

PROJECT MANUAL

U.S. DEPARTMENT OF ENERGY SOLAR DECATHLON 2011



BRINGING SOLAR TO THE SUNSHINE STATE!

U.S. DEPARTMENT OF
ENERGY

 **NREL**
NATIONAL RENEWABLE ENERGY LABORATORY

FLORIDA INTERNATIONAL UNIVERSITY

School of Architecture

Modesto A. Maidique Campus

11200 SW 8th Street PCA 386 A

Miami, Florida, 33199, USA

Prof. Marilys Nepomechie, FAIA

Marilys.Nepomechie@fiu.edu

Tel. 305.348.1887 Fax. 305.348.2650

Table of Contents

Table of Contents	2
Summary of Changes.....	4
<i>[01/11/2011] Revision 1</i>	<i>4</i>
<i>[03/22/2011] Revision 2</i>	<i>4</i>
<i>[05/02/2011] Revision 3</i>	<i>4</i>
<i>[08/11/2011] Revision 4</i>	<i>4</i>
Rules Compliance Checklist	5
Detailed Water Budget.....	8
Summary of Unlisted Electrical Components.....	10
Summary of Reconfigurable Features	11
Interconnection Application Form for Solar Decathlon 2011	12
Energy Analysis Results and Discussion.....	13
Construction Specifications	20
Division 01 - General Requirements.....	41
Division 04 – Masonry.....	49
Division 05 – Metals	21
Division 06 – Wood, Plastics, and Composites	40
Division 07 – Thermal and Moisture Protection	93
Division 08 – Openings.....	175
Division 09 – Finishes	196
Division 10 – Specialties	213
Division 11 – Equipment	230
Division 12 – Furnishings.....	239
Division 22 – Plumbing.....	253
Division 26 – Electrical.	326
Division 28 – Electronic Safety and Security.	326
Division 31 – Earthwork.....	331
Division 32 – Exterior Improvements.....	326
Division 33 – Utilities.....	326
Division 41 – Material Processing and Handling Equipment.....	362
Division 48 – Electrical Power Generation	368

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



Summary of Changes

Significant changes to the project manual that have occurred between submissions have been outlined below. The Construction Drawings should also be reviewed for relevant revisions.

[01/11/2011] Revision 1

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

- Complete update of all contents within manual

[03/22/2011] Revision 2

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

- Complete update of all contents within manual

[05/2/2011] Revision 3

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

- Complete update of all contents within manual

[08/11/2011] Revision 4

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

- Final submission

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	0 Sheets
Rule 4-2	Construction Equipment	Specifications for heavy machinery	0-602 ,0-603
Rule 4-3	Ground Penetration	Drawing(s) showing the locations and depths of all ground penetrations on the competition site	E-501
Rule 4-4	Impact on the Turf	Drawing(s) showing the location, contact area, and soil-bearing pressure of every component resting directly on the turf	S-101, S-111
Rule 4-5	Generators	Specifications for generators	Spec 41 65 16
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-101, P-104
Rule 4-6	Spill Containment	Specifications for all equipment, containers, and pipes that will contain fluids at any point during the event	Spec 22 11 16
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	S-501
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-501
Rule 5-2	Solar Envelope Dimensions	Drawing(s) showing the location of all house and site components relative to the solar envelope	G-201, G-202
Rule 5-2	Solar Envelope Dimensions	List of solar envelope exemption requests accompanied by justifications and drawing references	N/A
Rule 6-1	Structural Design Approval	List of, or marking on, all drawing and project manual sheets that have been or 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-001 – S 523
Rule 6-2	Finished Square Footage	Drawing(s) showing all information needed by the rules officials to measure the finished square footage electronically	G-101

Rule 6-2	Finished Square Footage	Drawing(s) showing all movable components that may increase the finished square footage if operated during contest week	N/A
Rule 6-3	Entrance and Exit Routes	Drawing(s) showing the accessible public tour route and the ground surface area that will be covered by organizer-provided walkway material	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	L-101
Rule 7-2	Watering Restrictions	Drawing(s) showing the layout and operation of grey water irrigation systems	N/A
Rule 8-1	PV Technology Limitations	Specifications for photovoltaic components	Spec 26 31 00
Rule 8-3	Batteries	Drawing(s) showing the location(s) and quantity of all primary and secondary batteries and stand-alone, PV-powered devices	L-101
Rule 8-3	Batteries	Specifications for all primary and secondary batteries and stand-alone, PV-powered devices	L-101
Rule 8-4	Desiccant Systems	Drawing(s) describing the operation of the desiccant system	N/A
Rule 8-4	Desiccant Systems	Specifications for desiccant system components	N/A
Rule 8-5	Village Grid	Drawing(s) showing the locations of the photovoltaics, inverter(s), terminal box, meter housing, service equipment, and grounding means	E201 – E501
Rule 8-5	Village Grid	Specifications for the photovoltaics, inverter(s), terminal box, meter housing, service equipment, and grounding means	Spec 26 05 26, 48 19 16, 26 24 16, 26 27 13,
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-603
Rule 8-5	Village Grid	Site plan showing the house, decks, ramps, tour paths, and terminal box	G-103
Rule 8-5	Village Grid	Elevation(s) showing the meter housing, main utility disconnect, and other service equipment	M-201
Rule 9-1	Container Locations	Drawing(s) showing the location of all liquid containers relative to the finished square footage	L-102
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. EDT or between 8 a.m. and 4 p.m. solar time on October 1	S-521

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	L-102
Rule 9-3	Greywater Reuse	Drawing(s) showing the layout and operation of greywater reuse systems	N/A
Rule 9-4	Rainwater Collection	Drawing(s) showing the layout and operation of rainwater collection systems	L-101
Rule 9-6	Thermal Mass	Drawing(s) showing the locations of liquid-based thermal mass systems	N/A
Rule 9-6	Thermal Mass	Specifications for components of liquid-based thermal mass systems	N/A
Rule 9-7	Greywater Heat Recovery	Drawing(s) showing the layout and operation of greywater heat recovery systems	N/A
Rule 9-8	Water Delivery	Drawing(s) showing the complete sequence of water delivery and distribution events	P-101
Rule 9-8	Water Delivery	Specifications for the containers to which water will be delivered	P-101
Rule 9-9	Water Removal	Drawing(s) showing the complete sequence of water consolidation and removal events	P-101
Rule 9-9	Water Removal	Specifications for the containers from which water will be removed	P-101
Rule 11-4	Public Exhibit	Interior and exterior plans showing entire accessible tour route	G-103

Detailed Water Budget

DETAILED WATER BUDGET

Hot Water Demands		2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM	7:30 PM	8:00 PM	8:30 PM	9:00 PM	9:30 PM	10:00 PM	Total (gal)
Contest 7	Hot Water (110 degrees)																	
	Fri, 9/23/2011 (Day 10)								18									18
	Sat, 9/24/2011												18		18			36
	Sun, 9/25/2011												18		18			36
	Mon, 9/26/2011				18			18				18						54
	Tues, 9/27/2011					18			18									36
	Wed, 9/28/2011						18		18									36
	Thurs, 9/29/2011									18					18			36
Fri, 9/30/2011							18	18									36	

Supply

Requirement																		288
--------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	------------

Dishwasher (120 degrees)		2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM	7:30 PM	8:00 PM	8:30 PM	9:00 PM	9:30 PM	10:00 PM	Total (gal)
Contest 8-5	Dishwasher (120 degrees)																	
	Fri, 9/23/2011					5.3												5.3
	Sat, 9/24/2011																	0
	Sun, 9/25/2011										5.3							5.3
	Mon, 9/26/2011																	0
	Tues, 9/27/2011		5.3															5.3
	Wed, 9/28/2011																	0
	Thurs, 9/29/2011			5.3														5.3
Fri, 9/30/2011			5.3														5.3	

Supply

Requirement																		26.5
--------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	-------------

Water Demands		2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM	7:30 PM	8:00 PM	8:30 PM	9:00 PM	9:30 PM	10:00 PM	Water Needed
Contest 8-3	Clothes Washer																	
	Fri, 9/23/2011					14												14
	Sat, 9/24/2011										14							14
	Sun, 9/25/2011										14							14
	Mon, 9/26/2011																	0
	Tues, 9/27/2011	28																28
	Wed, 9/28/2011																	0
	Thurs, 9/29/2011				28													28
Fri, 9/30/2011				14													14	

Supply

Requirement																		112
--------------------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	------------

Cooking		2:30 PM	3:00 PM	3:30 PM	4:00 PM	4:30 PM	5:00 PM	5:30 PM	6:00 PM	6:30 PM	7:00 PM	7:30 PM	8:00 PM	8:30 PM	9:00 PM	9:30 PM	10:00 PM	Total (gal)
Contest 9-2	Cooking																	
	Fri, 9/23/2011						2											2
	Sun, 9/25/2011										2							2

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



	Mon, 9/26/2011																			0
	Tues, 9/27/2011																			0
	Wed, 9/28/2011			2																2
	Thurs, 9/29/2011																			0
	Fri, 9/30/2011				2															2
<i>Supply Requirement</i>																				8
Contest 9-3	Dinner Parties																			
	Fri, 9/23/2011																			0
	Sat, 9/24/2011																			0
	Sun, 9/25/2011																			0
	Mon, 9/26/2011	5																		5
	Tues, 9/27/2011																			0
	Wed, 9/28/2011		5																	5
	Thurs, 9/29/2011																			0
	Fri, 9/30/2011																			0
<i>Supply Requirement</i>																				10
Contest 9-5	Movie Night																			
	Fri, 9/23/2011																			0
	Sat, 9/24/2011																			0
	Sun, 9/25/2011																			0
	Mon, 9/26/2011																			0
	Tues, 9/27/2011	5																		5
	Wed, 9/28/2011																			0
	Thurs, 9/29/2011																			0
	Fri, 9/30/2011																			0
<i>Supply Requirement</i>																				5
Daily Testing	Fri, 9/23/2011	4																		4
	Sat, 9/24/2011	4																		4
	Sun, 9/25/2011	4																		4
	Mon, 9/26/2011	4																		4
	Tues, 9/27/2011	4																		4
	Wed, 9/28/2011	4																		4
	Thurs, 9/29/2011	4																		4
	Fri, 9/30/2011	4																		4
<i>Supply Requirement</i>																				32
Initial Hot Water Tank Fill																				80
Leaks and spills																				50
Fire Protection																				300
TOTAL WATER DRAWS																				906.5
LANDSCAPE																				500
TOTAL WATER BUDGET																				1406.5

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



Summary of Unlisted Electrical Components

All electrical components used in the design of the Florida International University Solar Decathlon Team house shall carry an approved agency's listing per Section 6.7 of the Solar Decathlon 2011 Building Code.

Summary of Reconfigurable Features

Reconfigurable features in the Florida International University Perform[d]ancehouse include the following:

Architecture

- Operable louvers and shading canopy
- Operable sliding bug screen
- Operable folding glass doors on the North, East, and West
- Operable windows on the South

Interiors

- Retractable roller shades on the North, East and West
- Alternate dining configuration for the dining competition
- Round table for four converts to an oval table for eight people
- Additional countertop surface extends out from the Northeast corner pantry cabinet
- A computer workstation is housed within the Northwest corner cabinet
- Bed folds up into bedroom cabinetry and serves as additional office for the client

Please see sheets A-603 and A-604 for Movable Component Diagrams.

Note: Operable panels to remain in open or closed positions during Public Exhibit Hours. Reconfigurations of the operable panels will only be demonstrated during the Architecture and Market Appeal Juries and, if appropriate, the Engineering and Communications Juries as per Appendix B-2b.

Note: Murphy bed to remain in open or closed positions during Public Exhibit Hours. Reconfigurations of the Murphy bed will only be demonstrated during the Architecture and Market Appeal Juries and, if appropriate, the Engineering and Communications Juries as per Appendix B-2b.

Note: Additional countertop surface to remain in open or closed positions during Public Exhibit Hours. Reconfigurations of the additional countertop surface will only be demonstrated during the Architecture and Market Appeal Juries and, if appropriate, the Engineering and Communications Juries as per Appendix B-2b.

Interconnection Application Form for Solar Decathlon 2011

Florida International University LOT 206

PV SYSTEMS

Module Manufacturer	Short Description of Array	DC Rating of Array (sum of the DC ratings)
Sunpower	SPR-315E-WHT-D (320W); 28 modules (2 x 14); 2 strings with string power input 4.48 kW	8.96 kW

Total DC power of all arrays is: 8.96 kW

INVERTERS

Inverter Manufacturer	Model Number	Voltage	Rating (kVA or KW)	Quantity
Sunny Boy	SB 4000US (with integrated DC Disconnect)	240	Max. AC Power: 4.05 kW; Max DC Power: 4.24 kW	2

Total AC power of all inverters is: 8.10 kW

1. One-Line Electrical schematic – the loads do not have to be detailed. Refer to Sheet E-601
2. Calculations of service/feeder net computer load and neutral load (NEC 220). Refer to Sheet E-603
3. Plan view of the lot showing the house, decks, ramps, tour paths, the service point and the distribution panel or load center. Refer to G-103

Provide the Team's "Electrical Engineer" contact in the "Team Officer Contact Info" database on the Yahoo Group as required per Rule 3-2.

Energy Analysis Results and Discussion

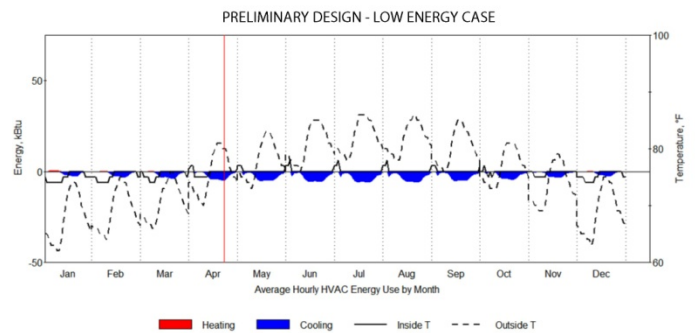
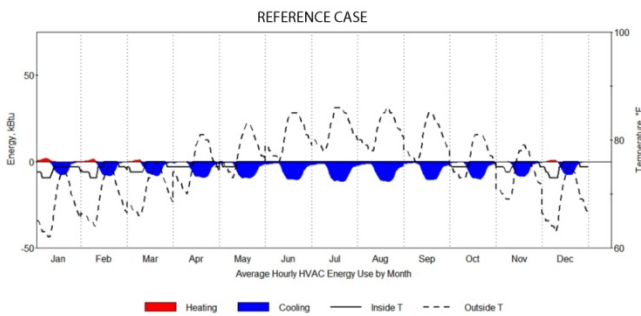
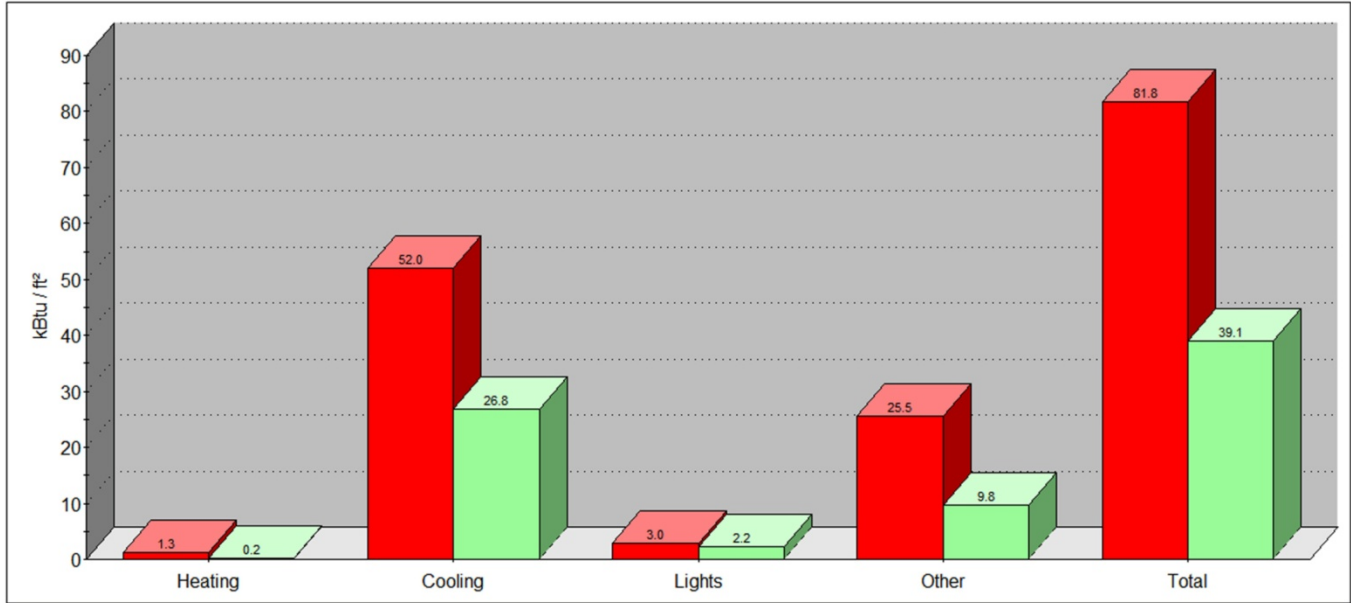
An interpretive energy analysis created in Energy 10 directly influenced key decision-making concerning the design of the mechanical systems and building envelope materials used in our perform[D]ance House design. The computer generated energy model was accomplished with the assistance of design studio instructor, Thomas Spiegelhalter at Florida International University.

The process began by creating two models. The first model performing as the Reference Case which represents a home of similar size and proportion comparative to the proposed design specifications was modeled to represent commonplace building construction practices and materiality. The second model is comparative to our benchmark, representing the initial design parameters with the NanaWall configurations on the east, west, and north facades. It also represents the configuration selected for the wall and roof insulation materials. The results demonstrated that the initial design required about 84% less energy in heating and 48% less energy in cooling. Overall energy demand was reduced in our working design by as much as 52% compared to the Reference Case.

The results of our initial findings suggested additional wall insulation increased R-value and the extension of wall sections on the east and west facades prior to the analysis were sufficient in meeting code. The HVAC system was sufficiently simplified to eliminate the need for ducting systems and then adjusted to the necessary sizing as required for the conditioned space. The modifications to the design allow for increased performance without significantly impacting the existing design intentions pursued in the preliminary design.

ANNUAL ENERGY CONSUMPTION (KBTU)

■ Reference Case ■ Low-Energy Case FIU





Generated by REScheck-Web Software
Compliance Certificate

Energy Code: **2009 IECC**
 Location: **Miami, Florida**
 Construction Type: **Single Family**
 Building Orientation: **Bldg. faces 180 deg. from North**
 Glazing Area Percentage: **43%**
 Heating Degree Days: **139**
 Climate Zone: **1**

Construction Site:

Owner/Agent:

Designer/Contractor:

Compliance: Passes using UA trade-off

Compliance: **69.1% Better Than Code** Maximum UA: **819** Your UA: **253** Maximum SHGC: **0.30** Your SHGC: **0.20**

The % Better or Worse Than Code index reflects how close to compliance the house is based on code trade-off rules.
 It DOES NOT provide an estimate of energy use or cost relative to a minimum-code home.

Assembly	Gross Area or Perimeter	Cavity R-Value	Cont. R-Value	Glazing or Door U-Factor	UA
Ceiling: Steel Joist/Rafter, 24in. o.c., 2x10	740	60.0	60.0		7
Wall: Steel Frame, 24in. o.c. Orientation: Back	363	50.0	50.0		2
Window: Metal, Thermal Break, 2 Pane w/ Low-E SHGC: 0.20 Orientation: Back	216			0.390	84
Wall: Steel Frame, 24in. o.c. Orientation: Front	363	50.0	50.0		3
Window: Metal, Thermal Break, 2 Pane w/ Low-E SHGC: 0.20 Orientation: Front	144			0.390	56
Door: Glass SHGC: 0.20 Orientation: Front	42			0.390	16
Wall: Steel Frame, 24in. o.c. Orientation: Left Side	297	50.0	50.0		5
Wall: Steel Frame, 24in. o.c. Orientation: Right Side	297	50.0	50.0		2
Window: Metal, Thermal Break, Double Pane SHGC: 0.20 Orientation: Right Side	24			0.390	9
Window: Metal, Thermal Break, 2 Pane w/ Low-E SHGC: 0.20 Orientation: Right Side	144			0.390	56
Floor: Steel Frame, 24in. o.c., 2x8, Over Unconditioned Space	740	40.0	40.0		13

Compliance Statement: The proposed building design described here is consistent with the building plans, specifications, and other calculations submitted with the permit application. The proposed building has been designed to meet the 2009 IECC requirements in REScheck-Web and to comply with the mandatory requirements listed in the REScheck Inspection Checklist.

Name - Title

Signature

Date

Project Title:
 Data filename:

Report date: 05/11/11
 Page 1 of 4



Generated by REScheck-Web Software
Inspection Checklist

Ceilings:

- Ceiling: Steel Joist/Rafter, 24in. o.c., 2x10, R-60.0 cavity + R-60.0 continuous insulation

Comments: _____

Above-Grade Walls:

- Wall: Steel Frame, 24in. o.c., R-50.0 cavity + R-50.0 continuous insulation

Comments: _____

- Wall: Steel Frame, 24in. o.c., R-50.0 cavity + R-50.0 continuous insulation

Comments: _____

- Wall: Steel Frame, 24in. o.c., R-50.0 cavity + R-50.0 continuous insulation

Comments: _____

- Wall: Steel Frame, 24in. o.c., R-50.0 cavity + R-50.0 continuous insulation

Comments: _____

Windows:

- Window: Metal, Thermal Break, 2 Pane w/ Low-E, U-factor: 0.390

For windows without labeled U-factors, describe features:

#Panes ____ Frame Type _____ Thermal Break? ____ Yes ____ No

Comments: _____

- Window: Metal, Thermal Break, 2 Pane w/ Low-E, U-factor: 0.390

For windows without labeled U-factors, describe features:

#Panes ____ Frame Type _____ Thermal Break? ____ Yes ____ No

Comments: _____

- Window: Metal, Thermal Break, Double Pane, U-factor: 0.390

For windows without labeled U-factors, describe features:

#Panes ____ Frame Type _____ Thermal Break? ____ Yes ____ No

Comments: _____

- Window: Metal, Thermal Break, 2 Pane w/ Low-E, U-factor: 0.390

For windows without labeled U-factors, describe features:

#Panes ____ Frame Type _____ Thermal Break? ____ Yes ____ No

Comments: _____

Doors:

- Door: Glass, U-factor: 0.390

Comments: _____

Floors:

- Floor: Steel Frame, 24in. o.c., 2x8, Over Unconditioned Space, R-40.0 cavity + R-40.0 continuous insulation

Comments: _____

Floor insulation is installed in permanent contact with the underside of the subfloor decking.

Solar Heat Gain Coefficient:

- The area-weighted average Solar Heat Gain Coefficient (SHGC) of all glazing cannot exceed 0.4. SHGC values are determined in accordance with the NFRC test procedure or taken from the default table.

Air Leakage:

Project Title:
Data filename:

Report date: 05/11/11
Page 2 of 4

- Joints (including rim joist junctions), attic access openings, penetrations, and all other such openings in the building envelope that are sources of air leakage are sealed with caulk, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.
- Air barrier and sealing exists on common walls between dwelling units, on exterior walls behind tubs/showers, and in openings between window/door jambs and framing.
- Recessed lights in the building thermal envelope are 1) type IC rated and ASTM E283 labeled and 2) sealed with a gasket or caulk between the housing and the interior wall or ceiling covering.
- Access doors separating conditioned from unconditioned space are weather-stripped and insulated (without insulation compression or damage) to at least the level of insulation on the surrounding surfaces. Where loose fill insulation exists, a baffle or retainer is installed to maintain insulation application.
- Wood-burning fireplaces have gasketed doors and outdoor combustion air.

