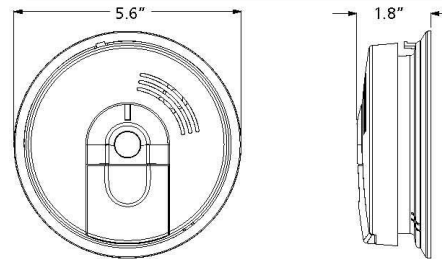
Installation of Smoke Alarm

The smoke alarm should be installed to comply with all local codes having jurisdiction in your area, Article 760 of the National Electric Code, and NFPA 72. Make certain all alarms are wired to a single, continuous (non-switched) power line, which is not protected by a ground fault interrupter. A maximum of 1000 ft. of wire can be used in the interconnect system. Use standard UL listed household wire as required by code.



Technical Specifications

Model:	i4618
UPC:	0-47871-07581-2
Power Source:	120VAC (80mA Max)
Sensor:	Ionization
Audio Alarm:	85dB at 10ft
Temperature Range:	40°F (4.4°C) to 100°F (37.8°C)
Humidity Range:	Up to 85% relative humidity (RH)
Size:	5.6" in diameter x 1.8" depth
Weight:	.5lbs
Interconnects:	Up to 24 Kidde devices
LED:	Green, receiving ac power Red, 4 modes of operation
Warranty:	5 year limited



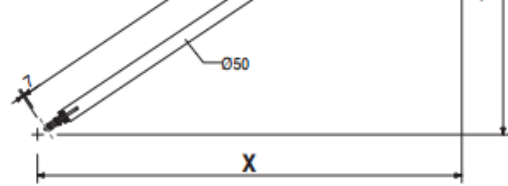
1016 Corporate Park Drive
Mebane NC 27302
1-800-880-6788
www.Kidde.com



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PART 32 - DIVISION 41 – MATERIAL PROCESSING AND HANDLING EQUIPMENT

41 65 16 – MOBILE GENERATORS

PART 1- GENERAL

SUMMARY

A. This section includes information about:

1. Specification for engine generators to be used during initial construction on site.

PERFORMANCE

Generator required on site during the assembly and disassembly phases of the competition will be removed during the competition period. Generator is required to power tools and lighting during the assembly/disassembly phases.

Engine generators shall meet the National Park Service (NPS) noise regulation stated in 36CFR2.12 – a maximum of 60 DB(A) at 50 ft / 15m under full load.

1.03 SECTION

A. Mobile generator model to be confirmed in Irvine at time of hire.

PART 2 – PRODUCT

2.01 MANUFACTURERS

A. Honda Engines

2.02 MODEL

A. 1. EU 6500iS

2.03 PERFORMANCE

A. 120/240V 6500W max. (54.1/27.1A) 5500W rated (45.8/22.9A)

B. Full GFCI Protection

C. Noise Level: 60 dB(A) @ rated load, 52 dB(A) @ ¼ load

PART 3 – EXECUTION

3.01 INSTALLERS

A. Team Texas/Germany

3.02 INSTALLATION

A. Special Techniques

1. See the General Installation Manual and Use and Care Guide

3.03 PROTECTION

A. All receptacles on the generator are protected against the shock hazard of ground fault current by a ground fault circuit interrupter (GFCI). The GFCI has TEST and RESET buttons and is connected to the circuit breaker.

B. The GFCI will not protect against short circuits or overloads.

C. Observe the following precautions to ensure proper GFCI operation and to reduce shock hazards.

1. Use grounded 3-conductor extension cords, tools, and appliances, or double-insulated tools and appliances.

2. Inspect cords and plugs, and replace if damaged.

3. Do not use cord lengths greater than 164 feet, and do not use multiple tools and appliances with built-in noise filters. Such use may activate the GFCI and trip the circuit breaker.

4. The generator ground terminal is connected to the frame of the generator, the metal non-current carrying parts of the generator, and the ground terminals of each receptacle.

3.04 MAINTENANCE

A. Scheduled maintenance is recommended to maintain optimal output performance. Sustained high-load or high-temperature operation, or use in unusually wet or dusty conditions, will require more frequent service.

B. Keep engine clean and well-oiled to maintain the power output levels.

C. It is recommended to change the oil in the engine twice or more per year. Depending on frequency of use. It is recommended to clean as needed. A mild, non-abrasive detergent may be applied for persistent dirt.

D. It is also recommended to inspect the mechanical and electrical connections annually.

KOMATSU

BBX50 series **FEATURE BROCHURE**

Cushion Tire Lift Trucks
4,000 – 6,500 lbs. Capacity
Total AC Electric
36/48 Dual Voltage System



KOMATSU FORKLIFT



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ISO 9001 CERTIFIED

END OF SECTION 41 65 16