Air Sealing and Insulation:

- Building envelope air tightness and insulation installation complies by either 1) a post rough-in blower door test result of less than 7 ACH at 33.5 psf OR 2) the following items have been satisfied:
 - (a) Air barriers and thermal barrier: Installed on outside of air-permeable insulation and breaks or joints in the air barrier are filled or repaired.
 - (b) Ceiling/attic: Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed.
 - (c) Above-grade walls: Insulation is installed in substantial contact and continuous alignment with the building envelope air barrier.
 - (d) Floors: Air barrier is installed at any exposed edge of insulation.
 - (e) Plumbing and wiring: Insulation is placed between outside and pipes. Batt insulation is cut to fit around wiring and plumbing, or sprayed/blown insulation extends behind piping and wiring.
 - (f) Corners, headers, narrow framing cavities, and rim joists are insulated.
 - (g) Shower/tub on exterior wall: Insulation exists between showers/tubs and exterior wall.

Materials Identification and Installation:

- Materials and equipment are installed in accordance with the manufacturer's installation instructions.
- Insulation is installed in substantial contact with the surface being insulated and in a manner that achieves the rated R-value.
- Materials and equipment are identified so that compliance can be determined.
- Manufacturer manuals for all installed heating and cooling equipment and service water heating equipment have been provided.
- Insulation R-values and glazing U-factors are clearly marked on the building plans or specifications.

Duct Insulation:

- Supply ducts in attics are insulated to a minimum of R-8. All other ducts in unconditioned spaces or outside the building envelope are insulated to at least R-6.

Duct Construction and Testing:

- Building framing cavities are not used as supply ducts.
- All joints and seams of air ducts, air handlers, filter boxes, and building cavities used as return ducts are substantially airtight by means of tapes, mastics, liquid sealants, gasketing or other approved closure systems. Tapes, mastics, and fasteners are rated UL 181A or UL 181B and are labeled according to the duct construction. Metal duct connections with equipment and/or fittings are mechanically fastened. Crimp joints for round metal ducts have a contact lap of at least 1 1/2 inches and are fastened with a minimum of three equally spaced sheet-metal screws.

Exceptions:

- Joint and seams covered with spray polyurethane foam.
- Where a partially inaccessible duct connection exists, mechanical fasteners can be equally spaced on the exposed portion of the joint so as to prevent a hinge effect.
- Continuously welded and locking-type longitudinal joints and seams on ducts operating at less than 2 in. w.g. (500 Pa).
- Duct tightness test has been performed and meets one of the following test criteria:
 - (1) Postconstruction leakage to outdoors test: Less than or equal to 59.2 cfm (8 cfm per 100 ft² of conditioned floor area).
 - (2) Postconstruction total leakage test (including air handler enclosure): Less than or equal to 88.8 cfm (12 cfm per 100 ft² of conditioned floor area) pressure differential of 0.1 inches w.g.
 - (3) Rough-in total leakage test with air handler installed: Less than or equal to 44.4 cfm (6 cfm per 100 ft² of conditioned floor area) when tested at a pressure differential of 0.1 inches w.g.
 - (4) Rough-in total leakage test without air handler installed: Less than or equal to 29.6 cfm (4 cfm per 100 ft² of conditioned floor area).

Heating and Cooling Equipment Sizing:

- Additional requirements for equipment sizing are included by an inspection for compliance with the International Residential Code.
- For systems serving multiple dwelling units documentation has been submitted demonstrating compliance with 2009 IECC Commercial Building Mechanical and/or Service Water Heating (Sections 503 and 504).

Circulating Service Hot Water Systems:

- Circulating service hot water pipes are insulated to R-2.
- Circulating service hot water systems include an automatic or accessible manual switch to turn off the circulating pump when the system is not in use.

Heating and Cooling Piping Insulation:

- HVAC piping conveying fluids above 105 degrees F or chilled fluids below 55 degrees F are insulated to R-3.

Swimming Pools:

- Heated swimming pools have an on/off heater switch.
- Pool heaters operating on natural gas or LPG have an electronic pilot light.
- Timer switches on pool heaters and pumps are present.

Exceptions:

Where public health standards require continuous pump operation.

Where pumps operate within solar- and/or waste-heat-recovery systems.

- Heated swimming pools have a cover on or at the water surface. For pools heated over 90 degrees F (32 degrees C) the cover has a minimum insulation value of R-12.

Exceptions:

Covers are not required when 60% of the heating energy is from site-recovered energy or solar energy source.

Lighting Requirements:

- A minimum of 50 percent of the lamps in permanently installed lighting fixtures can be categorized as one of the following:
 - (a) Compact fluorescent
 - (b) T-8 or smaller diameter linear fluorescent
 - (c) 40 lumens per watt for lamp wattage <= 15
 - (d) 50 lumens per watt for lamp wattage > 15 and <= 40
 - (e) 60 lumens per watt for lamp wattage > 40

Other Requirements:

- Snow- and ice-melting systems with energy supplied from the service to a building shall include automatic controls capable of shutting off the system when a) the pavement temperature is above 50 degrees F, b) no precipitation is falling, and c) the outdoor temperature is above 40 degrees F (a manual shutoff control is also permitted to satisfy requirement 'c').

Certificate:

- A permanent certificate is provided on or in the electrical distribution panel listing the predominant insulation R-values; window U-factors; type and efficiency of space-conditioning and water heating equipment. The certificate does not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels.

NOTES TO FIELD: (Building Department Use Only)

Project Title:
Data filename:

Report date: 05/11/11
Page 4 of 4



2009 IECC Energy Efficiency Certificate

Insulation Rating		R-Value	
Ceiling / Roof		120.00	
Wall		100.00	
Floor / Foundation		80.00	
Ductwork (unconditioned spaces):		_____	
Glass & Door Rating		U-Factor	SHGC
Window		0.39	0.20
Door		0.39	0.20
Heating & Cooling Equipment		Efficiency	
Heating System:	_____	_____	
Cooling System:	_____	_____	
Water Heater:	_____	_____	
Name: _____		Date: _____	
Comments:			

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



Construction Specifications

Division 01 - General Requirements

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



Division 04 - Masonry

04 72 00 Concrete Masonry Unit

SECTION 047200 – CONCRETE MASONRY UNIT

Division 05 – Metals

05 12 00 Structural Steel

SECTION 051200 - STRUCTURAL STEEL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

- A. The work specified in this section includes all labor, materials, equipment, permits, and services necessary for the furnishing, fabrication and erection of structural steel and related work, complete, in accordance with the Drawings and as specified herein, including the detailing of all connections.
- B. Structural steel is that work defined in AISC “Code of Standard Practice for Steel Buildings and Bridges” and as otherwise shown on Drawings.

1.03 RELATED SECTIONS SPECIFIED ELSEWHERE

- A. Division 03 Section “Cast-In-Place Concrete” for Grouting Base Plates.
- B. Division 03 Section “Concrete Formwork” for Placing Anchor Rods.
- C. Division 05 Section “Miscellaneous Metal Fabrication.”
- D. Division 09 Section “Special Coatings.”

1.04 RESPONSIBILITIES

- A. The Engineer of Record is responsible for the design of the steel framing and connections as presented in the Contract Documents. No changes to the requirements of the Contract Documents will be considered without complying with the applicable requirements for substitutions. This includes, but is not limited to, connection details, member sizes or steel grades.

- B. The fabricator is responsible for the preparation of Shop and Erection Drawings pursuant to the requirements of the Contract Documents. These drawings shall be prepared by or under the direct supervision and control of a Florida Licensed Engineer, who shall submit a letter to the Architect/Engineer stating such. The fabricator's Engineer shall, where necessary, complete the details presented on the Contract Documents and adapt those details to accommodate the atypical conditions. These drawings do not require his signature and seal. Acceptance of the Shop and Erection Drawings by the Architect/Engineer does not relieve the fabricator of the responsibility for accuracy of detail dimensions on the shop drawings and the general fit-up of parts to be assembled in the field.
- C. Environmental Objective Documentation: For each steel product specified a document signed by the manufacturer/fabricator stating compliance with the requirements of the environmental objectives.
- D. The fabricator is responsible for the design and detailing of all substitutions, which shall be prepared by or under the direct supervision and control of a Delegated Engineer as defined in the Contract Documents.
- E. The fabricator is responsible for the coordination of all surveyed field conditions and field measurements necessary for the detailing, fabrication and erection of their work. All field measurements shall be provided on the shop drawings prior to submittal.
- F. The Engineer of Record is responsible for the structural adequacy of the structure in the completed project. The erector is responsible for the means, methods and safety of the erection, including all temporary guys, beams, falsework, cribbing or other elements required for the erection operation. If the erector is unsure of these requirements, he shall retain a Florida Licensed Engineer to determine and design all temporary requirements.

1.05 SUBMITTALS

- A. Submit in accordance with conditions of Contract and Division 01 Specification Sections.
- B. Environmental Objective Documentation: Provide documentation of level of compliance with the following:
 - 1. Product Data for LEED credit: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - 2. The products supplied are manufactured/fabricated within a radius of 500 miles from the project site and/or the manufactured products are extracted, or recovered within 500 miles of the project site.
- C. Qualifications: Include lists of Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- D. Product Data for each type of product specified, including the following:
1. Bolts, nuts, and washers, including mechanical properties.
 2. Structural steel coatings.
- E. Fabricator's certification that the chemical and physical properties of the following materials comply with the Project requirements:
1. Structural steel
 2. Bolts, nuts and washers.
 3. Welding electrodes.
- F. Welder's certification. Submit to Owner's inspection agency.
- G. Letter from Florida Licensed Engineer responsible for shop drawings.
- H. The fabricator shall submit details and complete calculations that clearly identify proposed substitutions for Engineer's review prior to preparation of detailed shop drawings. Proposed variations to details shown on the Contract Drawings will be considered and such variations must have preliminary acceptance prior to the preparation of detailed shop drawings. The details and calculations shall clearly show the capacity of the connections designed by the fabricator. The calculations shall show details of the assembled joint with all bolts and welds required. All design calculations, drawings and details shall be signed, sealed and dated by the Delegated Engineer.
- I. Submit to the Architect/Engineer for acceptance shop and erection drawings for all structural steel components, prepared by or under the direct supervision and control of a Florida Licensed Engineer. See "Shop Drawings and Other Submittals" notes regarding the possible reproduction of Structural Drawings for use as shop or erection drawings. Drawings shall include complete details, dimensions, schedules and procedures for the fabrication, assembly, and sequence of erection.
1. Include details of cuts, connections, camber, holes, threaded fasteners and other pertinent data. Indicate welds by standard AWS A2.4 symbols and show size, length, and type of each weld. Show shop welds on shop drawings and field welds on erection drawings.
 2. Provide setting drawings, templates, and directions for installation of anchor rods, embeds and other anchorages to be installed by others.
 3. Indicate surface preparation, such as primed, galvanized, etc., of each surface of each piece.
- J. Before welding is started, the steel fabricator and erector, as applicable, shall submit to the Architect/Engineer a signed and sealed statement by a Florida Licensed Engineer, who specializes in the design of weldments, that he/she has provided written welding procedures for this Project, establishing the welding process,

sequence of assembly, preheat, interpass and postheat requirements in general if high residual stresses are present, and in particular for all members requiring partial or complete penetration groove welding.

- K. Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:
 - 1. Structural steel including chemical and physical properties.
 - 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 3. Tension-control, high-strength bolt-nut-washer assemblies.
 - 4. Shop primers.
 - 5. Nonshrink grout.
- L. Fabricator's Quality Control Program.
- M. Fabricator's shop inspection and test reports.
- N. Substantiating data for primer on Class A faying surface.

1.06 CODES AND STANDARDS

- A. Florida Building Code, 2007 Edition, with 2009 Supplements.
- B. AISC "Codes of Standard Practice for Steel Buildings and Bridges".
 - 1. Paragraph 4.4. "Approval" is modified such that the Structural Engineer will return submittals to the Architect/Engineer within ten working days from time of receipt.
- C. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
- D. AISC's "Specification for Structural Steel Buildings-Allowable Stress Design and Plastic Design."
- E. AISC's "Specification for the Design of Steel Hollow Structural Sections."
- F. AISC "Specifications for Structural Joints using ASTM A 325 or A490 Bolts" approved by the Research Council on Structural Connections of the Engineering Foundation.
- G. RCSC's "Specification for Structural Joints using ASTM A325 or A490 Bolts". Approved June 30, 2004.
- H. AWS D1.1 "Structural Welding Code - Steel".
- I. ASTM A 6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use".

- J. S.S.P.C. Society for Protective Coatings.
- K. Occupational Safety and Health Act (OSHA), as amended to date.

1.07 QUALITY ASSURANCE

- A. Fabricator Qualifications: Fabricator shall have an AISC Quality Certification in the category of Standard for Steel Building Structures (STD), with a Sophisticated Paint Systems endorsement and shall be SSPC Certified as a Qualified Paint Applicator with a minimum five years of documented successful experience on equivalent projects. Submit copy of AISC Certifications, SSPC Certification and résumé demonstrating equivalent project experience.
- B. Erector Qualifications: Erector shall be an AISC Certified Steel Erector (CSE) or Advanced Certified Steel Erector (ACSE) with a minimum five years of documented successful experience on equivalent projects. Submit copy of AISC Certification and résumé demonstrating equivalent project experience.
- C. Qualifications for welding work: Qualify welding procedures and operators in accordance with AWS “Standard Qualification Procedure”.
 - 1. The Fabricator for shop welds and the Erector for field welds shall retain a Florida Licensed Engineer, who specializes in the design of weldments to prepare a written welding program pursuant to the requirements of ANSI/AWS D1.1. The program shall include all necessary Welding Procedure Specifications (WPS), all necessary requirements for qualification testing of WPS and welding personnel. The WPS shall include the welding process, sequence of assembly, preheat, interpass and postheat requirements. Welded joints of heavy sections and plates 2 inch thick and greater shall be detailed to limit the amount of weld metal. Double bevels shall be used in lieu of single bevels. Welding shall start at the most restrained part of the weldment and proceed to the least restrained.
 - 2. The Fabricator and Erector, as applicable, shall conduct all necessary tests required by ANSI/AWS D1.1 to qualify the WPS.
 - 3. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests for the welding process and position used and have been continuously employed as a welder since certification. If recertification of welders is required, retesting will be Contractor’s responsibility.
- D. Stud Application Qualification Test:
 - 1. Prior to erection, conduct stud application qualification tests in accordance with AWS D1.1 Chapter 7.6 and Annex IX. The tests are the responsibility of the Contractor or stud applicator.
 - 2. Prepare specimen plates of A992 steel, minimum 1/2 inch thick, with an SP-6 surface preparation.

3. Weld a minimum of ten (10) studs through steel deck to the prepared plate(s). The studs and steel deck shall be of the same type as specified for use in the project. Test the studs by the bend test specified in AWS 7.6.6 or Annex IX.
 4. If the tests are conducted by other than the Owner's testing agency, that agency shall be properly notified so that they may be present to witness the entire test procedure.
- E. The Fabricator shall provide a system of quality control, including shop welding inspections and testing, to ensure that the minimum standards specified herein are attained. Submit to Owner, Architect, and Engineer complete details of the quality control program to be used and all testing and inspection reports. Visually inspect 100% of shop welds. Also, as a minimum, perform non-destructive tests of welds in conformance with AWS D1.1 as follows:
1. Splices: 100%.
 2. Full penetration welds: 100% of cantilevered members, 50% for all others.
 3. Partial penetration welds: 25%.
 4. Fillet welds: 10%.
- F. The fabricator may use the following examination methods, in descending order of importance. When a particular examination method for a joint is unfeasible, the highest order method that is practicable shall be used. Standard of acceptance shall be in accordance with AWS D1.1.
1. Ultrasonic Method: In accordance with AWS D1.1.
 2. Radiographic Method: In accordance with ASTM E 94 and ASTM E 142, with a minimum quality level of "2-2T". This procedure is limited to the inspection of groove welds in butt joints only and is not to be used for fillet welds.
 3. Magnetic Particle Method: In accordance with ASTM E109. Use for examining partial penetration welds. Percentage of examinations is defined elsewhere in these specifications. The Yoke method may be used only for supplementary surface examination.
 4. Dye Penetrant Examination Method: In accordance with ASTM E165.
- G. Cleaning and lubrication of ASTM F1852 twist-off-type tension-control bolt assemblies is not permitted.
- H. Turn-of-nut method of bolt tightening is not acceptable.
- I. Preconstruction Meeting: There shall be a Preconstruction Meeting with the Owner, Architect, Structural Engineer, Contractor, Fabricator, and Erector to clarify responsibilities and requirements as set forth in Division 01 "Project Management and Coordination".

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work
- B. Deliver anchor rods and anchorage devices which are to be embedded in cast-in-place concrete or masonry in ample time to not delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using plates, platforms, or other supports. Protect steel members and packaged materials from corrosion and deterioration.
- D. Store fasteners components in sealed containers until ready to use. Reseal open containers to prevent contamination by moisture or other deleterious substances. Store closed containers in a protective shelter to protect fasteners from dirt and moisture. Only as many fastener components as are anticipated to be installed during the work shift shall be taken from protective storage. Fastener components that are not incorporated into the work shall be returned to protective storage at the end of the work shift. Fasteners from open containers and fasteners that accumulate rust or dirt shall not be used and shall be immediately and permanently removed from the project site.
- E. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.09 ENVIRONMENTAL OBJECTIVES

- A. Manufacturer/Fabricator to supply documentation of level of compliance or non-compliance with the following requirements before consideration as an "Acceptable Manufacturer."
 - 1. All structural steel sections, steel plate, pipes, and HSS shall use steel made in an electric arc furnace (EAF).

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
 - 1. W-Shapes: 60 percent.
 - 2. Channels, Angles, MC Shapes: 60 percent.

3. Plate and Bar: 25 percent.
 4. Cold-Formed Hollow Structural Sections: 25 percent.
 5. Steel Pipe: 25 percent.
 6. All Other Steel Materials: 25 percent.
- C. Structural steel rolled W and WT shapes: ASTM A 992, Fy=50 ksi.
1. Requirements for Group 4 and 5 Members.
 - a. Steel shall be fine, grained killed steel.
 - b. Charpy V-notch impact tests shall be performed according to ASTM A673, "Sampling Procedure for Impact Testing of Structural Steel": The frequency of testing shall be as prescribed in A673; the test temperature shall be 70 F; the absorbed energy shall be 20 ft.-lb.
 - c. The Fabricator shall submit evidence to the Architect/Engineer that the mill has complied with the above requirements.
 2. Mill Inspection: All structural shapes in Group 4 and 5 shall conform to the requirements of ASTM 898, "Straight Beam Ultrasonic Examination of Rolled Steel Structural Shapes" to assure delivery of shapes free of gross internal discontinuities such as pipe, ruptures, or laminations. The Fabricator shall submit to the Architect/Engineer evidence of compliance by the mill with this requirement.
- D. Structural steel rolled M, S, C and MC shapes and Angles: ASTM A 36, Fy=36 ksi.
- E. Structural steel plates and bars: ASTM A 36, Fy=36 ksi.
1. All steel plates exceeding 2" in thickness shall conform to the requirements of ASTM A435, "Straight-Beam Ultrasonic Examination of Steel Plates", to assure delivery of steel plates free of gross internal discontinuities such as pipe, ruptures, or laminations. Plates shall be identified by stamping or stenciling "UT 435" adjacent to marking required by the material specification. The Fabricator shall submit to the Architect/Engineer evidence of compliance by the mill with this requirement.
- F. Cold-formed hollow structural sections (HSS):
1. Round sections: ASTM A500, Grade C, Fy=46 ksi.
 2. Square and Rectangular sections: ASTM A500, Grade B, Fy=46 ksi.
- G. Steel pipe: ASTM A53, Type E or S, Grade B, Fy=35 ksi.
- H. Anchor Rods: ASTM F1554, Grade 55 with Supplementary Requirement S1, hooked.
- I. Anchor Rods: ASTM A449 Type 1 threaded, with nuts and washers each end.

- J. Unfinished threaded fasteners: ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.
 - 1. Provide square head and nuts.
- K. Bolt Lubrication: All bolts shall be well lubricated at time of installation, dry, rusty bolts will not be allowed. Bolts or nuts shall be wax dipped by the bolt supplier or “Johnson’s Stick Wax 140” shall be used with all bolts in the shop or field. Cleaning and lubrication of ASTM 1852 twist-off type tension-control bolts is not permitted.
- L. Electrodes for welding: Comply with AWS D1.1-requirements.
 - 1. For complete-joint penetration groove welds, weld metal shall have a charpy V-notch impact strength of 20 ft./lbs. –20°F.
- M. Structural steel primer paint: SSPC – Paint 11 lead and chromate free, V.O.C. complaint, minimum solids 55% by volume. Use for steel not receiving special coatings or fireproofing. Refer to Architectural Drawings and Division 09.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Kem Bond HS universal Metal Primer; Sherwin Williams.
 - b. Tnemec – Series V10; Tnemec.
 - c. Interlac 573: International Protective Coatings.
 - 2. Provide shop primer and shop applied top coat paint in accordance with Division 09 Section “Special Coatings” where shown on the Architectural Drawings.
 - 3. Steel permanently exposed to the elements that does not receive a coating shall be hot dip galvanized.
- N. Non-metallic shrinkage-resistant grout: Provide in accordance with Section 033000.

2.02 FABRICATION

- A. Shop fabrication and assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and AISC “Code of Standard Practice for Steel Buildings and Bridges” as indicated on final shop drawings. Provide camber in structural members where indicated.
- B. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
- C. Where finishing is required, complete the assembly, including welding before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

- D. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- E. Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.
- F. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- G. Splices in Structural Steel: Splicing of structural steel members in the shop or the field is prohibited without prior approval of the Architect/Engineer. Any member having a splice not shown and detailed on approved shop drawings will be rejected.
- H. Compression Joints: Compression joints which depend on contact bearing as part of the splice capacity shall have the bearing surfaces of individual fabricated pieces prepared to a common plane by milling, sawing, or other suitable means.
- I. Connections:
 - 1. Weld shop connections, as indicated. Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance and quality of welds and for methods used in correcting welding work.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 - 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.
 - 5. At welded beam-column flange joints, weld backing and run-off tabs shall be removed and repaired, including a 5/16" reinforcing fillet weld on the edge below the complete-joint-penetration groove weld. The exception that the top-flange backing is permitted to remain if it is attached to the column flange with a continuous fillet weld on the edge below the complete-joint-penetration groove weld.

6. Bolt field connections, except where welded connections are indicated.

- J. Bearing and Fit-Up of Column Compression Joints: Compression joints of all columns shall have bearing surfaces finished to a common plane by milling, sawing, or other suitable means. Lack of contact bearing must not exceed 1/16", or corrective measures as defined by AISC Section M4.4 shall be required.
- K. Struts and Braces: Connect struts and braces to resist 50% of the allowable tensile strength of the members, unless otherwise specified.
- L. Compression members composed of two or more rolled shapes separated from one another by intermittent fillers shall be connected to one another at such fillers spaced at intervals so that the least slenderness ratio, l/r , of either shape, between the fasteners, does not exceed the governing slenderness ratio of the built-up member.
- M. High-strength Field Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325" (RCSC June 30, 2004).
- N. Field Welded Construction: Comply with AWS D1.1 for procedures, appearance and quality of welds, and method used in correcting welding work.
- O. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- P. Holes for other work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.
- Q. Provide threaded nuts welded to framing, and other specialty items as indicated to receive other work.
- R. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes, or enlarge holes by burning. Drill holes in bearing plates.
- S. Provide weep hole in any confined steel surface capable of retaining water during erection or service. Seal weld as required to prevent migration of water into confined region.

2.03 SHOP PAINTING

- A. Surface preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with SSPC: the Society for Protective Coatings. Use SSPC-SP 6, "Commercial Blast Cleaning" for steel to be painted or receive a coating and SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning" for all other conditions.

- B. Priming: Unless specified otherwise in Division 09 “Special Coatings” comply with the following: Immediately after surface preparation, apply VOC compliant structural steel primer paint in accordance with manufacturer’s instructions and at a rate to provide dry film thickness of not less than 2.5 mils. Use painting methods that result in full coverage of joints, corners, edges and exposed surfaces. Refer to Division 09 Section “Special Coatings” for priming and painting of members to receive special coatings.

Shop prime structural steel, except do not prime:

1. Members or portions of members to be embedded in concrete or mortar. Prime embedded steel that is partially exposed on exposed portions and initial 2” of embedded areas only.
 2. Surfaces that are scheduled to receive sprayed-on fireproofing.
 3. Members that are to be hot dip galvanized.
 4. Surfaces within 2” of welds.
 5. The faying surfaces of slip-critical bolted connections. The exception is for members that receive a coating system. There the faying surfaces should receive a primer providing a Class A surface, with a slip coefficient of 0.33. Submit substantiating data in conformance with Appendix A of the AISC “Specification for Structural Joints”.
 6. Mask off and do not prime a strip 2” wide on any surfaces to receive a row of headed studs or puddle welds.
- C. Steel members which cannot be readily painted after fabrication, such as back-to-back angles and tees, shall be primed and finish coated, or receive two coats of primer, prior to fabrication.
- D. Hot dip galvanize members permanently exposed to the elements, such as cooling tower support steel. Apply zinc coating according to ASTM A123.
1. Fill vent holes and grind smooth after galvanizing.
- E. Do not print or emboss the name of the fabricator on exposed steel unless it is completely concealed by the finish painting.

PART 3 - EXECUTION

3.01 ERECTION

- A. Surveys: Employ a Florida Licensed Engineer or Land Surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect/Engineer. Do not proceed with

erection until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect/Engineer.

- B. Temporary shoring and bracing: Provide temporary shoring and bracing members and connections of sufficient strength to bear imposed loads from steel self weight and erection procedures or any other loads created by other contractors on a temporary basis. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guidelines to achieve proper alignment of structures as erection proceeds.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
- C. Temporary planking: Provide temporary planking and working platforms as necessary to effectively complete work.
- D. Anchor rods and bolts: Furnish anchor rods, bolts and other connectors required for securing structural steel to foundations and other in-place work.
 - 1. Furnish templates and other devices as necessary for pre-setting rods, bolts and other anchors to accurate locations.
 - 2. Refer to Division 3 of these specifications for anchor rod installation requirements in concrete, and Division 4 for masonry installation.
- E. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
- F. Setting bases and bearing plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and clean bottom of base and bearing plate.
 - 1. Set base or bearing plate wedge or other adjusting devices.
 - 2. Tighten anchor rods after structural steel frame has been plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 - 3. Pack or pour non-shrink grout solidly between bearing surface and base or plate. Ensure that no voids remain. Finish exposed surfaces, protect grout and allow to cure.
 - 4. For proprietary grout materials, comply with manufacturer's instructions.
 - 5. Base plates must be grouted a minimum of 72 hours prior to placing concrete slabs on supporting steel structure.
- G. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

- H. Field assembly: Set structural members accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Comply with AISC Code of Standard Practice except where more stringent requirements are contained herein.
 - 1. Level and plumb individual members of structure within specified AISC tolerances.
 - 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- I. Splice members only where indicated and accepted on shop drawings.
- J. Erection bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
- K. Comply with AISC Specification for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- L. Do not enlarge unfair holes in members by burning or by use of drift pins. Ream holes that must be enlarged to admit bolts as permitted by Architect/Engineer.
- M. Tighten bearing-type bolts (A-325N) to the snug tight condition as follows:
 - 1. Bolts shall be placed in all holes, with washers positioned as required and nuts threaded to complete the assembly.
 - 2. Compacting the joint to the snug-tight condition shall progress systematically from the most rigid part of the joint.
 - 3. The snug-tightened condition is the tightness that is attained with a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench.
 - 4. More than one cycle through the bolt pattern may be required to achieve the snug-tightened joint.
- N. Provide hardened washers conforming to ASTM F436 and place under the part being turned.
- O. Do not reuse or retighten bolts which have been fully tightened. Use only non-galvanized nuts and bolts that are clean, rust-free, and well lubricated. Bolts and nuts shall be wax dipped by the bolt supplier or lubricated with Johnson's Stick Wax 140. Cleaning and lubrication of ASTM F1852 twist-off-type tension-control bolts is not permitted.

- P. Where slotted holes are used to accommodate thermal movement, notify the Architect/Engineer if bolt is expected to hit the end of slot, based on temperature at time of installation.
- Q. Store fastener components in sealed containers until ready for use. Reseal open containers to prevent contamination by moisture or other deleterious substances. Store closed containers from dirt and moisture in a protective shelter. Take from protective storage only as many fastener components as are anticipated to be installed during the work shift. Fastener components that are not incorporated into the work shall be returned to protective storage at the end of the work shift. Fasteners from open containers and fasteners that accumulate rust or dirt shall not be used and shall be immediately and permanently removed from the project site.
- R. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 3. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
 - a. Grind butt welds flush.
 - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.
- S. Headed shear studs: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions. All welding ferrules for shear connectors shall be removed prior to placement of concrete.
- T. Gas cutting: Do not use gas-cutting torches in field for correcting fabrication errors in primary structural framing. When permitted, finish gas-cut sections equal to a sheared appearance by grinding or reaming. Do not use gas cutting to fabricate bolt holes.
- U. Touch-up painting: Immediately after erection, slag field welds and clean bolted connections and abraded areas of shop paint. Apply paint to exposed areas using original shop primer or cold galvanizing compound. For exposed steel having special coatings system, reapply both primer and top coat per Division 9 Section,

“Special Coatings”. For galvanized steel, apply Zinc Clad Cold Galvanizing by Sherwin-Williams or Cold Galvanizing by ZRC Chemical by brush or spray to provide a minimum dry film thickness of 3 mils.

3.02 QUALITY CONTROL

- A. Shop testing and inspection by the Owner is to evaluate the effectiveness of the Fabricator’s required Quality Control and Assurance Program.
- B. Owner will engage a Structural Inspector to perform field inspections pursuant to the Structural Inspection Plan presented on the Drawings.
- C. Owner will engage a testing agency to perform shop inspections, shop testing, field-testing, and to prepare test and inspection reports.
- D. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- E. Provide access for testing agency to places where structural steel work is being fabricated or produced and unobstructed views to all members in nearby storage so that required inspection and testing can be accomplished.
- F. Testing agency may inspect structural steel at plant before shipment; however, Architect/Engineer reserves the right, at any time before final acceptance, to reject material not complying with specified requirement.
- G. Correct deficiencies in structural steel work which inspections or laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor’s expense, as may be necessary to reconfirm any noncompliance of original work, and as may be necessary to show compliance of corrected work.
- H. Shop Inspection and Tests: Testing Agency is to inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Review shop drawings and shop procedures with Fabricator’s supervisory personnel.
 - 2. Request and obtain necessary mill certifications of steel and verify proper material throughout the duration of the job.
 - 3. Verify welding procedure qualifications, either by prequalifications or by witnessing qualification tests.
 - 4. Verify welder qualifications, either by certification and/or by retesting. Obtain welder certificates.
 - 5. Spot check layout and dimensions of jigs and fixtures for joint preparation, and fit up of members.
 - 6. Verify welding electrodes to be used and other welding consumables as the job progresses.
 - 7. Check preheating procedures for conformance to AWS D1.1.

8. Verify procedures for welding in accordance with applicable portions of section 4, “Technique”, AWS D1.1.
 9. Verify that quality of welds meet the requirements of Paragraph B.15, “Quality of Welds”, AWS D1.1.
 10. Provide inspection of surface preparation for coating and coating operations in accordance with SSPC VIS 1 and 2.
 11. Perform visual inspection of all welds for compliance with Contract Documents. Provide random non-destructive tests of welds in conformance with Section 6 of AWS D1.1, as may be required by Architect/Engineer, but not less than:
 - a. Full penetration welds: 25%.
 - b. Partial penetration welds: 15%.
 - c. Fillet Welds: 10%.
 12. Testing laboratory may use the following examination methods, in descending order of importance. When a particular examination method for a joint is unfeasible, the highest order method that is practicable shall be used. Standard of acceptance shall be in accordance with AWS D1.1.
 - a. Ultrasonic Method: In accordance with AWS D1.1.
 - b. Radiographic Method: In accordance with ASTM E 94 and ASTM E 142, with a minimum quality level of “2-2T”. This procedure is limited to the inspection of groove welds in butt joints only and is not to be used for fillet welds.
 - c. Magnetic Particle Method: In accordance with ASTM E109. Use for examining partial penetration welds. Percentage of examinations is defined elsewhere in these specifications. The Yoke method may be used only for supplementary surface examination.
 - d. Dye Penetrant Examination Method: In accordance with ASTM E165.
 13. Ultrasonically inspect for laminations after welding all joints with Group 4 and 5 rolled shapes and plates greater than 1 1/2” thick, where material is subjected to tension in the through thickness direction. The ultrasonic inspection shall extend for a distance of six times the thickness of the plate receiving the through thickness tension, either side of the plate delivering the tension.
 14. Interpret, record, and report all results of the non-destructive tests.
 15. Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with Paragraph 3.7, “Corrections”, AWS D1.1
 16. Re-examine all repair areas and interpret, record, and report the results of examinations of repair welds.
- I. Field Inspection and Tests: Inspect and Test during the erection of structural steel assemblies as directed by the Engineer of Record, but not less than the following
1. Verify field welding procedures and obtain welder certificates.
 2. Check joint preparation and fit up, backing strips, and runout plates.
 3. Check preheating to assure proper temperature, uniformity, and thoroughness through the full material thickness.
 4. Review welding sequence.

5. Perform visual inspection of all welds for compliance with Contract Documents. Perform non-destructive tests of welds in conformance with Section 6 of AWS S1.1 as may be required by Architect/Engineer, but not less than:
 - a. Splices: 100%.
 - b. Full Penetration Welds: 50% except 100% of cantilever members.
 - c. Partial Penetration Welds: 25%.
 - d. Fillet Welds: 10%.
 6. Check 100% of bolted connections according to inspection procedures outlined in the “Specification for Structural Joints using ASTM A325 or A490 Bolts” and as required elsewhere in these specifications.
 7. Production Stud Application Testing: Test the first two studs per welder per day for each set-up and size and type of stud. Test by bending studs 30 degrees using a 4 lb. hammer per AWS D1.1 Section 7.7. Use a 4 lb. hammer to sound 100% of studs. A pinging sound usually represents a sound weld. Studs that produce a “thud” should be bend tested. Passing studs may remain bent while failing studs must be replaced.
 8. Interpret, record, and report all results of the non-destructive tests.
 9. Mark for repair any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with Paragraph 3.7, “Corrections”, AWS D1.1.
 10. Re-examine all repair areas and interpret, record, and report the results of examinations of repair welds.
- J. Pre-installation testing of as-received fastener assemblies shall be performed according to the Specifications for Structural Joints using ASTM A325 Bolts, Section 7 and as follows:
1. Tension Calibrator (a hydraulic device that indicates the pretension that is developed in a bolt that is installed in it) shall be provided by the testing agency, at the Project Site, to confirm the tension force in the fastener assembly.
 2. A sample of not fewer than three complete fastener assemblies from each shipping container shall be checked at the site.
 3. Fastener assemblies tested shall develop a pretension force not less than 1.05 times that required by Table 8.1 in AISC. Minimum passing test force: A325: 3/4”=29.4 kips, 7/8”=41.0 kips, 1”=53.6 kips; A490: 3/4”=36.8 kips, 7/8”=51.4 kips, 1”=67.2 kips.

END OF SECTION 051200

SECTION 054100 - COLD-FORMED METAL FRAMING

PART 4 - GENERAL

4.01 SECTION REQUIREMENTS

- A. Submittals: Product Data, Shop Drawings and material certificates.
- B. Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" for calculating structural characteristics of cold-formed metal framing.
- C. Comply with HUD's "Prescriptive Method for Residential Cold-Formed Metal Framing."
- D. Comply with AWS D1.3, "Structural Welding Code - Sheet Steel."
- E. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 5 - PRODUCTS

5.01 MATERIALS

- A. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 zinc coated; Structural Steel (SS); Grade 33.
- B. Steel Studs: C-shaped, with flange width of not less than 1-5/8 inches, minimum uncoated steel thickness of 0.0538 inches and of depths indicated.
- C. Steel Joists: C-shaped, with flange width of not less than 1-5/8 inches, minimum uncoated steel design thickness of 0.0538 inches and of depths indicated.
- D. Steel Track: U-shaped, minimum uncoated metal thickness of 0.0677 inches, with flange widths of 1-1/4 inches for studs and 1-5/8 inches for joists, of web depths indicated.

5.02 ACCESSORIES

- A. Accessories: Fabricate from the same material and finish used for framing members, of manufacturer's standard thickness and configuration, unless otherwise indicated.

- B. Cast-in-Place Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws.
- D. Insulation: ASTM C 665, Type I, unfaced mineral-fiber blankets.
- E. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.

PART 6 - EXECUTION

6.01 FRAMING

- A. Install framing and accessories level, plumb, square, and true to line, and securely fastened, according to ASTM C 1007. Temporarily brace framing until entire integrated supporting structure has been completed and permanent connections are secured.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten framing members by welding or screw fastening.
 - 3. Install insulation in built-up exterior framing members.
 - 4. Fasten reinforcement plates over web penetrations larger than standard punched openings.
- B. Erection Tolerances: Install cold-formed metal framing with a maximum variation of $L/180$ and with individual framing members no more than plus or minus $1/8$ inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- C. Studs: Install continuous top and bottom tracks securely anchored at corners and ends. Squarely seat studs against webs of top and bottom tracks. Space studs as indicated, set plumb, align, and fasten both flanges of studs to top and bottom tracks.
 - 1. Install and fasten horizontal bridging in stud system, spaced in rows not more than 48 inches apart.
 - 2. Install miscellaneous framing and connections to provide a complete and stable wall-framing system.
- D. Joists: Install and securely anchor perimeter joist track sized to match joists. Install joists bearing on supporting framing, brace and reinforce, and fasten to both flanges of joist track.
 - 1. Install bridging and fasten bridging at each joist intersection.
 - 2. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners.

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887
END OF SECTION 054000



SECTION 055200 - METAL RAILINGS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

A. Submittals: [Product Data] [Shop Drawings] [structural analysis data signed and sealed by a qualified professional engineer registered in the state where Project is located] [and] [manufacturer's color charts showing the full range of colors available for factory-applied finishes].

PART 2 - PRODUCTS

2.1 RAILING SYSTEMS

A. [Available]Manufacturers:

1. <Insert manufacturer's name>.

B. Provide railings capable of withstanding a uniform load of 50 lbf/ ft. (0.73 kN/m) and a concentrated load of 200 lbf (0.89 kN) applied to handrails and top rails of guards in any direction. Uniform and concentrated loads need not be assumed to act concurrently.

C. Provide railing infill capable of withstanding a concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m). Infill load and other railing loads need not be assumed to act concurrently.

D. For glass-supported railings, support each section of top rail by a minimum of three glass panels or by other means so top rail will remain in place if any one panel fails.

2.2 METALS

A. Aluminum, Extruded Bars and Tubing: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.

B. Aluminum Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

C. Bronze, Extruded Shapes: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).

D. Bronze, Seamless Tubing: ASTM B 135 (ASTM B 135M), Alloy UNS No. C23000 (red brass, 85 percent copper).

E. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

F. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

G. Steel Pipe: ASTM A 53, Schedule 40.

H. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.

I. Iron Castings: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

J. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 OTHER MATERIALS

A. Glass: Tempered glass complying with ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent glass, flat), Quality q3 (glazing select), [Class 1 (clear)] [Class 2 (tinted), bronze] [Class 2 (tinted), gray] [Class 2 (tinted) green].

1. Thickness for Structural Glass Balusters: As required by structural loads, but not less than [12.0] [19.0] mm.

2. Thickness for Glass Infill Panels: As required by structural loads, but not less than [6.0] [10.0] mm.

B. Wood Rails: Hardwood rails of species and profile indicated; with manufacturer's standard transparent finish, and secured to [recessed] [exposed] metal subrail.

C. Nonshrink, Nonmetallic Grout: ASTM C 1107; recommended by manufacturer for exterior applications.

2.4 FABRICATION

A. Assemble railing systems in shop to the greatest extent possible. Use connections that maintain structural value of joined pieces.

B. Form changes in direction of railing members by [bending] [mitering at elbow bends] [use of prefabricated fittings].

C. Fabricate railing systems and handrails for connecting members [by welding] [by brazing] [with concealed mechanical fasteners and fittings].

D. Provide manufacturer's standard wall brackets, flanges, miscellaneous fittings, and anchors to connect handrail and railing members to other construction.

E. Provide wall returns at ends of wall-mounted handrails.

2.5 FINISHES

- A. Aluminum Railings: [Class I, clear anodic finish; AA-M12C22A41; complying with AAMA 611] [Class I, color anodic finish; AA-M12C22A42/A44; complying with AAMA 611] [Baked enamel AA-C12C42R1x; thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603] [Siliconized polyester finish] [High-performance organic; AA-C12C42R1x; two-coat fluoropolymer system complying with AAMA 2604, with finish coats containing at least 70 percent PVDF resin by weight] [High-performance organic AA-C12C42R1x; three-coat fluoropolymer system complying with AAMA 2605, with finish coats containing at least 70 percent PVDF resin by weight].
- B. Bronze Railings: [Hand rubbed, lacquered, CDA-M31-M34-O6x] [Statuary conversion coating over satin finish, CDA-M32-C55].
- C. Stainless-Steel Railings: [No. 4, directional satin] [No. 6, dull satin] [No. 7, satin reflective] finish.
- D. Steel Railings: [Hot-dip galvanized after fabrication, ASTM A 123] [Hot-dip galvanized after fabrication, ASTM A 123; cleaned and shop primed after galvanizing] [Cleaned and shop primed].

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Fit exposed connections accurately together to form tight, hairline joints.
- B. Set railings accurately in location, alignment, and elevation and free of rack.
- C. Coat concealed surfaces of aluminum that will be in contact with cementitious materials or dissimilar metals, with a heavy coat of bituminous paint.
- D. Anchor posts in concrete by forming or core-drilling holes 5 inches (125 mm) deep and 3/4 inch (20 mm) greater than OD of post. Fill annular space between post and concrete with nonshrink, nonmetallic grout.
- E. Attach handrails to wall with wall brackets.

END OF SECTION 055200

**FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA**

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



05 70 00.A1 Decorative Metals by Wilsonart

05 70 00.A1 – DECORATIVE METALS BY WILSONART

PART 1 - GENERAL

Technical Data

1. Distributor and/or manufacturer

Wilsonart International

2400 Wilson Place

P.O. Box 6110

Temple, Texas 76503-6110

Phone: (254) 207-7000; (800) 433-3222

Fax: (254) 207-2384

Web Site: www.wilsonartlaminat.com

PART 2 - PRODUCTS

2. Product Description

Recommended Uses: Wilsonart Decorative Metals are designed for vertical interior or ceiling applications where a special accent is required or a special mood is desired. The surface of Decorative Metals is that of fine finished metal. The genuine metal material is appropriate for vertical areas in retail facilities, hotel and office lobbies, theaters and restaurants, where its special eye-catching properties add a definite prestigious appeal. Decorative Metals add a visual sense of lightness when used as inserted accent banding in massive casework. These materials also can add a bright touch when used as cladding or accent trim in custom furniture, especially in combination with high gloss solid color laminates, Wilsonart® Custom Edges or Wilsonart® Gibraltar® Solid Surfacing.

Product Composition:

**FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA**

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



Type 419: A solid sheet of aluminum is produced with a decorative, anodized finish and color on one side. The back side is prepared to facilitate bonding to a suitable substrate. (Keep this surface free of grease, oil or other contaminants.)

Basic Limitations: All decorative metals are designed for interior vertical applications. Only Anodized A-Look with an "EX" designation is recommended for protected exterior applications.

Reflective value and metal color may vary depending on type of lighting used. Fluorescent, incandescent and daylight produce slight color variations. The American Architectural Manufacturer's Association (AAMA) has issued the "Voluntary Specification for Anodized Architectural Aluminum" AAMA611-98. The maximum allowable color variation is established as Delta E CMC 5.0 or less for anodized aluminum produced from one coil.

Pattern, Size & Finish Availability:

Note: All decorative metals are supplied with a protective peel coat to prevent surface damage.

Product Type 418

Available in Types 416 & 419

Product Type 419, Anodized Aluminum

Pattern	Name	Surface Finish	Thickness	Stock Sizes
6284	Satin Brushed Copper Aluminum	Anodized	0.025"	4x8' & 4x10'

Note: Sample Chain includes #6255P (418) Polished Gold Aluminum with phenolic backer

Sheet Dimensions

Type 419, Anodized Aluminum (without phenolic back)

Sheet Widths	48" (-0 + 1/2")	1219.2 mm (-0 + 12.7 mm)
Sheet Lengths	96" (-0 + 1/2")	2438.4 mm (-0 + 12.7 mm)
	120" (-0 + 1/2")	3048 mm (-0 + 12.7 mm)
Sheet Thickness	0.025" ± 0.002" (0.64 mm ± 0.05 mm)	
Weight PSF	0.353# psf	
Decorative Strips	1 3/4" x 120" (44.5 mm x 3048 mm)	

3. Technical Data

Codes and Certifications: Currently there are no NEMA standards or tests for decorative metal surfacing. However, American National Standards Institute/National Electrical Manufacturers Association (ANSI/NEMA), LD3-2005, Annex A, should be consulted for basic fabrication and handling techniques.

The GREENGUARD Environmental Institute™ has awarded its GREENGUARD® Indoor Air Quality Certification to Wilsonart Laminate. All Wilsonart Laminate product types were tested under the stringent GREENGUARD Standards for low-emitting products. All GREENGUARD Indoor Air Quality Certified® products ensure minimal impact on the indoor environment. For a copy of the certificate, visit www.greenguard.org.

Typical Fire Test Data:

Wilsonart Decorative Metals (Type 419) have been tested in accordance with ASTM-E84, Tunnel Test, and achieved Class 1 or A as follows:

Type	Thickness	Smoke Developed	Flame Spread
418, Phenolic Backed with types 416 and 419	0.040"	0	25
419, Anodized Aluminum	0.025"	0	0

Model Code Designations used to determine flame spread classification

Flame Spread Classification (Maximum Rating)	International (IBC)	Life Safety (NFPA 101)
25	A	A
75	B	B
200	C	C

(Reference: Architectural Woodwork Quality Standard, 8th Edition, Version 1.0 - 2003)

All Model Codes regulate the generation of smoke by interior finish material. In all cases they specify a maximum smoke development rating of 450.

Fire code approvals:

Product Type	Certification
418, Phenolic Backed with types 416 and 419	New York City, MEA 5-87-M, Vol. III

NSF Certification

(Type 419) Anodized Aluminum

NSF International Standard 51 approval for splash zone

FDA Certification

(Types 401, 416 & 419) A-Look Mirror Metal, Artisan Group and Anodized Aluminum

Food & Drug Administration approval for food contact

FMVSS 302

(Types 401 & 419) A-Look Mirror Metals and Anodized Aluminum

U.S. Federal Motor Vehicle Safety Standard, “Flammability of Interior Materials”, compliant

General Standards: Currently there are no NEMA standards or tests for decorative metal surfacing.

Specific Product Standards: Currently there are no NEMA standards or tests for decorative metal surfacing.

PART 3 - EXECUTION

4. Installation: Fabrication and Assembly Recommendations

For comprehensive fabrication instructions for Metal types 419, consult the Decorative Metals Fabrication Manual, BR0406.

Fabrication and installation of A-Look Mirror Quality Decorative Metals is easy with tools and machinery normally associated with laminate, metal or woodworking shops. They are easily applied by using a low- or non-shrink silicone sealant and low-modulus contact cement, or a very high-bond type of double-stick foam tape. Please refer to the manual for comparison to other reflective mirror materials for equivalent rigidity and general properties.

Some points to keep in mind when using A-Look Decorative Metals include:

1. Use on vertical surfaces only. Horizontal work surfaces are not recommended.
2. A-Look Decorative Metals can be formed using standard roll bending equipment.
3. The protective film should be removed when installation is complete. If the film is left in place after installation, exposure to direct sunlight for a prolonged period may cause a paste residue and create other problems.
4. For exterior applications, the edge of Anodized A-Look EX Decorative Metals should be covered or sealed with aluminum or stainless steel molding (such as H or J mold) using a sealant that does not contain acid or a strong alkaline solution. Interior applications can be butt jointed.

Caution: Check adhesive carefully prior to application. When adhesive is used, due to the inherent thermal expansion and contraction ratios, A-Look Decorative Metals may pull toward the base material after installation. It is suggested that you use VHB double-stick foam tape, or a low-modulus silicone or rubberizing contact cement.

5. Warranty

Wilsonart International, Inc. warrants that, under normal use and service, the material and workmanship of its Wilsonart® Decorative Metals and METALAMINATES™ shall conform to the applicable supplier or industry standards set out below, or to the standards set forth on the applicable technical data sheets for a period of one (1) year from the

date of sale to the first consumer purchaser. Dealers and distributors are provided with the technical data sheets which contain specific standards of performance for the products. In the event that a Decorative Metal or METALAMINATES product does not perform as warranted, the first consumer purchaser's sole remedy shall be limited to repair or replacement of all or any part of the product which is defective, at the manufacturer's sole discretion. In no instance shall the replacement cost exceed the original purchase price paid by the consumer purchaser for the Decorative Metals or METALAMINATES product.

This warranty applies only to product:

1. In its original installation; and
2. Purchased by the first consumer purchaser.

This warranty is not transferable, does not cover horizontal applications and expires upon resale or transfer by the purchaser.

This warranty shall not apply to defects or damage arising from any of the following:

1. Accidents, abrasion, physical impact, abuse or misuse;
2. Exposure to extreme temperature, corrosive atmospheres or precipitants;
3. Improper fabrication, installation or maintenance; or
4. Any damage due to delivery or after delivery of the product to the purchaser.
5. Horizontal applications.

NO OTHER WARRANTIES, EXPRESS OR IMPLIED, ARE MADE, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. UNDER NO CIRCUMSTANCES SHALL WILSONART INTERNATIONAL, INC. BE LIABLE FOR ANY LOSS OR DAMAGE ARISING FROM THE PURCHASE, USE OR INABILITY TO USE THIS PRODUCT, OR FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES. NO FABRICATOR, INSTALLER, DEALER, AGENT OR EMPLOYEE OF WILSONART INTERNATIONAL, INC. HAS THE AUTHORITY TO MODIFY THE OBLIGATIONS OR LIMITATIONS OF THIS WARRANTY.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state; therefore, some of the limitations stated above may not apply to you. It is to your benefit to save your documentation upon purchase of a product.

Supplier or Industry Standards for Decorative Metals and METALAMINATES for visual surface defects are as follows:

1. Visual Surface Defects – means spots, indents, stains, scratches, orange peel and/or sheet flatness. These defects must not be easily detected when inspected using established viewing conditions.
2. Established viewing conditions shall be from a distance of 6.6 feet with an indirect illumination intensity of 400 lux. The viewing area is 4 square feet.

3. Visual surface defects are measured according to T.A.P.P.I. T564 sp-96, Transparent Chart for the Estimation of Defect Size. A visual defect means spots, indents, etc. that are 0.8mm(2) or more within 4 square feet, or 2 defects each having an area of 0.4mm(2) or more within 4 square feet. Further the visual defect should be at least 12” apart.

6. Maintenance

- Types 418 & 419:

It is recommended that anodized aluminum surfaces be cleaned with 409[®] Glass & Surface Cleaner and warm water with a mild soap such as those used for hands or dishes. Household cleaners, non-ammoniated detergents, or glass cleaners may be used. Stubborn stains may be removed with a thin, clean oil and a dry cloth. After cleaning, always wipe the surface completely dry with a soft, clean cloth. Do NOT use cleaners that contain abrasives, acids or alkalis, as they will mar the surface. Ammoniated detergents or petroleum-based cleaners should not be used to clean anodized aluminum surfaces.

Do NOT clean metal face with solvents, paint thinner or adhesive remover. Refer to BRO406, Decorative Metals Fabrication Manual, for adhesive removal recommendations.

7. Technical Services

For samples, literature, questions or technical assistance, please contact our toll-free Hotline at (800) 433-3222, Monday through Friday, 7 am –7 pm, CST, or www.wilsonartlaminat.com

Specification Form:

Surface shall be Wilsonart Decorative Metals,
produced by Wilsonart International,
Temple, Texas 76503-6110.

Type: Specify 419

Surface

Metal Number: 6284

Metal Name: SATIN BRUSHED COPPER
ALUMINUM

Adhesive

Name: _____

Grade/Type: _____

Manufacturer: _____

Fabrication shall comply with Architectural Woodwork
Quality Standards Guide

MetalsTD (TD0276)

Revised: July 22, 2010

©1998-2007, Wilsonart International, Inc.

END OF SECTION 057000.A1



Most Widely Accepted and Trusted

ICC-ES Evaluation Report

ESR-2122

Reissued March 1, 2010

This report is subject to re-examination in two years.

www.icc-es.org | (800) 423-6587 | (562) 699-0543

A Subsidiary of the International Code Council®

DIVISION: 06—WOOD AND PLASTICS
Section: 06095—Nails

REPORT HOLDER:

STANLEY® FASTENING SYSTEMS, L.P.
ROUTE 2, BRIGGS DRIVE
EAST GREENWICH, RHODE ISLAND 02818
(401) 884-2500
www.bostitch.com

EVALUATION SUBJECT:

STANLEY BOSTITCH® METAL PLATE CONNECTOR
(MCN) NAILS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2009 International Building Code® (2009 IBC)
- 2009 International Residential Code® (2009 IRC)
- 2006 International Building Code® (2006 IBC)
- 2006 International Residential Code® (2006 IRC)

Property evaluated:

Structural

2.0 USES

Stanley® BOSTITCH® Metal Plate Connector (MCN) nails are generally used to fasten metal connectors to lumber, wood, and engineered wood materials in designed structural connections. They can also be used in wood-to-wood structural and nonstructural connections and to fasten other engineered materials to wood and engineered wood products.

3.0 DESCRIPTION

3.1 General:

The MCN nails are formed from plain steel wire and have diamond-shaped points, smooth shanks and 0.283-inch-diameter (7.2 mm) full-round flat heads. Five nail sizes (shank diameter by length) are recognized in this report: 0.131 by 1½ inches (3.3 by 38 mm); 0.148 by 1½ inches (3.8 by 38 mm); 0.131 by 2½ inches (3.3 mm by 64 mm); 0.148 by 2½ inches (3.8 by 64 mm); and 0.162 by 2½ inches (4.1 mm by 64 mm). The MCN nails may be heat-treated and may be either bright (nongalvanized) or coated with mechanically deposited zinc in accordance with ASTM B 695, Class 40.

Nails having a 0.131-inch-diameter (3.3 mm) smooth shank have a minimum average bending yield strength of 100,000 psi (689 MPa); and nails having a 0.148-inch-diameter (3.8 mm) or a 0.162-inch-diameter (4.1 mm) shank have a minimum average bending yield strength of 90,000 psi (620 MPa). The nails recognized in this report conform to the dimensional tolerances specified in ASTM F 1667. The nails are collated into paper or plastic strips.

4.0 DESIGN AND INSTALLATION

4.1 Design:

4.1.1 General: The nominal design values in this report are for normal duration of load and dry conditions of use [less than 19 percent moisture (16 percent moisture for engineered wood)]. The nominal reference design values in this report must be multiplied by applicable adjustment factors referenced in the National Design Specification (NDS) to obtain the allowable nail design values. Reference design values are not limited to those specified in Tables 1 and 2 of this report. Designs using other side-plate thicknesses, side-plate metals, and wood materials are permitted provided the analysis is in compliance with the NDS. Design values of one wood species group or engineered wood product are also applicable to other species groups or engineered wood products having the same or higher dowel bearing strength, F_w , or specific gravity. Design of metal parts must comply with Section 10.2.3 of the NDS.

4.1.2 Lateral Loads: Typical reference lateral design values, Z , for single shear, metal side-plate connections are shown in Table 1. The tabulated values are calculated from the yield mode equations in the NDS, Section 11.3, and provide design loads for the MCN nails used with metal side plates complying as ASTM A 653 SS designation, Grade 33; as ASTM A 1011, SS designation, Grade 33; and as ASTM A 36 with minimum tensile strength of 58,000 psi (400 MPa).

4.1.3 Withdrawal Loads: Reference withdrawal design values, W , for single nails inserted into the side grain of sawn lumber or perpendicular to the veneers or strands of structural composite lumber are shown in Table 2. The MCN nails may be used in dimensional lumber and engineered wood products (structural composite lumber) other than those shown in Table 2, and design values may be established by using the withdrawal equation given in Section 11.2. of the NDS. The method of establishing withdrawal equivalence for structural composite lumber must be in accordance with ASTM D 5456, Section A2.6.

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

Copyright © 2010



Page 1 of 3

4.2 Installation:

The nails must be installed with appropriate tools, such as Stanley[®] BOSTITCH[®] MCN nail tools or manual tools. Installation requirements must comply with the applicable code and the NDS.

5.0 CONDITIONS OF USE

The Stanley[®] BOSTITCH[®] Metal Plate Connector (MCN) Nails described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The nails must be identified and installed in accordance with this report and the manufacturer's published installation instructions. If there is a conflict between this report and the manufacturer's published installation instructions, this report governs.
- 5.2 Fasteners used in chemically treated wood, such as preservative-treated or fire-retardant-treated wood, must comply with the requirements in Section 2304.9.5 of the 2009 and 2006 IBC or Section R317.3 of the 2009 IRC, or Section R319.3 of the 2006 IRC. Use of the MCN nails described in this report in chemically treated wood is beyond the scope of this report.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Nails and Spikes (AC116), dated October 2008.

7.0 IDENTIFICATION

The nails are packaged in cartons bearing labels with the manufacturer's name (Stanley Fastening Systems, L.P.); brand name (BOSTITCH); nail description (type, length, and shank diameter); minimum average bending yield strength, F_y ; and the evaluation report number (ESR-2122).

The head of each nail is identified by one of the marks noted in Table 3, depending on nail size. Nongalvanized nails, and nails collated in plastic strips, are identified with Stanley Fastening Systems part numbers RH-MC13115-S, RH-MC14815-S, RH-MC13125-S, RH-MC14825-S, and RH-MC16225-S. Nails with a mechanically deposited zinc coating are identified with Stanley Fastening Systems part numbers RH-MC13115GAL-S, RH-MC14815GAL-S, RH-MC13125GAL-S, RH-MC14825GAL-S, and RH-MC16225GAL-S. When the nails are collated in paper tape, the RH prefix and the suffix S are replaced by a PT and 1M, respectively. Bulk products are labeled B15131-MC, B25131-MC, B15148-MC, B25148-MC and B25162-MC. Bulk galvanized product numbers include the designation G in the product number.

TABLE 1—REFERENCE LATERAL DESIGN VALUES, $Z^{4,5}$ (pounds), FOR STANLEY BOSTITCH METAL PLATE CONNECTOR (MCN) NAILS USED WITH METAL SIDE-PLATES⁶

NAIL SIZE (Inches)	SPECIES GROUP OF MAIN MEMBER (Specific Gravity ⁴)		
	Southern Pine (0.55)	Douglas Fir-Larch (0.50)	Spruce-Pine-Fir (0.42)
ASTM A 653, SS designation, Grade 33, No. 10 Gage Side Plate			
0.131 x 1 1/2 (or 2 1/2)	126	117	102
0.148 x 1 1/2 (or 2 1/2)	149	138	120
0.162 x 2 1/2	172	160	139
ASTM A 653, SS Designation, Grade 33, No. 20 Gage Side Plate			
0.131 x 1 1/2 (or 2 1/2)	102	94	81
0.148 x 1 1/2 (or 2 1/2)	123	114	98
0.162 x 2 1/2	148	136	117
ASTM A 1011, SS Designation, Grade 33, No. 3 Gage and No. 7 Gage Side Plates			
0.131 x 1 1/2 (or 2 1/2)	144	133	114
0.148 x 1 1/2 (or 2 1/2)	175	161	138
0.162 x 2 1/2	204	188	165
ASTM A 36, No. 3 Gage Side Plate			
0.131 x 1 1/2 (or 2 1/2)	146	134	114
0.148 x 1 1/2 (or 2 1/2)	176	162	138
0.162 x 2 1/2	211	194	170

For SI: 1 lbf = 4.45 N, 1 Inch = 25.4 mm, 1 psi = 6.89 kPa.

¹Lateral design values are for normal loads and must be multiplied by all applicable adjustment factors in the NDS.

²Lateral design values are based on: $F_y = 100,000$ psi (689 MPa) for 0.0131-inch-diameter (3.4 mm) nails; $F_y = 90,000$ psi (620 MPa) for 0.148-inch-diameter (3.8 mm) nails and 0.162-inch-diameter (4.1 mm) nails.

³Base-metal thickness for No. 3 gage is 0.2391 inch (6.1 mm); base-metal thickness for No. 7 gage is 0.1793 inch (4.55 mm); base-metal thickness for No. 10 gage is 0.1345 inch (3.4 mm); base-metal thickness for No. 20 gage is 0.0358 inch (0.91 mm); dowel bearing capacity (F_w) for ASTM A 653, Grade 33 (Nos. 10 and No. 20 gage), is 61,850 psi (426 MPa); dowel bearing strength for ASTM A 1011, SS designation, Grade 33, No. 7 gage is 71,500 psi (493 MPa); dowel bearing capacity of ASTM A 36, No. 3 gage is 87,000 psi (599 MPa). Capacities of other configurations may be determined with appropriate engineering calculation using NDS Section 11.

⁴Assigned specific gravity of sawn lumber per the NDS or equivalent specific gravity for structural composite lumber as determined by ASTM D 5456.

TABLE 2—REFERENCE WITHDRAWAL DESIGN LOADS, $W^{1,2}$ (pounds per inch of penetration),
 FOR STANLEY BOSTITCH METAL PLATE CONNECTOR (MCN) NAILS

WOOD SPECIES GROUP	SPECIFIC GRAVITY ³	MCN NAIL SHANK DIAMETER (Inch)		
		0.131	0.148	0.162
Southern pine	0.55	41	46	50
Douglas fir-larch	0.50	32	36	40
Spruce-pine-fir	0.42	21	23	26

For \bar{S} : 1 pound = 4.45 N, 1 Inch = 25.4 mm.

¹Tabulated withdrawal design loads are per inch of penetration into side grain of the main member.

²Normal duration of load. Values may be adjusted for duration of load as prescribed in the applicable code.

³Assigned specific gravity of sawn lumber per the NDS or equivalent specific gravity for structural composite lumber as determined by ASTM D 5456.

TABLE 3—NAIL HEAD MARKINGS FOR STANLEY BOSTITCH METAL PLATE CONNECTOR (MCN) NAILS

HEAD IDENTIFICATION	NAIL SIZE (Inches)
B1	0.131 × 1½
B2	0.131 × 2½
B3	0.148 × 1½
B4	0.148 × 2½
B5	0.162 × 2½

For \bar{S} : 1 Inch = 25.4 mm.



Most Widely Accepted and Trusted

ICC-ES Evaluation Report

ESR-2122 Supplement

Issued March 1, 2010

This report is subject to re-examination in two years.

www.icc-es.org | (800) 423-6587 | (562) 699-0543 A Subsidiary of the International Code Council®

DIVISION: 06—WOOD AND PLASTICS
Section: 06095—Nails

REPORT HOLDER:

STANLEY® FASTENING SYSTEMS, L.P.
ROUTE 2, BRIGGS DRIVE
EAST GREENWICH, RHODE ISLAND 02818
(401) 884-2500
www.bostitch.com

EVALUATION SUBJECT:

STANLEY BOSTITCH® METAL PLATE CONNECTOR (MCN) NAILS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2007 Florida Building Code—Building
- 2007 Florida Building Code—Residential

Properties evaluated:

Structural

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to indicate that the Stanley® BOSTITCH® Metal Plate Connector (MCN) nails described in Sections 2.0 through 7.0 of the master report ESR-2122 comply with the 2007 Florida Building Code—Building and the 2007 Florida Building Code—Residential, when designed and installed in accordance with the master report.

For products falling under Florida Rule 9B-72, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the master report reissued on March 1, 2010.

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

Copyright © 2010



Page 1 of 1



Most Widely Accepted and Trusted

ICC-ES Evaluation Report

ESR-2122 Supplement

Issued March 1, 2010

This report is subject to re-examination in two years.

www.icc-es.org | (800) 423-6587 | (562) 699-0543 A Subsidiary of the International Code Council®

DIVISION: 06—WOOD AND PLASTICS
Section: 06095—Nails

REPORT HOLDER:

STANLEY® FASTENING SYSTEMS, L.P.
ROUTE 2, BRIGGS DRIVE
EAST GREENWICH, RHODE ISLAND 02818
(401) 884-2500
www.bostitch.com

EVALUATION SUBJECT:

STANLEY BOSTITCH® METAL PLATE CONNECTOR (MCN) NAILS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2007 Florida Building Code—Building
- 2007 Florida Building Code—Residential

Properties evaluated:

Structural

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to indicate that the Stanley® BOSTITCH® Metal Plate Connector (MCN) nails described in Sections 2.0 through 7.0 of the master report ESR-2122 comply with the 2007 Florida Building Code—Building and the 2007 Florida Building Code—Residential, when designed and installed in accordance with the master report.

For products falling under Florida Rule 9B-72, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the master report reissued on March 1, 2010.

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

Copyright © 2010



Page 1 of 1

END OF SECTION 06 05 23

SECTION 06 09 00 WOOD AND PLASTIC FASTENINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

www.strongtie.com

1.2 RELATED SECTIONS

1.3 REFERENCES

1.4 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 MANUFACTURERS

2.2 MATERIALS

1. Sheet: ASTM A36, ASTM A653, ASTM A1011
2. Fasteners: ASTM A307, ASTM F1554, ASTM F1667, SAE C1022 (SDS Screws)
1. Sheet: ASTM A240, ATT M A480
2. Fasteners: ASTM A493
1. Gray paint
2. Hot-dipped galvanized or electro-plated galvanized: G90, G185 (ZMAX or HDG)
3. Powder-coated paint
4. Electro-galvanized, Zinc dichromate and Double Barrier for SD and SDS screws

2.3 FABRICATION

2.4 TESTING

1. Static load tests in wood assemblies
2. Static load tests in steel jigs
3. Static load tests of products embedded in concrete or masonry

PART 3 EXECUTION

3.1 EXAMINATION

3.2 INSTALLATION

3.3 FIELD QUALITY CONTROL

END OF SECTION 060900

SECTION 061064 – ECOLIFE-PRE TREATMENT

PRESSURE-TREATED WOOD PRODUCTS

PART 7 - GENERAL

SCHEDULE 0 - SECTION INCLUDES

- PRODUCT DATA SHEET 0 - Preservative treatment of lumber and plywood.
- PRODUCT DATA SHEET 1 - Fire-retardant treatment of lumber and plywood.

SCHEDULE 1 - RELATED SECTIONS

- PRODUCT DATA SHEET 0 - Section 06100 - Rough Carpentry.
- PRODUCT DATA SHEET 1 - Section 06200 - Finish Carpentry.

SCHEDULE 2 - REFERENCES

- PRODUCT DATA SHEET 0 - ASTM International (ASTM):
 - 7.01 ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 7.02 ASTM A653 / A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 7.03 ASTM D3201 Standard Test Method for Hygroscopic Properties of Fire-Retardant Wood and Wood-Base Products.
 - 7.04 ASTM D5516 Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.
 - 7.05 ASTM D5664 Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
 - 7.06 ASTM D6305 Standard Practice for Calculating Bending Strength Design Adjustment Factors for Fire retardant Treated Plywood Roof Sheathing.
 - 7.07 ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.

- PRODUCT DATA SHEET 1 - American Wood-Protection Association (AWPA):

- 7.01 AWPA E12 Standard method of determining the corrosion of metal in contact with wood.
- 7.02 AWPA M4 - Standard for the Care of Preservative Treated Wood Products.

- 7.03 AWPA P5 - Standard for Waterborne Preservatives.
- 7.04 AWPA P17 Fire Retardant Formulations.
- 7.05 AWPA P23 Standard for Chromated Copper Arsenate Type C (CCA-C).
- 7.06 AWPA P25 - Standard for Inorganic Boron (SBX).
- 7.07 AWPA P26 - Standard for Alkaline Copper Quat Type A (ACQ-A).
- 7.08 AWPA P27 - Standard for Alkaline Copper Quat Type B (ACQ-B).
- 7.09 AWPA P28 Standard for Alkaline Copper Quat Type C (ACQ-C).
- 7.10 AWPA P29 Standard for Alkaline Copper Quat Type D (ACQ-D).
- 7.11 AWPA P47 - Standard for DCOI/Imidacloprid/Stabilizer, Waterborne (EL2).
- 7.12 AWPA P50 Standard for Fire Retardant FR-2 (FR-2).
- 7.13 AWPA T1 - Use Category System: Processing and Treatment Standard.
- 7.14 AWPA U1 - Use Category System: User Specification for Treated Wood.

PRODUCT DATA SHEET 2 - Permanent Wood Foundation (PWF) Design Specification, ANSI/AF&PA PWF-2007.

PRODUCT DATA SHEET 3 - Permanent Wood Foundations, Design and Construction Guide, Southern Pine Council. Publication #400.

PRODUCT DATA SHEET 4 - National Fire Protection Association (NFPA) 255 Method of Test of Surface Burning Characteristics of Building Materials.

PRODUCT DATA SHEET 5 - NER 643, ACQ® Preserve® Wood Preservative Treatment; International Code Council -Evaluation Service, ICC-ES.

PRODUCT DATA SHEET 6 - Underwriters Laboratories, Inc. (UL) 723 Tests for Surface Burning Characteristics of Building Materials.

PRODUCT DATA SHEET 7 - Hawaiian Local Building Code Standards.

SCHEDULE 3 - SUBMITTALS

PRODUCT DATA SHEET 0 - Submit under provisions of Section 01300.

PRODUCT DATA SHEET 1 - Product Data: Manufacturer's instructions for use, including requirements for storage, cutting, and finishing.

PRODUCT DATA SHEET 2 - Preservative Treatment Certification: Treating plant's certification of compliance with specified standards, process employed, and preservative retention values.

PRODUCT DATA SHEET 3 - Fire-Retardant Treatment Certification: Treating plant's certification of compliance with specified requirements.

SCHEDULE 4 - QUALITY ASSURANCE

- PRODUCT DATA SHEET 0 - Wood Treatment Plant Qualifications: Wood treatment plant experienced in performing work of this section licensed by Viance, LLC.
- PRODUCT DATA SHEET 1 - Source Quality: Obtain treated wood products from a single approved source.
- PRODUCT DATA SHEET 2 - Preservative Treatment: Mark each piece of plywood and lumber to show compliance with specified standards.
- PRODUCT DATA SHEET 3 - Fire-Retardant Treatment: Mark each piece of plywood and lumber to show compliance with specified standards.
- PRODUCT DATA SHEET 4 - Regulatory Requirements: Provide fire retardant treatment which complies with the following regulatory requirements:
- 7.01 International Building Code (IBC).
 - 7.02 International Residential Code (IRC).
 - 7.03 International Code Council Evaluation Service ICC-ES ESR 2645.
 - 7.04 City of Los Angeles, California RR24502.
 - 7.05 City of New York, New York Building Code, MEA 406 and MEA 407.
- PRODUCT DATA SHEET 5 - Independent Third Party Inspection:
- 7.01 Provide plant inspections.
- PRODUCT DATA SHEET 6 - Kiln Dry after Treatment (KDAT): Provide kiln dry material as indicated or required.
- 7.01 Kiln dry after treatment to 19 percent maximum moisture content for lumber and 18 percent for plywood in accordance with AWWA T1, Section 7 - Drying After Treatment (lumber) and AWWA T1, Section :F: Pressure treated composites (3c) kiln drying after treatment.

SCHEDULE 5 - DELIVERY, STORAGE, AND HANDLING

- PRODUCT DATA SHEET 0 - Exposure: Prevent wood products against moisture and dimensional changes, in accordance with instructions from treating plant.

SCHEDULE 6 - WARRANTY

- PRODUCT DATA SHEET 0 - Manufacturer's Warranty: Provide manufacturer's standard 20-year transferable limited warranty for pressure-treated wood.
- PRODUCT DATA SHEET 1 - Manufacturer's Warranty: Provide manufacturer's standard 40-year transferable limited warranty for pressure-treated wood.
- PRODUCT DATA SHEET 2 - Manufacturer's Warranty: Provide manufacturer's standard 50-year limited

warranty for pressure-treated wood.

PRODUCT DATA SHEET 3 - Manufacturer's Warranty: Provide manufacturer's standard limited lifetime warranty for pressure treated wood.

PART 8 - PRODUCTS

SCHEDULE 0 - MANUFACTURERS

PRODUCT DATA SHEET 0 - Acceptable Manufacturer: Viance, which is located at: 200 E. Woodlawn Rd. Suite 350 ; Charlotte, NC 28217; Toll Free Tel: 800-421-8661; Tel: 704-522-0825; Email: [request info \(ijohnson@viance.net\)](mailto:requestinfo@ijohnson@viance.net); Web: www.treatedwood.com

PRODUCT DATA SHEET 1 - Requests for substitutions will be considered in accordance with provisions of Section 01600.

PRODUCT DATA SHEET 2 - Substitutions: Not permitted.

SCHEDULE 1 - MATERIALS

PRODUCT DATA SHEET 0 - Dimension Lumber: As specified in Section 06100.

PRODUCT DATA SHEET 1 - Structural Plywood: As specified in Section 06100.

PRODUCT DATA SHEET 2 - Finish Lumber and Plywood: As specified in Section 06200.

PRODUCT DATA SHEET 3 - Fasteners and Metal Hardware In Preservative Treated Wood : For treated wood and where wood is in ground contact, subject to high relative humidity, or exposed to weather, provide corrosion resistant steel fasteners with hot-dip zinc coating per ASTM A153/A153M, provide corrosion resistant hardware per ASTM A653 / A653M Class G-185 in compliance with building code requirements.

PRODUCT DATA SHEET 4 - Fasteners In Fire-Retardant Treated Wood: Use only code approved fasteners as specified in ICC-ES ESR 2645.

SCHEDULE 2 - PRESERVATIVE PRESSURE TREATMENT OF WOOD

PRODUCT DATA SHEET 0 - Preservative treatment for above ground use continuously protected from liquid water:

8.01 Treatment: TimberSaver[®] PT (SBX) in accordance with AWPA U1 and P5 and P25.

A. For protection against North American subterranean termites, decay and insects, 0.25 lb/cu ft (4kg/m³) Disodium Octaborate Tetrahydrate (DOT) minimum retention (0.17 lb/cu ft (2.7 kg/m³) as B2O₃ equivalent) retention.

B. For protection against North America subterranean termites, Formosan termites and

- insects, use 0.42 lb/cu ft. (6.7 kg /m³) Disodium Octaborate Tetrahydrate (DOT) minimum retention (0.28 lb/cu ft.(4.5 kg/m³) as B2O₃ equivalent) in accordance with AWPA U1 or Hawaiian building code standards as appropriate.
- C. All lumber and Plywood treated with TimberSaver PT shall be protected from exposure to the weather during transit and storage. TimberSaver PT treated products shall be stored out of ground contact and protected against exposure to liquid water.
- 8.02 Treatment: TimberSaver®40 (SBX) in accordance with AWPA U1 and P5 and P25.
- A. For protection against North American subterranean termites, Formosan termites and insects use 0.42 lb/cu ft. (6.7 kg /m³) Disodium Octaborate Tetrahydrate (DOT) minimum retention (0.28 lb/cu ft.(4.5 kg/m³) as B2O₃ equivalent) in accordance with AWPA U1 or Hawaiian building code standards as appropriate.
- B. All lumber and Plywood treated with TimberSaver 40 shall be protected from exposure to the weather during transit and storage. TimberSaver 40 treated products shall be stored out of ground contact and protected against exposure to liquid water.
- 8.03 Treat wood in the following locations:
- A. All framing lumber, studs, sill plates, floor joists, roof rafters, trusses, plywood,
- B. Interior sheathing, furring strips, flooring, moldings and wood trim.
- C. Ecolife® is protected with a revolutionary, non-metallic preservative plus wood stabilizer system. Ecolife Stabilized Weather Resistant Wood was the first decking product to receive NAHB Research Center National Green Building Certification as a "Green Approved Product", eligible to contribute points toward certification of a building under the National Green Building Standard™. Ecolife Stabilized Weather-Resistant Wood is protected with Ecovance™ preservative-the active ingredient of which was awarded a US EPA Presidential Green Chemistry Award in 1996 for its use in other applications. Ecolife Stabilized Weather-Resistant Wood is an environmentally preferred building product that enhances the strength and long-term natural beauty of your deck projects -with significantly lower maintenance. Ecolife Stabilized Weather-Resistant Wood is not approved for use in ground contact, fresh water immersion or salt water immersion.

PRODUCT DATA SHEET 1 - Preservative Treatment for Above Ground Use: decking, fencing, handrails, joists and subflooring, roof decks and sheathing.

- 8.01 Treatment: ACQ as manufactured for Viance in accordance with AWPA U1 and P5, P26, P27, P28, P29 or NER 643 as appropriate.
- A. Use 0.15 lb/cu ft (2.4 kg/m³) of ACQ® in accordance with U1 or NER 643 as appropriate.
- 8.02 Treatment: EcoLife II as manufactured by Viance.
- A. Use 0.019 lb/cu ft (0.3 kg/m³) of EL2 (+ 0.2 lb/cu ft MCS) in accordance with AWPA U1 or use 0.0187 lb/cu ft (0.3kg/m³) Ecolife II in accordance with ESR 1851 as appropriate.
- 8.03 Treat wood in the following locations:
- A. In contact with roofing, flashing, or waterproofing.

- B. In contact with masonry or concrete.
- C. Within 18 inches (450 mm) of grade.
- D. Exposed to weather.
- E. Other locations indicated.

PRODUCT DATA SHEET 2 - Preservative Treatment, Ground and Fresh Water Contact: Fence posts, Landscaping, piers and docks.

- 8.01 Treatment: ACQ as manufactured for Viance in accordance with AWPA U1 and NER 643.
 - A. Use 0.40 lb/cu ft (6.4 kg/m³) of ACQ® in accordance with U1 or NER 643 as appropriate.
- 8.02 Use 0.40 lb/cu ft (6.4 kg/m³) retention.
- 8.03 If required, kiln dry after treatment to 19 percent maximum moisture content for lumber and 18 percent for plywood.
- 8.04 Treat wood in the following locations:
 - A. In contact with ground.
 - B. In contact with fresh water.
 - C. Used as posts, landscaping timbers, retaining walls, piers, or docks.

PRODUCT DATA SHEET 3 - Preservative Treatment for Wood Foundation Systems: Permanent wood foundations, crawl spaces.

- 8.01 Pressure-treat softwood lumber, timber, and plywood for wood foundation systems with waterborne preservatives to comply with AWPA U1.
- 8.02 Treatment: ACQ as manufactured for Viance in accordance with AWPA U1 or NER 643.
 - A. Use 0.60 lb/cu ft (9.6 kg/m³) of ACQ® in accordance with U1 or NER 643 as appropriate.

PRODUCT DATA SHEET 4 - Preservative Treatment for Salt Water Splash Zone Exposure:

- 8.01 Pressure-treat softwood lumber, timber, and plywood for salt water splash with waterborne preservatives to comply with AWPA U1.
- 8.02 Treatment: ACQ as manufactured for Viance in accordance with AWPA U1 or NER 643.
 - A. Use 0.60 lb/cu ft (9.6 kg/m³) of ACQ® in accordance with U1 or NER 643 as appropriate.
 - B. SupaTimber®: Clean and odor-free pressure treatment contains waterborne arsenical preservatives; requires some precautions in use and handling.

SCHEDULE 3 - CCA PRESERVATIVE PRESSURE TREATMENT OF WOOD

PRODUCT DATA SHEET 0 - Preservative Treatment of lumber and plywood for Above Ground Use (UC3) in accordance with the U.S. EPA Supplemental label requirements for forest products treated with CCA:

- 8.01 Treatment: CCA type C manufactured by CSI in accordance with AWPA U1, P5 and P23.
- 8.02 Use 0.25 lb/cu ft (4 kg/m³) of CCA type C in accordance with AWPA U1.
- 8.03 When required, kiln dry after treatment to 19 percent maximum moisture content for lumber and 18 percent for plywood recommended in accordance with AWPA T1 Section 7 - Drying After Treatment (lumber) and AWPA T1 Section F Pressure treated composites (3c) kiln drying after

treatment.

- 8.04 Treat wood for use in the following locations:
- A. In contact with roofing, flashing, or waterproofing.
 - B. In contact with masonry or concrete.
 - C. Within 18 inches (450 mm) of grade.
 - D. Exposed to weather.
 - E. Other locations indicated.

PRODUCT DATA SHEET 1 - Preservative Treatment of lumber and plywood for Ground and Fresh Water Contact (UC4A) in accordance with the U.S. EPA Supplemental label requirements for forest products treated with CCA:

- 8.01 Treatment: CCA type C manufactured by CSI in accordance with AWPA U1, P5 and P23.
- 8.02 Use 0.40 lb/cu ft (6.4 kg/m³) of CCA type C retention in accordance with AWPA U1.
- 8.03 When required, kiln dry after treatment to 19 percent maximum moisture content for lumber and 18 percent for plywood recommended in accordance with AWPA T1 Section 7 - Drying After Treatment (lumber) and AWPA T1 Section F Pressure treated composites (3c) kiln drying after treatment.
- 8.04 Treat wood in the following locations:
- A. In contact with ground.
 - B. In contact with fresh water.
 - C. Used as posts, landscaping timbers, retaining walls, piers, or docks.

PRODUCT DATA SHEET 2 - Preservative Treatment of lumber and plywood for Wood Foundation Systems UC4B in accordance with the U.S. EPA Supplemental label requirements for forest products treated with CCA:

- 8.01 Pressure-treat softwood lumber, timber, and plywood for wood foundation systems with CCA type C manufactured by CSI in accordance with AWPA U1, P5 and P23.
- A. Use lb/cu ft (9.6 kg/m³) retention of CCA type C to comply with AWPA U1

PRODUCT DATA SHEET 3 - Preservative Treatment of lumber and plywood for salt water splash zone uses (UC4B) in accordance with the U.S. EPA Supplemental label requirements for forest products treated with CCA

- 8.01 Pressure treat softwood lumber, timber and plywood with CCA type C manufactured by CSI in accordance with AWPA U1, P5 and P23.
- 8.02 Use 0.60 lb/cu ft (9.6 kg/m³) retention of CCA type C to comply with AWPA U1

PRODUCT DATA SHEET 4 - Preservative Treatment for Poles (UC4B) in accordance with the U.S. EPA Supplemental label requirements for forest products treated with CCA

- 8.01 Pressure treat poles with CCA type C manufactured by CSI in accordance with AWPA U1, P5 and P23..
- 8.02 Use 0.60 lb/cu ft (9.6 kg/m³) retention of CCA type C to comply with AWPA U1

- PRODUCT DATA SHEET 5 - Preservative Treatment of wood for fresh water and land round piles (UC4C) in accordance with the U.S. EPA Supplemental label requirements for forest products treated with CCA
- 8.01 Pressure treat wood with CCA type C manufactured by CSI in accordance with AWPA U1, P5 and P23.
 - 8.02 Use 0.80 lb/cu ft (12.8 kg/m³) retention of CCA type C to comply with AWPA U1.

- PRODUCT DATA SHEET 6 - Preservative Treatment of wood for salt water immersion (Marine Use) (UC5) in accordance with the U.S. EPA Supplemental label requirements for forest products treated with CCA
- 8.01 Pressure treat wood with CCA type C manufactured by CSI in accordance with AWPA U1, P5 and P23.
 - 8.02 Use retentions of CCA type C appropriate for the marine exposure zone to comply with AWPA U1.

SCHEDULE 4 - FIRE RETARDANT PRESSURE TREATMENT OF LUMBER AND PLYWOOD

- PRODUCT DATA SHEET 0 - Fire retardant treatment for wood, including roof and floor trusses, roof decks and sheathing; subflooring, beams and purlins, blocking and furring, studs, joists and paneling, architectural millwork and trim, interior non-load bearing partitions and exterior load-bearing walls.
- 8.01 Lumber: Comply with AWPA U1 UCFA, Type A or ICC-ES ESR 2645.
 - 8.02 Plywood: Comply with AWPA U1, UCFA, Type A or ICC-ES ESR 2645.
 - 8.03 Surface Burning Characteristics: UL FR-S rating; or flame spread and smoke developed ratings of 25 or less in a test of 30 minutes' duration in accordance with IBC section 2303.2.
 - 8.04 Treatment: D-Blaze FRT as manufactured by Viance.
 - 8.05 Kiln dry after treatment to 19 percent maximum moisture content for lumber and 15 percent for plywood
 - 8.06 Treat wood used for the following applications:
 - A. Roof and floor trusses.
 - B. Roof decks and sheathing.
 - C. Subflooring.
 - D. Beams and purlins.
 - E. Millwork and trim.

PART 9 - EXECUTION

SCHEDULE 0 - INSTALLATION

- PRODUCT DATA SHEET 0 - Framing and Sheathing: Comply with installation requirements in Section 06100.
- PRODUCT DATA SHEET 1 - Millwork and Trim: Comply with installation requirements in Section 06200.
- PRODUCT DATA SHEET 2 - Preservative Treated Wood:
- 9.01 Surface treatment of field cuts: All field cuts on members that provide structural support to a

permanent structure shall be field treated in accordance with AWWA M4.

PRODUCT DATA SHEET 3 - Wood Foundation System: Install in accordance with the following:

- 9.01 Permanent Wood Foundation (PWF) Design Specification, ANSI/AF&PA PWF-2007.
- 9.02 Permanent Wood Foundations, Design and Construction Guide, Southern Pine Council.
Publication #400.

PRODUCT DATA SHEET 4 - Fire-Retardant Treated Wood:

- 9.01 Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.
- 9.02 End cuts and drilling are permitted. Do not rip or mill lumber after fire-retardant treatment.

END OF SECTION 061064

06 11 00 Exterior Rough Carpentry

SECTION 061100 - EXTERIOR ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for wood-preservative treated wood, metal framing anchors and decking fasteners.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

- A. Lumber: Provide dressed lumber, S4S, marked with grade stamp of inspection agency.

2.02 TREATED MATERIALS

- A. Preservative-Treated Boards and Dimension Lumber: AWPA C2.
 - 1. Use treatment containing no arsenic or chromium and less than 10% formaldehyde.
- B. After treatment, re-dry boards, dimension lumber to 19 percent maximum moisture content.
- C. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
- D. Provide preservative-treated materials for all exterior rough carpentry, items indicated on Drawings, and the following:
 - 1. Framing members less than 30 inches above grade.
 - 2. Sills and ledgers.
 - 3. Members in contact with masonry or concrete.
 - 4. Decking.
 - 5. Ramps.

2.03 LUMBER

A. Dimension Lumber:

1. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness,
2. Deck Framing: [No. 2] [Southern pine: SPIB].
3. Dimension Lumber Posts: [No. 2] [Mixed southern pine: SPIB].
4. Dimension Lumber Decking and Ramps: [No. 1]: Southern Pine.
5. Dimension Lumber Benches: [No. 1 Southern Pine:] provide material hand selected for freedom from characteristics, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.
6. Dimension Lumber Railing Members and Benches: [No. 1] Southern Pine:
 7. Maximum Moisture Content: [15] percent.
 8. Board Decking: 1-1/4-inch- (32-mm-) thick, radius-edged decking.
 - a. Southern pine, [Premium]; SPIB.
 9. Boards for Benches: [Southern pine, B & B finish; SPIB].
 - a. Southern pine, [Premium]; SPIB.

2.04 MISCELLANEOUS PRODUCTS

- A. Fasteners: Use [stainless steel] [fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or ASTM F 2329] unless otherwise indicated.
1. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
 2. Power-Driven Fasteners: CABO NER-272.
 3. Carbon-Steel Bolts: ASTM A 307 (ASTM F 568M) with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers all hot-dip zinc coated.
- B. Post installed Anchors: Stainless-steel, [chemical] [or] [torque-controlled expansion] anchors with capability to sustain, without failure, a load equal to six times the load imposed as determined by testing per ASTM E 488.
- C. Metal Framing Anchors: Structural capacity, type, and size indicated, made from [hot-dip galvanized steel complying with ASTM A 653/A 653M, G60 (Z180) coating] [hot-dip galvanized steel complying with ASTM A 653/A 653M, G185 (Z550) coating] [stainless steel complying with ASTM A 666, Type 304].

- D. Deck Splines: Plastic splines designed to fit in grooves routed into the sides of decking material and be fastened to deck framing with screws.[Splines are made from UV-resistant polypropylene.]
- E. Deck Clips: Black-oxide-coated stainless-steel clips designed to be fastened to deck framing with screws, and to secure decking material with teeth.
- F. Deck Tracks: Formed metal strips designed to be fastened to deck framing and to secure decking material from underside with screws. Made from [epoxy powder-coated, hot-dip galvanized] [stainless] steel.
- G. Flexible Flashing: UV-resistant, self-adhesive, elastomeric thermoplastic flashing material with an overall thickness of not less than 0.040 inch (1.0 mm).

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction" unless otherwise indicated.
- C. Securely attach rough carpentry to substrates, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
 - 2. Published requirements of metal framing anchor manufacturer.
 - 3. [Table 2304.9.1, "Fastening Schedule," in the IBC] [Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings].
- D. Secure decking to framing with concealed decking fasteners.
- E. Railing Installation: Countersink fastener heads, fill flush, and sand filler.
 - 1. Fit balusters to railings, glue, and [nail] [screw] in place.
 - 2. Secure newel posts to stringers and risers with [through bolts] [lag screws] [countersunk-head wood screws and glue].
 - 3. Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts and glue.



MATERIAL SAFETY DATA SHEET
 UNIVERSAL FOREST PRODUCTS®, INC.
 2801 East Beltline NE, Grand Rapids, Michigan 49525
 (616) 364-6161
www.ufpi.com



SECTION 1 – PRODUCT IDENTIFICATION

PRODUCT NAME:	ProWood [®] MICRO CA
SYNONYMS:	Wood pressure treated with “micronized” copper and tebuconazole (“azole”) wood preservatives. ProWood Micro CA with Microshades (a colorant). ProWood Micro CA treated wood products with water repellent. ProWood Micro CA treated wood products with mold inhibitor. ProWood Micro CA treated formaldehyde bonded products (plywood).
DESCRIPTION:	Wood, often slightly darker colored than untreated wood. May be dyed to various shades.
PURPOSE:	For use where wood is subject to decay or termite attack.
PREPARED BY:	Legal Compliance Department
EMERGENCY CONTACT:	Company: (800) 598-9663 Chemtrec: (800) 424-9300

SECTION 2 – HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

CAS #	Hazardous Component	Percent ¹
N/A	Wood/Wood dust	90-98.5
12069-69-1	Copper Carbonate expressed as elemental copper	0.3-1.0
107534-96-3	Tebuconazole	<1.0
1309-37-1	Red Iron Oxide ²	<1.0
51274-00-1	Yellow Iron Oxide ²	<1.0
50-00-0	Formaldehyde ³	0-8

¹The above values may vary due to the variability of treatment and the natural variability of wood.

²Red and yellow iron oxide are present only in those products with added colorants (ProWood Micro CA with Microshades).

³Formaldehyde present only in those products bonded with formaldehyde based glues.

This Product is considered hazardous under the criteria in 29 CFR 1910.1200 (Hazard Communication Standard) and the Canadian Workplace Hazardous Materials Information System.

SECTION 3 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Solid wood, appearance may vary	Specific Gravity:	Not Available
Odor:	wood odor	Vapor Pressure:	Not Available
Boiling Point:	Not Applicable	Vapor Density:	Not Applicable
Melting Point:	Not Applicable	Density:	Not Applicable
Freezing Point:	Not Applicable	% Volatile by Volume:	Not Applicable
Weight per Gallon:	Not Applicable	Solubility (H2O):	Not Applicable
Evaporation Rate:	Not Applicable	Reactivity (H2O):	Not Applicable

SECTION 4 – FIRE AND EXPLOSION HAZARD

Flash Point	Method	Upper/Lower Flammable Limit	Auto-ignition	Rate of Burn
Not Applicable	Not Applicable	Not Available	Not Available	Not Available

Unusual Fire and Explosion Hazards: Wood is combustible when exposed to heat or flame. Wood dusts may form explosive mixtures with air in the presence of an ignition source. Combustion products may yield irritating and toxic fumes and vapors including amines and other organic materials, copper compounds, oxides of carbon and nitrogen.

Fire Fighting Equipment and Extinguishing Media: Use water to wet down wood to reduce the likelihood of ignition. Fire fighters should use full protective clothing including self-contained breathing apparatus.

NFPA Codes:	Health	1	HMIS Codes:	Health	1
	Flammability	1		Flammability	1
	Reactivity	0		Reactivity	0
	Other	N/A		Protection	B

Reactivity Data: Product is stable under normal conditions. Keep away from excessive heat, sparks and open flames. Keep away from incompatible materials including strong reducing and oxidizing agents. Hazardous polymerization is not likely to occur.

SECTION 5 – HEALTH HAZARDS AND FIRST AID

WARNING! Wood dust may form an explosive mixture with air. Use exhaust ventilation when cutting, sawing or grinding in an enclosed area. Wood dust may cause irritation to eyes, skin and upper respiratory tract. When cutting, sanding or grinding avoid inhalation and wear safety glasses. Handling may cause splinters, use puncture resistant gloves. Do not burn pressure-treated wood in open fire, stoves, fireplaces or residential boilers. Observe good hygiene and safety practices when handling this product.

	Signs and Symptoms of Acute Overexposure	First Aid Measures
Eyes:	Wood dust may cause irritation to the eyes. Symptoms can include irritation, redness, scratching of the cornea and tearing	Immediately flush eyes with water for at least 15 minutes. Seek medical attention if symptoms persist.
Skin:	Prolonged contact with treated wood and/or treated wood dust may cause irritation to the skin. Any wood dust may cause irritation to the skin. Mechanical rubbing may increase skin irritation. Some wood species and their dusts may contain natural toxins, which may cause dermatitis or allergic reactions in sensitized individuals.	For skin irritation, flush immediately with soap and water; continue at least 15 minutes. If irritation persists, get medical attention immediately. If wood splinters are injected under the skin, get medical attention.
Ingestion:	If ingestion does occur, slight gastrointestinal irritation may result. Certain species of wood and their dusts may contain natural toxins, which can have adverse effects on humans.	If the material is swallowed, get medical attention or advice. Do not induce vomiting.
Inhalation:	Wood dust is irritating to the nose, throat and lungs. Symptoms may include nasal dryness, deposits or obstructions in the nasal passages, coughing, sneezing, dryness and soreness of the throat and sinuses, hoarseness and wheezing. Prolonged or repeated inhalation of wood dusts may cause respiratory irritation, recurrent bronchitis and prolonged colds. Some species may cause allergic respiratory reactions with asthma-like symptoms in sensitized individuals. Prolonged exposure to wood dust by inhalation has been reported to be associated with nasal and paranasal cancer.	If dusts are inhaled, remove person to fresh air. If symptoms persist, seek medical attention.

Note to Physician: Respiratory ailments and pre-existing skin conditions may be aggravated by exposure to wood dust. Medical conditions generally aggravated by exposure to wood dust include pre-existing eye, respiratory and skin conditions.

Chronic Overexposure: Wood dusts may be irritating to the eyes, skin and respiratory tract. Prolonged or repeated inhalation of wood dust may cause respiratory irritation, recurrent bronchitis and prolonged colds. Depending on the species of wood, recurrent exposure may cause allergic skin and respiratory reactions in some individuals.

Carcinogenicity: ProWood Micro CA treated wood and its components, other than wood dust, are not listed as carcinogens by ACGIH, NIOSH, of IARC. Wood dust is classified as a carcinogen by ACGIH, NIOSH, and IARC, which is based on an increased incidence of nasal and paranasal cancer in people exposed to wood dusts. Carcinogenicity of wood dust: ACGIH – A1 Confirmed Human Carcinogen (related to wood dusts-hard wood); NIOSH – Occupational carcinogen (related to wood dust); IARC – Monograph 62, 1995 (related to wood dust)(Group 1 (carcinogenic to humans)). IARC has listed formaldehyde as a probable human carcinogen.

SECTION 6 – EXPOSURE CONTROL MEASURES/PERSONAL PROTECTION

Personal Protective Equipment

- Eyes/Face: Wear safety glasses with side shields when handling, cutting, sanding or grinding this material. Use a face shield for processes that may generate excessive dusts and splinters.
- Skin: Wear puncture resistant work gloves, such as leather when handling. Wear chemical resistant rubber gloves when handling freshly treated lumber at the treating facility.
- Respiratory: Respirators must be worn if the ambient concentration of airborne contaminants exceeds prescribed exposure limits. Dust masks may be worn to avoid inhalation of nuisance dust. Dust masks may not be adequate protection in environments above the occupational exposure limit.
- Ventilation: Cutting, grinding or sanding should be done outdoors or in a well ventilated area.

Component Exposure Limits*

Component	OSHA		ACGIH	
	PEL	STEL	TLV	TLV STEL
**Wood/Wood dust	15 mg/m ³ total dust 5 mg/m ³ respirable fraction (as a nuisance dust)	N/A	1 mg/m ³ TWA	10 mg/m ³ TWA
Copper Carbonate expressed as Elemental Copper	0.1 mg/m ³ TWA (fume)	N/A	0.2 mg/m ³ TWA (fume)	N/A
Tebuconazole	N/A	N/A	N/A	N/A
Red and Yellow Iron Oxide	10 mg/m ³ (total dust)	N/A	10 mg/m ³ (total dust)	N/A
Formaldehyde	0.75 ppm	2 ppm	0.3 ppm	N/A

**A state run OSHA program may have more stringent limits for wood dust and/or PNOR.

SECTION 7 – SAFE HANDLING, STORAGE, DISPOSAL AND ACCIDENTAL RELEASE MEASURES

Handling Procedures:

- Do not generate airborne dusts in the presence of an ignition source when sawing, cutting or grinding wood.
- Some preservative may migrate from the treated wood into soil/water or may dislodge from the wood upon contact with skin. Wash exposed areas thoroughly. Wash hands after handling and before eating.
- Avoid contact of wood dusts with skin and eyes. Avoid breathing wood dusts.
- Do not eat, drink or smoke when handling this product or in areas where dusts of this product are present.

Storage Procedures:

- Maintain good housekeeping procedures, such as sweeping regularly to avoid accumulation of dusts.
- Store away from excessive heat, sparks and open flame.

Accidental Release and Disposal Procedures:

- Do not burn pressure treated lumber in open fires, stoves, fireplaces or residential boilers.
- Do not use as mulch.
- Dispose of waste material according to local, State and Federal regulations.
- No containment procedures are needed as this product cannot spill or leak the preservative.

SECTION 8 – HUMAN AND ECOLOGICAL TOXICITY

Ecotoxicity: The product is not expected to leach harmful amounts of preservative into the environment; however, some preservative may migrate into soil and water. The wood preservatives in this product contain insecticides and fungicides, which when released into the environment at high enough concentrations, are expected to adversely affect or destroy contaminated plants. They may be harmful or fatal to wildlife. Toxicological and ecotoxicity testing have not been performed on this product. Environmental fate information is not available.

SECTION 9 – REGULATORY INFORMATION

SARA Sec. 302 & 304: N/A

SARA Section 311/312: Acute Health: Yes Chronic Health: Yes Fire: Yes Pressure: No Reactive: No

SARA 313: Form R required for 1.0% de minimis concentration (related to copper). Typical product retentions will be less than 1.0% copper.

FIFRA: This material contains the chemicals present on either the Listing of Pesticide Chemicals (40 CFR 180) or Pesticides Classified for Restricted Use as listed by FIFRA.

DOT: Not Regulated.

STATE: California Proposition 65 Warning: This product contains a chemical (wood dust) known to the State of California to cause cancer.

NOTICE: THE INFORMATION AND RECOMMENDATIONS SET FORTH ARE BELIEVED TO BE ACCURATE. HOWEVER, UNIVERSAL FOREST PRODUCTS®, INC. MAKES NO WARRANTY WITH RESPECT TO AND DISCLAIMS ALL LIABILITY FROM RELIANCE ON THE INFORMATION.

END OF SECTION 061100

SECTION 061600- SHEATHING

SUBFLOORING AND UNDERLAYMENT

Plywood Subfloor-Underlayment: DOC PS 1, **Exterior, C-C Plugged exposed underlayment** single-floor panels.

Span Rating: Not less than **24"** o.c.

Nominal Thickness: Not less than **3/4"**

Edge Detail: Tongue and groove.

Plywood Subflooring: **Exterior, Structural** single-floor panels or sheathing.

Span Rating: Not less than 24" o.c.

Nominal Thickness: Not less than **3/4"**

Plywood Underlayment for Ceramic Tile: DOC PS 1, Exterior, C-C Plugged, not less than **5/8-inch (15.9-mm)** nominal thickness, for ceramic tile set in **latex-portland cement mortar**.

FASTENERS

General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M of Type 304 stainless steel.

Nails, Brads, and Staples: ASTM F 1667.

Power-Driven Fasteners: NES NER-272.

Wood Screws: ASME B18.6.1.

Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

Stainless steel screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Stainless Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-

polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

For steel framing less than **0.0329 inch (0.835 mm)** thick, use screws that comply with ASTM C 1002.

For steel framing from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick, use screws that comply with ASTM C 954.

Screws for Fastening Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Provide washers or plates if recommended by sheathing manufacturer.

END OF SECTION 061600

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

- A. Submittals: **[Product Data for solid-surfacing materials] [Shop Drawings] [and] [Samples showing the full range of colors, textures, and patterns available for each type of finish].**
- B. Quality Standard: **[Architectural Woodwork Institute's "Architectural Woodwork Quality Standards."]
[Woodwork Institute's "Manual of Millwork."]**
- C. Note: a species of wood is considered tropical for the purposes of this prerequisite if it is grown in a country that lies between the Tropics of Cancer and Capricorn.
- D. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is completed, and HVAC system is operating.
- E. Notice to Vendors: The FIU Solar Decathlon Team prefers to purchase products that contain tropical wood ONLY if they are certified according to the guidelines of the Forest Stewardship Council (FSC). Please provide the country of manufacture of each product you expect to supply to us. Also please provide a list of FSC certified products you can supply.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Medium-Density Fiberboard: IKEA ABSTRAKT 800.699.86. High gloss white cover panels. Low Formaldehyde. Meets German E-1 Standard (Formaldehyde emissions from fiberboard must not exceed the E-1 standard which is equivalent to 0.1 parts-per-million).
- B. Furniture grade plywood.

- 1. Products:

a. IKEA BESTA.

2.02 CABINET HARDWARE AND ACCESSORY MATERIALS

- A. Butt Hinges: 2-3/4-inch (70-mm), 5-knuckle steel hinges made from 0.095-inch- (2.4-mm-) thick metal, and as follows:
1. Semiconcealed Hinges for Sliding Doors: IKEA BESTA, Rail for sliding door 101.058.36.
 2. Semiconcealed Hinges for Overlay Doors: IKEA , Integral hinge 501.323.76.
- B. IKEA BESTA Push Latch 701.965.17.
- C. Catches: [**Magnetic catches, BHMA A156.9, B03141**] [**Ball friction catches, BHMA A156.9, B03013**].
- D. Adjustable Shelf Standards and Supports: [**BHMA A156.9, B04071; with shelf rests, B04081**] [**BHMA A156.9, B04102; with shelf brackets, B04112**].
- E. Drawer Slides: BHMA A156.9, B05091.
1. Box Drawer Slides: [**Grade 1**] [**Grade 1HD-100**].
 2. File Drawer Slides: [**Grade 1HD-100**] [**Grade 1HD-200**].
 3. Pencil Drawer Slides: [**Grade 2**] [**Grade 1**].
 4. Keyboard Slides: [**Grade 1**] [**Grade 1HD-100**].
 5. Trash Bin Slides: [**Grade 1HD-100**] [**Grade 1HD-200**].
- F. Drawer Locks: BHMA A156.11, E07041.
- G. Grommets for Cable Passage through Countertops: [**1-1/4-inch (32-mm)**] [**2-inch (51-mm)**] <Insert size> OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
- H. Exposed Hardware Finishes: Comply with BHMA A156.18 for BHMA code number indicated.
1. Finish: [**Dark Satin Bronze: BHMA 613**] [**Bright Brass: BHMA 605**] [**Satin Chrome: BHMA 626 or BHMA 652**] [**Satin Stainless Steel: BHMA 630**].
- I. Furring, Blocking, Shims, and Hanging Strips: [**Fire-retardant-treated**] [**Softwood or hardwood**] lumber, kiln dried to 15 percent moisture content.

2.03 INTERIOR WOODWORK

- A. Complete fabrication to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- C. Plastic-Laminate Cabinets: [**Custom**] grade.
 - 1. AWI Type of Cabinet Construction: [**Flush overlay**] [**Reveal overlay**] [**Reveal overlay on face frame**] [**Flush inset**] [**Flush inset with face frame**].
 - 2. WIC Construction Style: Style [**A, Frameless**] [**B, Face Frame**].
 - 3. WIC Door and Drawer Front Style: [**Flush overlay**] [**Reveal overlay**] [**Lipped**] [**Flush**].
 - 4. Laminate Cladding: Horizontal surfaces other than tops, HGS; postformed surfaces, HGP; vertical surfaces, [**HGS**] [**VGS**]; Edges, [**HGS**] [**VGS**] [**PVC tape, 0.018 inch (0.460 mm) thick**] [**PVC edge banding, 0.12 inch (3 mm) thick**]; semiexposed surfaces, [**VGS**] [**CLS**] [**thermoset decorative panels**].
 - 5. Drawer Sides and Backs: [**Solid hardwood**] [**Thermoset decorative panels**].
 - 6. Drawer Bottoms: [**Hardwood plywood**] [**Thermoset decorative panels**].

2.04 SHOP FINISHING OF INTERIOR ARCHITECTURAL WOODWORK

- A. Finishes: Same grades as items to be finished.
- B. Finish architectural woodwork at the fabrication shop; defer only final touch up until after installation.
 - 1. Apply one coat of sealer or primer to concealed surfaces of woodwork. [**Apply two coats to back of paneling and to end-grain surfaces.**]
 - 2. Apply a vinyl wash coat to woodwork made from closed-grain wood before staining and finishing.
 - 3. After staining, if any, apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
- C. Transparent Finish: AWI finish system [**synthetic penetrating oil**] [**conversion varnish**] [**catalyzed polyurethane**] <Insert system designation>.
- D. Transparent Finish: WI finish System [**4, conversion varnish**] [**5, catalyzed polyurethane**] [**6, penetrating oil**] <Insert system designation>.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Install woodwork to comply with referenced quality standard for grade specified.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of **1/8 inch in 96 inches (3 mm in 2400 mm)**.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Fasten with countersunk concealed fasteners and blind nailing. Use fine finishing nails [**or finishing screws**] for exposed nailing, countersunk and filled flush with woodwork.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than **36 inches (900 mm)** long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
- G. Anchor paneling to supports with concealed panel-hanger clips and by blind nailing on back-up strips, splined-connection strips, and similar associated trim and framing.
- H. Stairs: Securely anchor carriages to supporting substrates. Install stairs with treads and risers no more than **1/8 inch (3 mm)** from indicated position.
- I. Railings:
 - 1. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.
 - 2. Wall Rails: Support rails on indicated metal brackets securely fastened to wall framing.
- J. Cabinets: Install so doors and drawers are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
 - 1. Fasten wall cabinets through back, near top and bottom, at ends and not more than **16 inches (400 mm)** o.c. with [**No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips**] [**No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish**] [**toggle bolts through metal backing or metal framing behind wall finish**].

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



K. Anchor countertops securely to base units. Seal space between backsplash and wall. **END OF SECTION 064023**

SECTION 064116.A1 - ARCHITECTURAL CABINETS

IKEA Search

Welcome!

All products New Special Offers! Living room Bedroom Kitchen Children's IKEA Textiles All departments

Home / Living room / TV & media solutions / TV solutions for flatscreen TVs up to 37"

BESTÅ

TV storage combo with sliding doors

\$920.00

The price reflects selected options
198.758.74

Sliding doors save space when open and hides the TV when needed. [Read more](#)

Color
high gloss white

1 Buy online Save to list

Buy at your local store
FL Sunrise Ok

Store selection may vary and prices may differ from those online.

Color

Show all (8 more)

More Models

Show all (33 more)

Product information

BESTÅ
TV storage combo with sliding doors
\$920.00

Care instructions
Wipe clean with a damp cloth.
Wipe clean using a damp cloth and a mild cleanser.
Wipe dry with a clean cloth.

Package measurement and weight
20 packages
[Show dimensions, weight and article numbers](#)

Key features

- Sliding doors save space when open and hides the TV when needed.
- Frames in different sizes; allows you to create a solution to suit the size of your TV.
- Doors and drawer fronts in many different colors and finishes. Easy to make your storage combination more personal.

Product description
Rail for sliding doors:
Aluminum

Extra shelf:
Tempered/safety glass

Shelf unit/ shelf unit/height extension unit:
Back: Fiberboard, Foil, Foil
Main parts: Particleboard, Fiberboard, Foil, Honeycomb structure recycled paper filling
Top panel/ Bottom panel: Particleboard, Fiberboard, Foil, Honeycomb structure recycled paper filling, Polypropylene

TV storage unit:
Main parts: Particleboard, Foil, ABS plastic

More BESTÅ/FRAMSTÅ/INREDA system

[Go to BESTÅ/FRAMSTÅ/INREDA system](#)

More TV solutions for flatscreen TVs up to 37"

[Go to TV solutions for flatscreen TVs up to 37"](#)

- Store, find and display; with INREDA interior organizers you can easily organize your things.

Designer:
IKEA of Sweden/Mikael Warnhammar

Product dimensions

Width: 94 1/2 "
Depth: 15 3/4 "
Height: 75 5/8 "

Width: 240 cm
Depth: 40 cm
Height: 192 cm

Top panel/ Bottom panel: Particleboard, Foil, Particleboard, Honeycomb structure recycled paper filling, ABS plastic
Back panel: Particleboard, Foil
Back/ Drawer bottom: Fiberboard, Acrylic paint
Drawer front: Fiberboard, Tempered/safety glass, Foil, ABS plastic

Door:
Particleboard, Foil

 **Delivery**
Get all your options with our delivery service.

 **Assembly service**
In need of some assembly assistance? Help is at hand.

 **IKEA Gift Card**
Our flattest pack so far! Click for details.

IKEA Catalog & Brochures
Request View



Customer Service
Need help? Ask Anna!
FAQ
Return Policy
Children's Product Registration
All IKEA Services

About IKEA
People & the Environment
IKEA Foundation
IKEA News Room
Our Code of Conduct

The IKEA Store
Find an IKEA Store
IKEA Food & Restaurant
IKEA Business
IKEA Gift Card
View your IKEA Credit Card Account

Careers at IKEA
Search careers
Your career at IKEA
Coworker stories
Work areas

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887
END OF SECTION 064116.A1



06 61 16.A1 Solid Surface Countertop by Ikea

SECTION 066116.A1 - SOLID SURFACE COUNTER TOP BY IKEA

PART 1 — GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following horizontal and trim solid surface product types:

- 1. Countertops with sinks

- B. Alternates:

- 1. None

1.3 DEFINITION

- A. Solid surface is defined as nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.4 SUBMITTALS

- A. Product data:

- 1. For each type of product indicated.
- 2. Product data for the following:
 - a. Chemical-resistant tops

B. Shop drawings:

1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices and other components.
 - a. Show full-size details, edge details, thermoforming requirements, attachments, etc.
 - b. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
 - c. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in solid surface.

D. Product data:

1. Indicate product description, fabrication information and compliance with specified performance requirements.

F. Product certificates:

1. For each type of product, signed by product manufacturer.

G. Fabricator/installer qualifications:

1. Provide copy of certification number.

H. Manufacturer certificates:

1. Signed by manufacturers certifying that they comply with requirements.

I. NSF/ANSI standards:

1. Refer to www.nsf.org for the latest compliance to NSF/ANSI Standard 51 for food zone — all food types.

J. Maintenance data:

1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions.
 - a. Maintenance kit for finishes shall be submitted.

2. Include in project closeout documents.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Shop that employs skilled workers who custom fabricate products similar to those required for this project and whose products have a record of successful in-service performance.

B. Fabricator/installer qualifications:

1. Work of this section shall be by a certified fabricator/installer, certified in writing by the manufacturer.

C. Applicable standards:

1. Standards of the following, as referenced herein:

- a. American National Standards Institute (ANSI)
- b. American Society for Testing and Materials (ASTM)
- c. National Electrical Manufacturers Association (NEMA)
- d. NSF International

2. Fire test response characteristics:

- a. Provide with the following Class A (Class I) surface burning characteristics as determined by testing identical products per UL 723 (ASTM E84) or another testing and inspecting agency acceptable to authorities having jurisdiction:

- 1) Flame Spread Index: 25 or less.
- 2) Smoke Developed Index: 450 or less.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.

- B. Store components indoors prior to installation.

C. Handle materials to prevent damage to finished surfaces.

1. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.7 WARRANTY

A. Provide manufacturer's warranty against defects in materials.

1. Warranty shall provide material and labor to repair or replace defective materials.
2. Damage caused by physical or chemical abuse or damage from excessive heat will not be warranted.
3. Warranty shall be transferable to subsequent owner for remainder of warranty period.

B. Optional Installed Warranty:

1. To qualify for the optional Installed Warranty, fabrication and installation must be performed by a DuPont Certified Fabrication/Installation source who will provide a brand plate for the application.
2. This warranty covers all fabrication and installation performed by the certified/approved source subject to the specific wording contained in the Installed Warranty Card.

C. Manufacturer's warranty period:

1. Ten years from date of substantial completion.

1.8 MAINTENANCE

A. Provide maintenance requirements as specified by the manufacturer.

PART 2 — PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:

1. Subject to compliance with requirements, provide products by one of the following:
 - a. Ikea Numerar countertop

2.2 MATERIALS

A. Solid wood components

1. solid wood birch 96 7/8" x 25 5/8"
2. Superficial damage to a depth of 0.010 inch (.25 mm) shall be repairable by sanding and/or polishing.

B. Thickness:

1. 1 1/2"

C. Edge treatment:

1. Radius Edge ¼"

2.3 ACCESSORIES

A. Joint adhesive:

1. Manufacturer's standard one- or two-part adhesive kit to create inconspicuous, nonporous joints.

B. Sealant:

1. Manufacturer's standard mildew-resistant, FDA-compliant, NSF 51-compliant (food zone — any type), UL-listed silicone sealant in colors matching components.

2.5 FINISHES

A. Select from the manufacturer's standard color chart.

1. Color: birch

B. Finish:

1. Provide surfaces with a uniform finish.
 - a. Semigloss; gloss range of 20–40.

3.1 EXAMINATION

- A. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.
 - 1. Provide product in the largest pieces available.
 - 2. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in finished work.
 - a. Exposed joints/seams shall not be allowed.
 - 3. Reinforce field joints with solid surface strips extending a minimum of 1 inch on either side of the seam with the strip being the same thickness as the top.
 - 4. Cut and finish component edges with clean, sharp returns.
 - 5. Rout radii and contours to template.
 - 6. Anchor securely to base cabinets or other supports.
 - 7. Align adjacent countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop.
 - 8. Carefully dress joints smooth, remove surface scratches and clean entire surface.
 - 9. Install countertops with no more than 1/8-inch (3 mm) sag, bow or other variation from a straight line.
- B. Coved backsplashes and applied sidesplashes:
 - 1. Install applied sidesplashes using manufacturer's standard color-matched silicone sealant.

2. Adhere applied sidesplashes to countertops using manufacturer's standard color-matched silicone sealant.

3.3 REPAIR

- A. Repair or replace damaged work, which cannot be repaired to architect's satisfaction.

3.4 CLEANING AND PROTECTION

- A. Keep components clean during installation.
- B. Remove adhesives, sealants and other stains.

END OF SECTION 066116.A1



Acoustical Surfaces, Inc.

SOUNDPROOFING, ACOUSTICS, NOISE & VIBRATION CONTROL SPECIALISTS

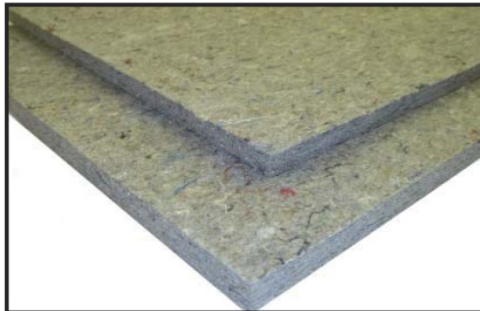
123 Columbia Court North • Suite 201 • Chaska, MN 55318

(952) 448-5300 • Fax (952) 448-2613 • (800) 448-0121

Email: sales@acousticalsurfaces.com

Visit our Website: www.acousticalsurfaces.com

We Identify and **S.T.O.P.** Your Noise Problem



QUIET FLOOR ULTRA™ Soundproofing Backer

- Economical
- Recycled “Green” Product
- 100% Pre-Consumer Recycled Synthetic Fiber
- Easy to Install

MATERIAL: 100% pre-consumer recycled synthetic fiber.

FEATURES: Can contribute to LEED MRc4.1-4.2 credits.

APPLICATIONS: Flooring underlayment.

THICKNESS: 0.50" (+/- 2%).

SIZES: 2' x 4' or 4' x 8' panels.

WEIGHT: 4000gm/sq m (120oz/sq yd.).

4' x 8' sheets = approx. 25 lbs..... 68 sheets/pallet = 1700lbs..... 12 pallets/tkl.

2' x 4' sheets = approx. 6.25 lbs..... 272 sheets/pallet = 1700lbs..... 24 pallets/tkl.

DENSITY: 20 lbs/ft³.

R-VALUE: @0.50" thickness = 2.09 hr-ft²-degF/Btu (4.19/inch).

FLAMMABILITY: Meets or exceeds the ASTM E-84-07 parameters for 'Class A' Interior Wall & Ceiling Finish Category.

VOLATILE ORGANIC COMPOUNDS:

Certified SCS Indoor Advantage – Gold. Passed Section 01350 VOC test to comply with Collaborative High Performance Schools (CHPS) and Office Spaces.

SOUND: *Impact Insulation Class (IIC)* The method is designed to measure the change in impact sound transmission of a floor-ceiling assembly in a controlled laboratory environment. ASTM E2179-03. **IIC = 20.**

Sound Transmission Class (STC) The sound-insulating property of a partition element is expressed in terms of the sound transmission loss. (Stand alone product – no ceiling or wall assembly) ASTM E90-04, ASTM E413-04 **STC = 15.**

Noise Reduction Coefficient (NRC) A single number rating obtained by taking the arithmetic average of the absorption coefficients at specified frequencies, rounded to the nearest 0.05.

NRC = 0.50

Sound Absorption Average (SAA) A single number rating obtained by taking the arithmetic average of the one-third octave bands at specified frequencies, rounded to the nearest 0.01.

SAA = 0.49

INSTALLATION: Acoustical Adhesive.

• Soundproofing Products • Sonex™ Ceiling & Wall Panels • Sound Control Curtains • Equipment Enclosures • Acoustical Baffles & Banners • Solid Wood & Veneer Acoustical Ceiling & Wall Systems
• Professional Audio Acoustics • Vibration & Damping Control • Fire Retardant Acoustics • Hearing Protection • Moisture & Impact Resistant Products • Floor Impact Noise Reduction
• Sound Absorbers • Noise Barriers • Fabric Wrapped Wall Panels • Acoustical Foam (Egg Crate) • Acoustical Sealants & Adhesives • Outdoor Noise Control • Assistive Listening Devices
• OSHA, FDA, ADA Compliance • On-Site Acoustical Analysis • Acoustical Design & Consulting • Large Inventory • Fast Shipment • No Project too Large or Small • Major Credit Cards Accepted

END OF SECTION 072113

SECTION - 072116 – BATT INSULATION

PART 4 - GENERAL

4.01 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 5 - PRODUCTS

5.01 INSULATION PRODUCTS

- A. Surface-Burning Characteristics: ASTM E 84, and as follows:
1. Flame-Spread Index: 25 or less where exposed; otherwise, as indicated in Part 2 "Insulation Products" Article.
 2. Smoked-Developed Index: 450 or less.
- B. Glass-Fiber-Board Insulation: ASTM C 612, Type IA or Types IA and IB; **unfaced**; nominal density of **4.25 lb/cu. ft.** with flame-spread index of 25 or less.

5.02 ACCESSORIES

- A. Vapor Retarder: **Reinforced polyethylene, 6 mils.**

PART 6 - EXECUTION

6.01 INSTALLATION

- A. Install insulation in areas and in thicknesses indicated or required to produce R-values indicated. Cut and fit tightly around obstructions and fill voids with insulation.
- B. Bond units to substrate with mechanical anchorage to provide permanent placement and support of units.
- C. Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage. Locate seams at framing members, overlap, and seal with tape.

END OF SECTION 072116

07 21 19 Spray Foam Insulation

SECTION - 072119 – SPRAY FOAM INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closed Cell Spray Foam Insulation.

1.2 RELATED SECTIONS

- A. Section 07100 – Damp proofing and Waterproofing: Insulation installed with waterproofing systems.
- B. Section 07260 - Vapor Retarders: Vapor retarder materials.
- C. Section 07270 - Air Barriers: Air seal materials.
- D. Section 07500 - Membrane Roofing: Insulation in low-slope roofing applications.
- E. Section 07810 - Fire and Smoke Protection: Insulation installed in conjunction with fire stopping or smoke containment systems.
- F. Section 09200 - Plaster and Gypsum Board: Insulation installed in conjunction with interior wall and ceiling finish systems.
- G. Section 15810 - Ducts: Insulation to surround HVAC ductwork.

1.3 REFERENCES

- A. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
- C. ASTM C 1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
- D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
- F. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

- G. ASTM D 1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
- H. ASTM D 1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
- I. ASTM D 1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
- J. ASTM D 2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
- K. ASTM D 2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.

1.4 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for flame and smoke, concealment, and over coat requirements.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer with a minimum of ten years experience manufacturing products in this section shall provide all products listed.
- B. Installer Qualifications: Products listed in this section shall be installed by a single organization with at least five years experience successfully installing insulation on projects of similar type and scope as specified in this section.
- C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship is approved by Architect.

3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Storage: Store materials in dry locations with adequate ventilation, protected from freezing rain, direct sunlight and excess heat and in such a manner to permit easy access for inspection and handling. Store at temperature between 55 and 80 degrees F (12.7 to 26.6 degrees C).
- C. Handling: Handle materials to avoid damage.

1.8 PRE-APPLICATION MEETINGS

- A. Convene minimum two weeks prior to starting work of this section.

1.9 SEQUENCING

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

1.10 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.
- B. Do not apply insulation when substrate temperatures are under 40 degrees F (4.4 degrees C) prior to installation.
- C. Surfaces must be dry prior to application of spray foam. Excess humidity may cause poor adhesion, and result in product failure.
- D. To avoid overspray, product should not be applied when conditions are windy.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: CertainTeed Corp., Insulation Group, which is located at: 750 E. Swedesford Rd. P. O. Box 860 ; Valley Forge, PA 19482-0860; Toll Free Tel: 800-233-8990; Fax: 610-341-7940; Email: request info; Web: certainteed.com/CertainTeed/Pro/Design+Professional/Insulation

B. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 SPRAY FOAM INSULATION

A. Insulation: HFC-blown type Closed Cell Foam: CertainTeed CertaSpray Closed Cell Foam is a medium-density, MDI-based polyurethane thermoset rigid foam. When CertaSpray A-side closed cell is mixed with CertaSpray B-side closed cell under pressure in a 1:1 volumetric ratio, they react and expand into a medium-density closed cell foam with an in-place core density of 1.9- 2.2 pcf:

1. Physical and Mechanical Properties:

- a. Core Density: 1.9-2.4 pcf when tested in accordance with ASTM D 1622.
- b. Thermal Resistance (aged): 5.8 less than or equal to 2-1/2 inches / 6.4 when greater than 2-1/2 inches when tested in accordance with ASTM C 518 at 75 degrees F, (h-ft²- degrees F)/Btu.
- c. Thermal Resistance (initial): 6.4 when tested in accordance with ASTM C 518 at 75 degrees F, (h-ft²- degrees F)/Btu.
- d. Closed Cell Content: 88-95 percent when tested in accordance with ASTM D 2842.
- e. Compressive Strength: Greater than 25 psi when tested in accordance with ASTM D 1621.
- f. Tensile Strength: 23 psi when tested in accordance with ASTM D 1623.
- g. Water Absorption: Less than 2 percent by volume when tested in accordance with ASTM D 2842.
- h. Dimensional Stability: Less than 9 percent by volume when tested in accordance with ASTM D 2126 at 75 degrees F/95 percent RH, 28 Day.
- i. Water Vapor Transmission: 1.3 perm/inch when tested in accordance with ASTM E 96.
- j. Air Permeability: 0.013 when tested in accordance with ASTM E 283 at 1 inch thickness, L/s/m².
- k. Fungi Resistance: Pass, with no growth when tested in accordance with ASTM C 1338.

2. Fire performance

- a. Flame Spread: Less than 25 when tested in accordance with ASTM E 84.
 - b. Smoke: Less than 450 when tested in accordance with ASTM E 84.
3. Thermal Performance (aged): Tested in accordance with ASTM C 518 and/or ASTM C 177 at 75 degrees F (24 degrees C) mean temperature.
- a. Thickness 1 inch (25 mm), R-Value 5.8 (h-ft²-degreesF)/Btu (1.0 (m²-degreesC)/W).
 - b. Thickness 1-1/2 inches (38 mm), R-Value 8.7 (h-ft²-degreesF)/Btu (1.5 (m²-degreesC)/W).

- c. Thickness 2 inches (51 mm), R-Value 11.6 (h-ft²-degreesF)/Btu (2.0 (m²-degreesC)/W).
- d. Thickness 2-1/2 inches (64 mm), R-Value 16.0 (h-ft²-degreesF)/Btu (2.8 (m²-degreesC)/W).
- e. Thickness 3 inches (76 mm), R-Value 19.2 (h-ft²-degreesF)/Btu (3.4 (m²-degreesC)/W).
- f. Thickness 3-1/2 inches (89 mm), R-Value 22.4 (h-ft²-degreesF)/Btu (3.9 (m²-degreesC)/W).
- g. Thickness 4 inches (102 mm), R-Value 25.6 (h-ft²-degreesF)/Btu (4.5 (m²-degreesC)/W).
- h. Thickness 4-1/2 inches (114 mm), R-Value 28.8 (h-ft²-degreesF)/Btu (5.1 (m²-degreesC)/W).
- i. Thickness 5 inches (127 mm), R-Value 32.0 (h-ft²-degreesF)/Btu (5.6 (m²-degreesC)/W).
- j. Thickness 5-1/2 inches (140 mm), R-Value 35.2 (h-ft²-degreesF)/Btu (6.2 (m²-degreesC)/W).
- k. Thickness 6 inches (152 mm), R-Value 38.4 (h-ft²-degreesF)/Btu (6.8 (m²-degreesC)/W).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify that all exterior and interior wall, partition, and floor/ceiling assembly construction has been completed to the point where the insulation may correctly be installed.
- C. Verify that substrate and cavities are dry and free of any foreign material that will impede application.
- D. Verify that mechanical and electrical services in ceilings, walls and floors have been installed and tested and, if appropriate, verify that adjacent materials are dry and ready to receive insulation.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Mask and protect adjacent surfaces from overspray or dusting.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions. Product must be installed according to local code, and must be applied by a qualified applicator.
- B. Apply insulation by spray method, to uniform monolithic density without voids.
- C. Apply to minimum cured thickness as indicated on the Drawings or as scheduled at the end of this Section.
- D. Seal plumbing stacks, electrical wiring and other penetrations into attic to control air leakage.
- E. Apply insulation to fill voids around doors and windows. Apply insulation to fill voids around accessible service and equipment penetrations.
- F. Do not install spray foam insulation in areas where it will be in contact with equipment or materials with operating temperatures of 180 degrees F (82 degrees C) or greater.
- G. Apply insulation within all steel tube and stud boxed framing
- H. Where building is designed to meet the specific air tightness standards of the Energy Star Program, apply insulation as recommended by manufacturer to provide airtight construction. Apply sealant to joints between structural assemblies as specified in Division 7.
- I. Patch damaged areas.

3.4 FIELD QUALITY CONTROL

- A. Inspection will include verification of insulation and density.

3.5 PROTECTION

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

3.6 SCHEDULES

- A. As designed

Floor 6"

Walls East & West 10"

Walls North & South 8"

Roof 10"

- B. Price option

Floor 5"

Walls East & West 6.5"

Walls North & South 6.5"

Roof 6.5"

Specification Sheet



CertaSpray® Closed Cell Foam

1. PRODUCT NAME

CertainTeed CertaSpray®
 Closed Cell Foam

2. MANUFACTURER

CertainTeed Corporation
 P.O. Box 860
 Valley Forge, PA 19482-0105
 Phone: 610-341-7000
 800-233-8990
 Fax: 610-341-7571
 Website:
 www.certainteed.com/insulation

3. PRODUCT DESCRIPTION

Basic Use: CertaSpray Closed Cell Foam is a two-component closed cell spray foam with a zero-ozone-depleting HFC blowing agent. When CertaSpray A-side closed cell is mixed with CertaSpray B-side closed cell under pressure in a 1:1 volumetric ratio, they react and expand into a medium-density closed cell foam with an in-place core density of 1.9-2.4 pcf.

Benefits: CertaSpray Closed Cell Foam provides thermal insulation for the interior of the home and reduces air infiltration through the building envelope.

Applications: The closed cell 2-pcf foam can be spray-applied into open wall cavities, perimeter joists, cathedral ceilings, garage ceilings, attics and crawlspaces. Product can be installed up to 12" thick in ceilings and 8" thick in walls when covered with a code approved 15-minute thermal barrier. Product is meant for interior applications. Product must be finished according to local code, and must be applied by a qualified applicator.

Composition and Materials: CertaSpray Closed Cell Foam is a medium-density, MDI-based polyurethane thermoset rigid foam.

Limitations: Foam Plastic Insulation: CertaSpray Closed Cell Foam is defined by the building codes as a foam plastic insulation.

Thermal Barrier: Many building codes require that foam plastic insulation be covered with an approved 15-minute thermal barrier. Consult local building code officials to ensure the application meets local building codes and regulations.

Vapor Retarder: CertaSpray Closed Cell Foam must be installed at a thickness of at least 1.75" to be considered as a vapor retarder. Check local building code for climate-specific vapor retarder requirements.

Lighting Fixtures: The National Electrical Code prohibits installation of any insulation over or within 3" (76 mm) of recessed light fixtures, unless approved insulated ceiling (IC) light fixtures are used.

Maximum Use Temperature: CertaSpray foam should not be in contact with equipment or materials that have operating temperatures greater than 180°F.

4. TECHNICAL DATA

CertainTeed CertaSpray Closed Cell foam has achieved ICC-ES approval. The evaluation report number is ESR-2669.

Chemical Properties

	CertaSpray A	CertaSpray B
Viscosity at 25°C, cps	150-250	1400
Specific Gravity at 25°C, g/ml	1.23	1.14

Fire Performance**

	TEST METHODS	RESULT
Flame Spread Index, 6 ^{***}	ASTM E84	< 25
Smoke Index, 6 ^{***}	ASTM E84	< 450
≤ 12" in ceilings	NFPA 286	Pass when covered with a 15-minute thermal barrier
≤ 8" in walls	NFPA 286	

** The results of the test method may not be indicative of real-life fire performance. All plastic insulation must be separated from the interior building by an approved thermal barrier of 1/2" gypsum wallboard or equivalent thermal barrier material as required by the building code.



Physical and Mechanical Properties*

PROPERTY	ASTM METHOD	VALUE
Core Density, pcf	D1622	1.9-2.4
Thermal Resistance (aged) at 75°F, (h-ft ² -°F)/Btu	C518	5.8 ≤ 2" 6.4 > 2"
Thermal Resistance (initial) at 75°F, (h-ft ² -°F)/Btu	C518	6.7
Closed Cell Content, %	D2842	88-95%
Compressive Strength, psi	D1621	> 25
Tensile Strength, psi	D1623	60
Water Absorption, % by volume	D2842	< 2%
Dimensional Stability, 75°F/95% RH, 28 Days, vol%	D2126	< 9%
Water Vapor Transmission (Permeability), perm-inch	E96	1.51
Permeance (perms)	E96	1.51@1" 0.76@2" 0.50@3" 0.38@4" 0.30@5" 0.25@6"
Air Permeability, at 1" thickness, L/s/m ²	E283	0.013
Fungi Resistance	C1338	Pass, with no growth

* The typical properties were obtained on samples produced with a Gusmer/Graco H25 spray machine using an air-purged Fusion spray gun. The foam was sprayed at a thickness of approximately 4", in two passes of 2" each. Please see Recommended Processing Conditions for additional information.

Recommended Processing Conditions

	VALUE
Preheater Temperature, °F	120-135
Hose Temperature, °F	≤ 135
Pressure, psi	1100-1500
A/B Volumetric Ratio	1/1
Cream Time*, sec	1-2
Tack-free Time*, sec	4 - 7
Maximum Thickness per Pass, inches	2
Maximum Installed Thickness, inches	See Applications Section

THERMAL PERFORMANCE			
THICKNESS		AGED R-VALUE*	
inches	mm	(h-ft ² -°F)/Btu	(m ² -°C)/W
1	25	5.8**	1.02
1½	38	8.7**	1.53
2	51	11.6**	2.04
2½	64	16.0	2.82
3	76	19.2	3.38
3½	89	22.4	3.95
4	102	25.6	4.51
4½	114	28.8	5.07
5	127	32.0	5.64
5½	140	35.2	6.20
6	152	38.4	6.76
7	178	44.8	7.89
8	203	51.2	9.02
9	229	57.6	10.14
10	254	64.0	11.27
11	279	70.4	12.40
12	305	76.8	13.53

Tested in accordance with ASTM C518 and/or C177 at 75°F (24°C) mean temperature.

*Aged 90 days at 140°F.

**When applied at a thickness > 2", aged R-Value is 6.4 per inch. When applied at a thickness ≤ 2", aged R-Value is 5.8 per inch.

5. INSTALLATION

All application surfaces must be free of oil, grease, dust and debris. Surface must be dried prior to application of spray foam. Excess humidity may cause poor adhesion, and result in product failure. To avoid overspray, product should not be applied when conditions are windy.

Substrate temperature must reach 40°F prior to application.

The final product yield is dependent on spray conditions and spray techniques.

Typical End Use Properties: The thermal performance values depicted in the chart at left are achieved at the thickness specified when installed as recommended.

CAUTION: CertainTeed recommends that you consult an HVAC expert and comply with guidelines established by applicable building codes prior to using any closed or open cell spray foam insulation product in an attic retrofit application. If not installed correctly, adding spray foam to a vented attic may significantly impair the performance of the HVAC system and may cause other damage to the building. CertainTeed will not assume any liability or responsibility for any personal injury or property damage occurring as a result of the improper installation of spray foam insulation that is not in accordance with the instructions accompanying the product, that is not in conformance with any applicable building codes, or that is contrary to the advice given by a duly qualified HVAC expert.

6. HANDLING AND STORAGE

Storage: It is recommended that the CertaSpray-B and CertaSpray-A drums should be stored between 55-80°F. Keep containers tightly closed and store in a dry, well-ventilated area protected from

freezing, rain, direct sunlight and excess heat. The storage life of chemicals is up to 6 months when stored according to the recommended conditions.

Handling: When opening the drums, loosen the cap slowly to release pressure in the drum. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing aerosols, vapor or mist. Wash skin thoroughly after handling.

The MSDS for CertaSpray-A and CertaSpray-B closed cell must be read before using this product.

7. HEALTH AND SAFETY

The health and safety information in this data sheet does not contain sufficient detail for safe handling in all cases. For detailed safety and health information refer to the Material Safety Data Sheet for this product.

8. AVAILABILITY AND COST

Distributed and sold throughout the United States. For availability and cost contact your local Territory Manager, contractor or distributor, or call CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

9. WARRANTY

Refer to CertainTeed's Lifetime Limited Warranty for CertaSpray® Foam Insulation (30-50-012).

10. MAINTENANCE

No maintenance required.

11. TECHNICAL SERVICES

Technical assistance can be obtained either from the local CertainTeed sales representative, or by calling CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

12. FILING SYSTEMS

CertainTeed Pub. No. 30-50-011. Additional product information is available upon request.



EMERGENCY CALLS:

CertainTeed Emergency Response Center
800-424-9300
CHEMTREC—Spills, Leak, Fire
800-424-9300 (in USA and Canada)

ASK ABOUT OUR OTHER CERTAINTEED PRODUCTS AND SYSTEMS:

EXTERIOR: ROOFING • SIDING • WINDOWS • FENCE • RAILING • TRIM • DECKING • FOUNDATIONS • PIPE
INTERIOR: INSULATION • GYPSUM • CEILINGS

CertainTeed Corporation
P.O. Box 860
Valley Forge, PA 19482

Professional: 800-233-8990
Consumer: 800-782-8777
www.certainteed.com/insulation



Code No. 30-50-011, © 11/10 CertainTeed Corporation.

END OF SECTION 072119

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



07 22 00 Tapered Insulation

SECTION 072200 – TAPERED INSULATION

SECTION 072600 – WEATHER BARRIER

PART 7 - GENERAL

7.01 SECTION REQUIREMENTS

- A. Submittals: ICC-ES evaluation reports for water-resistive barrier.

PART 8 - PRODUCTS

8.01 WATER-RESISTIVE BARRIERS

- A. Building Wrap: ASTM E 1677, Type I air barrier; with water-vapor permeance not less than **10 perms** per ASTM E 96, Desiccant Method (Procedure A); flame-spread and smoke-developed indexes not greater than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.

- 1. Products:

- a. HUSKY, Poly-America's standard sheeting, 8mil.

8.02 ACCESSORIES

- A. Flexible Flashing: Adhesive **butyl rubber** compound, bonded to plastic film or spunbonded polyolefin, with an overall thickness of **0.030 inch (0.8 mm)**.
- B. Building Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

PART 9 - EXECUTION

9.01 INSTALLATION

- A. Building Paper Installation:
 - 1. Apply building paper immediately after sheathing is installed.
 - 2. Apply horizontally with a **2-inch** overlap and a **6-inch** end lap.
 - 3. Seal seams, edges, fasteners, and penetrations with tape.
 - 4. Extend into jambs of openings and seal corners with **flexible flashing or tape**.

B. Building Wrap Installation:

1. Apply building wrap immediately after sheathing is installed.
2. Seal seams, edges, fasteners, and penetrations with tape.
3. Extend into jambs of openings and seal corners with tape.

C. Flexible Flashing Installation:

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least **3 inches**, except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

END OF SECTION 072600

SECTION 073100 – METAL FLASHING

PART 10 - GENERAL

10.01 SECTION REQUIREMENTS

- A. Submittals: Product Data **and Samples**.
- B. Comply with SMACNA's "Architectural Sheet Metal Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- C. Coordinate installation of sheet metal flashing and trim with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

PART 11 - PRODUCTS

11.01 SHEET METAL

- A. Aluminum Sheet: **ASTM B 209**, alloy as standard with manufacturer for finish required, not less than **0.032 inch (0.8 mm)** thick; and **with mill finish**.

11.02 ACCESSORIES

- A. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners.
 - 1. Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
 - 2. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 3. Fasteners for Aluminum Sheet: Aluminum.

11.03 FABRICATION

- A. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

PART 12 - EXECUTION

12.01 INSTALLATION

- A. Comply with SMACNA's "Architectural Sheet Metal Manual." Allow for thermal expansion; set true to line and level. Install Work with laps, joints, and seams permanently watertight and weatherproof; conceal fasteners where possible.
- B. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- C. Fabricate nonmoving seams in sheet metal with flat-lock seams. **For aluminum, form seams and seal with epoxy seam sealer. Rivet joints for additional strength.**
- D. Aluminum Flashing and Trim: Coat back side of aluminum flashing and trim with bituminous coating where it will contact wood, ferrous metal, or cementitious construction.
- E. Separate dissimilar metals with a bituminous coating or polymer-modified, bituminous sheet underlayment.

END OF SECTION 073100

SECTION 074213.A1 – METAL WALL PANELS BY ALCOA – ALUMINUM COMPOSITE MATERIAL BUILDING PANELS (PE)

Part 1 – GENERAL

1.01 Summary

A. Section Includes

1. The extent of panel system work is indicated on the drawings and in these specifications.
2. Panel system requirements include the following components:
 - a. Aluminum-faced composite panels with mounting system. Panel mounting system including anchorages, furring, fasteners, gaskets and sealants, related flashing adapters and masking for a complete installation.
 - b. Panel manufacturer recommends that system should include shop-installed aluminum stiffeners on all panels of 20 square feet or larger. Minimum stiffener recommendation is one per 20 square feet of panel area.
 - c. Parapet coping, column covers, soffits, sills, border and filler items may be indicated as integral components of the panels system or as designed.
 - d. All flashing metal required shall be provided by the panel manufacturer.
 - e. System to be fabricated and installed per local code requirements.

B. Related Documents

1. Drawings and general provisions of the contract, including general and supplementary conditions, division 1 specification sections and technical specification divisions 2 through 16, apply to this section.

C. Related Work Specified Elsewhere

1. Section 05100: Structural steel
2. Section 06100: Backup walls
3. Section 07200: Insulation
4. Section 07600: Metal flashing, counter flashing and parapet coping
5. Section 07920: Caulking and sealants
6. Section 09200: Interior wall finishes

1.02 Quality Assurance

- A. Composite panel manufacturer shall have a minimum of 15 years' architectural experience in the manufacture of this product and be located within the continental USA.
- B. It is recommended that fabrication and installation of composite panels shall be from a single source. If not single source, both panel fabricator and the installer must show proof of past successful collaboration.
- C. Fabricator shall be acceptable to composite panel manufacturer.
- D. Fabricator and installer shall have a minimum 5 years' experience in architectural metal panel work similar in

scope and size to this project.

- E. Coordinate fabrication schedule with construction progress as directed by the contractor to avoid delay of work.
- F. Shop drawings shall show the preferred joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration, on the inside face of the panel system as determined by ASTM E331.
- G. Maximum deviation from vertical and horizontal alignment of erected panels: 6 mm (1/4") in 6 m (20') non-accumulative.
- H. Panel fabricator and installer shall assume undivided responsibility for all components of the exterior panel system, including but not limited to, attachment to sub-construction, panel-to-panel joinery, panel-to-dissimilar-material joinery and joint seal associated with the panel system.

1.03 References

A. American Society for Testing and Materials

1. E330: Structural Performance of Exterior Windows, Curtain Walls and Doors under the Influence of Wind Loads.
2. E283: Rate of Leakage Through Exterior Windows, Curtain Walls and Doors.
3. D1781: Climbing Drum Peel Test for Adhesive Materials.
4. E84: Surface-Burning Characteristics of Building Materials.
5. E283: Air Performance of Exterior Windows, Curtain Walls and Doors.
6. D3363: Method for Film Hardness by Pencil Test.
7. D2794: Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
8. D3359: Methods for Measuring Adhesion by Tape Test.
9. D2247: Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
10. B117: Method of Salt Spray (Fog) Testing.
11. D822: Practice for Operating Light and Water Exposure Apparatus (Carbon-Arc Type) for Testing Paint, Varnish, Lacquer and Related Products.
12. D1308: Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
13. D1735: Method for Water Fog Testing of Organic Coatings.
14. D1929: Standard Test Method for Determining Ignition Temperature of Plastics.
15. D635: Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in Horizontal Position.

B. American Architectural Manufacturers Association

1. AAMA-620 Coil Coating Aluminum Substrates

1.04 Submittals

- A. Submittals shall be sent to above individual and address

B. Samples

1. Panel assembly: Two samples of each type of assembly, 304 mm (12") x 304 mm (12") minimum.
2. Two samples of each color or finish selected, 76 mm (3") x 102 mm (4") minimum.
3. Custom-color samples will contain drawdown lines. Sizes for custom-color samples are limited.

C. Shop Drawings: Submit shop drawings showing project layout and elevations; fastening and anchoring methods; detail and location of joints, sealants and gaskets, including joints necessary to accommodate thermal movement; trim; flashing; and accessories.

D. Manufacturer's literature shall certify that material meets specifications.

E. Fabrication Tickets: Submit fabrication drawings showing location and type of aluminum-extruded stiffeners at typical panels and at corner panels, if required.

F. Documents showing product compliance with the local building code shall be submitted prior to the bid. These documents may include evaluation reports, test reports, supporting document and drawings, and manufacturer's data. The architect must approve alternate material prior to bid date.

1.05 Warranty

A. The fabricator and installer will warrant the wall system for a period of 1 year that the fabrication and installation workmanship will be free from defects.

B. The aluminum composite material manufacturer shall warrant for a period of 30 years against Max 5 fade based on ASTM D2244 and Max 8 chalk based on ASTM D4212 and delamination of the paint finish.

1.06 Packaging, Shipping and Handling

A. Follow manufacturer's recommendations.

B. Store material in accordance with panel manufacturer's recommendations.

Part 2 – Products

2.01 Panels

A. Composite Panels

1. Panels shall be Reynobond[®] Aluminum Composite Material (ACM) as manufactured by Alcoa Architectural Products, 50 Industrial Boulevard, Eastman, Georgia 31023. Contact Eastman plant at 1-800-841-7774 or 478-374-4746 or at www.alcoaarchitecturalproducts.com.

2. Other manufacturers are acceptable as long as they meet the same criteria as Reynobond in thickness, panel weight, bond integrity, fire rating, paint color and finish. ACM must be manufactured in the USA.

B. Standard Polyethylene Core (PE)

C. Panel Thickness: RB240 (6 mm) = 0.236

D. Panel Weight: RB240 (6 mm) = 1.49 lbs/sft

E. Product Performance

1. Bond integrity

When tested for bond integrity, in accordance with ASTM D1781 (simulating resistance to panel delamination), there shall not be an adhesive failure of the bond a) between the core and the skin or b) cohesive failure of the core itself below the following values.

2. Peel Strength

178 N mm/mm (40 in lb./in.) As manufactured

178 N mm/mm (40 in lb./in.) After 21 days soaking in water at 70°F

3. Fire Performance

ASTM E84 – Passed Class A

F. Panel Finishes

Coil-coated Kynar 500[®] or Hylar 5000[®] based polyvinylidene fluoride (PVDF). Alcoa Architectural Products shall be Colorweld[®] 500 a fluoropolymer coating utilizing 70% Kynar 500[®] resins.

1. Color: To be chosen from Alcoa Architectural Products, Reynobond[®] standard series one, two or three colors.
2. Coating: Shall be factory applied on a continuous-process paint line. Coating shall consist of a 0.2 mil (approx.) prime coat and a 0.8 mil (approx.) finish coat containing 70% Kynar 500[®] resins. (If Colorweld[®] 500XL, coating shall consist of a 0.2 mil (approx.) barrier prime coat, a 0.80 mil (approx.) color coat, containing 70% Kynar 500[®] resins and a 0.5 mil (approx.) clear coat containing 70% Kynar 500[®] resins.) Nominal dry film thickness is 1.50 mils.
3. Gloss: ASTM D523 standard at 60° shall be 25–30.
4. Pencil hardness: ASTM D3363 shall be F-2H minimum.
5. Flexibility T-Bend: ASTM D4145 shall be 0-2T-Bend; no pick-off.
6. Adhesion: ASTM D3359 reverse impact 1/16" crosshatch shall show no cracking or adhesion loss.
7. Reverse Impact: ASTM D2794 1500 x metal thickness aluminum shall show no cracking or adhesion loss.
8. Acid Resistance: ASTM D1308, 10% muriatic acid, 24 hrs., shall show no effect. 20% sulfuric acid, 18 hrs, shall show no effect.
9. Acid Rain Test: Kesternich SO₂, DIN 500180, 10 cycles min. No objectionable color change.
10. Alkali Resistance: ASTM D1308, 10%, 25% NaOH, 1 hr., shall show no effect.
11. Salt Spray Resistance: ASTM B117, 5% salt fog at 95°F. Pass 4,000 hrs. less than 1/16" average creep from scribe; up to a few #8 blisters.
12. Humidity Resistance: ASTM D714 & ASTM D2247 100% relative humidity at 95°F, shall pass 4,000 hrs., # 8 blisters.
13. Exterior Exposure: 10 years at 45°, South Florida. ASTM D2244 shall be Max. 5 fade and ASTM D4214 shall be Max. 8 chalk.
14. Paint system shall meet the requirements of AAMA 620 specifications.

15. (FEVE) Megaflon[®], Coraflon[®], Valflon[®] or any Lumiflon[®]-based paint systems are not acceptable.
16. Paint system shall have more than 20 years of architectural field use.

2.02 Panel Fabrication

A. ACM is comprised of two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process using no glues or adhesives between dissimilar materials. The core shall be free of voids and/or air spaces and not contain foamed insulation materials. The bond between the core and the skins shall be a chemical bond. Products laminated sheet by sheet in a batch process using glues or adhesives between materials shall not be acceptable.

B. Aluminum Face Sheets

1. Thickness: 0.020"
2. Aluminum alloy shall be 3000 series or equivalent.

C. Tolerances

1. Panel Bow: Shall not exceed 0.8% of panel overall dimension in width or length.
2. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible. Panel dimensions shall be such that there will be an allowance for field adjustment and thermal movement.
3. Panel Lines: Breaks and curves shall be sharp and true, and surfaces free of warps or buckles.
4. Flatness: Panels shall be visually flat.
5. Panel Surfaces: Shall be free of scratches or marks caused during fabrication.

D. System Characteristics

1. Plans, elevations, details, characteristics and other requirements indicated are based upon standards by one manufacturer. It is intended that other manufacturers, receiving prior approval, may be acceptable, provided their details and characteristics comply with size and profile requirements, and material/performance standards.
2. System must not generally have any visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.
3. Fabricate panel system to dimension, size and profile indicated on the drawings based on a design temperature of 68°F (20°C).
4. Fabricate panel system to avoid compressive skin stresses. The installation detailing shall be such that the panels remain flat regardless of temperature changes and at all times remain air- and watertight.
5. The finish side of the panel shall have a removable protective film applied prior to fabrication, which shall remain on the panel during fabrication, shipping and erection to protect the surface from damage.

E. System Type (*select from the following*)

1. Rout-and-Return Dry System: Fabricator and installer must provide an engineered pressure relief system including extruded perimeter frame; drainage gutter; all extrusions, clips, fasteners, anchors, spacers, trim, flashings, gaskets, sealant, etc.

F. System Performance

1. Composite panels shall be capable of withstanding building movements and weather exposures based on the following test standards required by the architect and/or local building codes:
 - a. Wind Load – If system tests are not available, under the direction of an independent third-party laboratory, mockups shall be constructed and tests performed to show compliance to the following minimum standards:
 - i. Panels shall be designed to withstand the design wind load based upon the local building code, but in no case less than 20 pounds per square foot (psf) and 30 psf on parapet and corner panels. Wind-load testing shall be conducted in accordance with ASTM E330 to obtain the following results.
 - ii. Normal to the plane of the wall between supports, deflection of the secured perimeter-framing members shall not exceed $L/175$ or $3/4"$, whichever is less.
 - iii. Normal to the plane of the wall, the maximum panel deflection shall not exceed $L/60$ of the full span.
 - iv. Maximum anchor deflection shall not exceed $1/16"$. At $1\ 1/2$ times design pressure, permanent deflections of framing members shall not exceed $l/100$ of span length and components shall not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed $1/16"$.
 - b. Air/Water System Test – Without backup waterproof membrane. If system tests are not available, under the direction of an independent third-party laboratory, mockups shall be constructed and tests performed to show compliance to the following minimum standards:

- i. Air Infiltration – When tested in accordance with ASTM E283, air infiltration at 1.57 psf must not exceed 0.06 cubic feet per minute per square foot of wall area.
- ii. Water Infiltration – Water infiltration is defined as uncontrolled water leakage through the exterior face of the assembly. Systems not using a construction sealant at the panel joints (i.e., Dry Systems) shall be designed to drain any water leakage occurring at the joints. No water infiltration shall occur in any system under a differential static pressure of 6.24 psf after 15 minutes of exposure in accordance with ASTM E331.

The above tests are on panel systems that do not include a waterproof membrane behind panels.

2.03 Accessories

- A. Extrusions, formed members, sheet and plate shall conform with ASTM B209 and the recommendations of the manufacturer.
- B. Panel stiffeners, if required, shall be structurally fastened or restrained at the ends and shall be secured to the rear face of the composite panel with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.
- C. Sealants and gaskets within the panel system shall be as per manufacturer's standards to meet performance requirements.
- D. Fabricate flashing materials from 0.040" minimum thickness aluminum sheet provided by panel manufacturer to match the adjacent curtain wall/panel system where exposed. Post-painted spray-applied flashings are not acceptable. Provide a lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bead of non-hardening sealant.
- E. Fasteners (concealed/non-corrosive): Fasteners as recommended by system fabricator and installer.

Part 3 – Execution

3.01 Inspection

- A. Surfaces to receive panels shall be even, smooth, sound, clean, dry and free from defects detrimental to work. Notify contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.
- B. Surfaces to receive panels shall be structurally sound as determined by a registered engineer. In no case shall metal structural supports be less than 18 gauge.

3.02 Installation

- A. Erect panels plumb and level.

- B. Attachment system shall allow for the free vertical and horizontal thermal movement due to expansion and contraction for a material temperature range of -20°F (-29°C) to +180°F (+82°C). Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement are not permitted. Fabrication, assembly and erection procedure shall account for the ambient temperature at the time of the respective operation.
- C. Panels shall be erected in accordance with an approved set of shop drawings.
- D. Anchor panels securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary thermal movement and structural support.
- E. Conform to panel fabricator's instructions for installation of concealed fasteners.
- F. Do not install component parts that are observed to be defective, including warped, bowed, dented, scraped and broken members.
- G. Do not cut, trim, weld or scrape component parts during erection in a manner that would damage the finish, decrease strength or result in a visual imperfection or a failure in performance. Return component parts that require alteration to shop for refabrication, or for replacement with new parts.
- H. Separate dissimilar metals; use appropriate gaskets and fasteners to minimize corrosive or electrolytic action between metals.

3.03 Adjusting and Cleaning

- A. Remove and replace panels damaged beyond repair as a direct result of panel installation. After installation, panel repair and replacement shall become the responsibility of the general contractor.
- B. Repair panels with minor damage.
- C. Remove masking film (if used) as soon as possible after installation. Masking intentionally left in place after panel installation on an elevation shall become the responsibility of the general contractor.
- D. Any additional protection, after installation, shall be the responsibility of the general contractor to remove.
- E. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- F. Final cleaning shall not be part of the work of this section.

END OF SECTION 074213.A1

07 54 23 Adhered Thermoplastic Membrane Roofing
SECTION 075423 – ADHERED THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL CONDITIONS

1.01 DESCRIPTION

Scope

To install a complete adhered Sika Sarnafil roofing system including membrane, flashings and other components.

Related Work

The work includes but is not limited to the installation of:

- Removal of Existing Roofing and Insulation
- Substrate Preparation
- Roof Drains
- Vapor Barrier
- Wood Blocking
- Insulation
- Separation Layers
- Roof Membrane
- Fasteners
- Adhesive for Flashings
- Roof Membrane Flashings
- Walkways
- Metal Flashings
- Sealants

Upon successful completion of work the following warranties may be obtained:

- Sika Sarnafil Warranty
- Roofing Applicator Warranty

QUALITY ASSURANCE

This roofing system shall be applied only by a Roofing Applicator authorized by Sika Sarnafil prior to bid (Sika Sarnafil "Applicator").

Upon completion of the installation and the delivery to Sika Sarnafil by the Applicator of certification that all work has been done in strict accordance with the contract specifications and Sika Sarnafil's requirements, a Sika Sarnafil Technical Service Representative will review the installed roof system wherever a Standard or System warranty has been specified.

There shall be no deviation made from the Project Specification or the approved shop drawings without prior written approval by the Owner, the Owner's Representative and Sika Sarnafil.

All work pertaining to the installation of Sarnafil membrane and flashings shall only be completed by Applicator personnel trained and authorized by Sika Sarnafil in those procedures.

SUBMITTALS

At the time of bidding, the Applicator shall submit to the Owner (or Representative) the following:

Copies of Specification.

Samples of each primary component to be used in the roof system and the manufacturer's current literature for each component.

Written approval by the insulation manufacturer (as applicable) for use and performance of the product in the proposed system.

Sample copy of Sika Sarnafil's warranty.

Sample copy of Applicator's warranty.

Dimensioned shop drawings which shall include:

Outline of roof with roof size and elevations shown.

Details of flashing methods for penetrations.

Technical acceptance from Sika Sarnafil.

Certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and other industry standards or practices.

Certification from the Applicator that the system specified meets all identified code and insurance requirements as required by the Specification.

Material Safety Data Sheets (MSDS)

CODE REQUIREMENTS

The Applicator shall submit evidence that the proposed roof system meets the requirements of the local building code and has been tested and approved or listed by the following test organizations. These requirements are minimum standards and no roofing work shall commence without written documentation of the system's compliance, as required in the "Submittals" section of this specification.

System shall be designed to meet a minimum wind design requirements of the most recent version of ASCE 7.

Factory Mutual Research Corporation (FM) - Norwood, MA

- Class 1-60 (required for most situations)
- Class 1-75 (for increased wind exposure)
- Class 1-90 (for high wind exposure)

Underwriters Laboratories, Inc. - Northbrook, IL

- Class A assembly
- Class B assembly
- Class C assembly

PRODUCT DELIVERY, STORAGE AND HANDLING

All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

As a general rule all adhesives shall be stored at temperatures between 40 degree F (5 degree C) and 80 degree F (27 degree C). Read instructions contained on adhesive canister for specific storage instructions.

All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.

All materials which are determined to be damaged by the Owner's Representative or Sika Sarnafil are to be removed from the job site and replaced at no cost to the Owner.

JOB CONDITIONS

Sarnafil materials may be installed under certain adverse weather conditions but only after consultation with Sika Sarnafil, as installation time and system integrity may be affected.

Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be heat welded before leaving the job site that day.

All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.

All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.

All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.

The Applicator is cautioned that certain Sarnafil membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with Sarnafil membranes. The Applicator shall consult Sika Sarnafil regarding compatibility, precautions and recommendations.

Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over Sarnafelt or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.

Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air or similar methods.

The Applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.

All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.

All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.

The Applicator shall take precautions that storage and application of materials and equipment does not overload the roof deck or building structure.

Installation of a Sarnafil membrane over coal tar pitch or a resaturated roof requires special consideration to protect the Sarnafil membrane from volatile fumes and materials. Consult Sika Sarnafil for precautions prior to bid.

Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.

All rooftop contamination that is anticipated or that is occurring shall be reported to Sika Sarnafil to determine the corrective steps to be taken.

The Applicator shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing (letter copy to Sika Sarnafil) to the Owner's Representative for corrective action prior to the installation of the Sika Sarnafil roof system.

Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition in writing for correction at the Owner's expense (letter copy to Sika Sarnafil).

Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's satisfaction.

All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.

The Applicator shall conduct fastener pullout tests in accordance with the latest version of the SPRI/ANSI Fastener Pullout Standard to verify condition of the deck/substrate and to confirm expected pullout values.

The Sarnafil membrane shall not be installed under the following conditions without consulting Sika Sarnafil's Technical Dept. for precautionary steps:

The roof assembly permits interior air to pressurize the membrane underside.

Any exterior wall has 10 percent or more of the surface area comprised of opening doors or windows.

The wall/deck intersection permits air entry into the wall flashing area.

Precautions shall be taken when using Sarnacol adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.

Protective wear shall be worn when using solvents or adhesives or as required by job conditions.

Sarnafil membranes are slippery when wet or covered with snow, frost, or ice. Working on surfaces under these conditions is hazardous. Appropriate safety measures must be implemented prior to working on such surfaces. Always follow OSHA and other relevant fall protection standards when working on roofs.

BIDDING REQUIREMENTS

Pre-Bid Meeting:

A pre-bid meeting shall be held with the Owner's Representative and involved trades to discuss all aspects of the project. The Applicator's field representative or roofing foreman for the work shall be in attendance. Procedures to avoid rooftop damage by other trades shall be determined.

Site Visit:

Bidders shall visit the site and carefully examine the areas in question as to conditions that may affect proper execution of the work. All dimensions and quantities shall be determined or verified by the Applicator. No claims for extra costs will be allowed because of lack of full knowledge of the existing conditions unless agreed to in advance with the Owner or Owner's Representative.

WARRANTIES

Sika Sarnafil Membrane Warranty

Upon successful completion of the work to Sika Sarnafil's satisfaction and receipt of final payment, the Sika Sarnafil Membrane Warranty shall be issued.

Sika Sarnafil Standard Warranty (only products purchased from Sika Sarnafil are covered under Standard Warranty)

Upon successful completion of the work to Sika Sarnafil's satisfaction and receipt of final payment, the Sika Sarnafil Standard Warranty shall be issued.

Sika Sarnafil System Warranty (only products purchased from Sika Sarnafil are covered under System Warranty)

Upon successful completion of the work to Sika Sarnafil's satisfaction and receipt of final payment, the Sika Sarnafil System Warranty shall be issued.

Applicator/Roofing Contractor Warranty

Applicator shall supply Owner with a separate workmanship warranty. In the event any work related to roofing, flashing, or metal is found to be within Applicator warranty term, defective or otherwise not in accordance with Contract Documents, the Applicator shall repair that defect at no cost to the Owner. Applicator's warranty obligation shall run directly to the Owner, and a copy shall be sent to Sika Sarnafil.

Owner Responsibility

Owner shall notify both Sika Sarnafil and the Applicator of any leaks as they occur during the time period when both warranties are in effect.

WARRANTY DURATIONS

Sika Sarnafil's warranty shall be in effect for a ____ year duration.

Applicator's/Roofing Contractor's Warranty shall be in effect for a ____ year duration.

PRODUCTS

GENERAL

- A. The components of the Sarnafil Adhered roof system are to be products of Sika Sarnafil as indicated on the Detail Drawings and specified in the Contract Documents.

- B. Components to be used that are other than those supplied or manufactured by Sika Sarnafil may be submitted for review and acceptance by Sika Sarnafil. Sika Sarnafil's acceptance of any other product is only for a determination of compatibility with Sika Sarnafil products and not for inclusion in the Sika Sarnafil warranty. The specifications, installation instructions, limitations, and restrictions of the respective manufacturers must be reviewed by the Owner's Representative for acceptability for the intended use with Sika Sarnafil products.
- C. Condensation or moisture migration into the roof system must be controlled so that it does not compromise the performance of the insulation and other components of the assembly. Moisture vapor tends to migrate from warmer to cooler areas. Air/vapor retarders are used to inhibit or block the flow of warm moist air into the roof system. To determine if an air/vapor barrier is necessary, a design professional with experience with air handling and moisture control should be consulted.

Special consideration should be given to construction related moisture. An example is the significant amount of moisture generated when concrete floor slabs are poured after the roof has been installed. Sika Sarnafil is not responsible for damage to the insulation when exposed to construction related moisture.

MEMBRANE

- A. Sarnafil G410 fiberglass reinforced membrane with a lacquer coating.

Membrane shall conform to ASTM D4434 (latest version), "Standard for Polyvinyl Chloride Sheet Roofing".
Classification: Type II, Grade I.

Sarnafil₁₀G410-20, 80 mil (2.0 mm), thermoplastic membrane with fiberglass reinforcement.

Certified Polymer Thickness

Membrane manufacturer is to certify that the polymer thickness is of the polymer thickness specified (see 2.02, B, 1 through 9). Certification is to be signed by the membrane manufacturer's quality control manager. ASTM +/- tolerance for membrane thickness is not accepted.

Color of Membrane

EnergySmart White, initial solar reflectance of 0.83, emittance of 0.90, and solar reflective index (SRI) of 104 (ENERGY STAR listed).

Typical Physical Properties ⁽¹⁾

<u>Parameters</u>	<u>ASTM Test Method</u>	<u>ASTM D-4434 Spec. Requirement</u>	<u>Typical Physical Properties</u>
Reinforcing Material	-	-	Fiberglass
Overall Thickness(1), min., inches (mm)	D638	0.045 (1.14)	[0.0__inches]
Thickness Above Scrim	-	-	0.023 (avg.)
Tensile Strength, min., psi (MPa)	D638	1500 (10.4)	1600 (11.1)
Elongation at Break, min. (machine / transverse)	D638	250% / 220%	250% / 220%
Seam strength(2), min. (% of tensile strength)	D638	75	80
Retention of Properties After Heat Aging	D3045	-	-
Tensile Strength, min., (% of original)	D638	90	95
Elongation, min., (% of original)	D638	90	90
Tearing Resistance, min., lbf (N)	D1004	10 (45.0)	14 (63.0)
Low Temperature Bend, -40° F (-40° C)	D2136	Pass	Pass
Accelerated Weathering Test (florescent light, uv exposure)	G154	5,000 Hours	10,000 Hours
Cracking (7x magnification)	-	None	None
Discoloration (by observation)	-	Negligible	Negligible
Crazing (7x magnification)	-	None	None
Linear Dimensional Change	D1204	0.10 % max.	0.02%
Weight Change After Immersion in Water	D570	± 3.0% max.	2.5%
Static Puncture Resistance, 33 lbf (15 kg)	D5602	Pass	Pass
Dynamic Puncture Resistance, 7.3 ft-lbf (10 J)	D5635	Pass	Pass
Initial Solar Reflectance	E903	-	0.83
Emissivity	E408, C1371, Other	-	0.90
Solar Reflective Index (SRI)	E1980	-	104
Recycled Content (5 & 10 ft. sheets only)	8 to 12% Pre-Consumer / Up to 1% Post Consumer.		

Notes

(1) Typical Physical Properties data is applicable for 0.048 in (1.2 mm) membrane thickness and greater.

(2) Failure occurs through membrane rupture not seam failure.

FLASHING MATERIALS

B. Wall/Curb Flashing

Sarnafil G410-15 60 mil (1.5 mm) Membrane

A fiberglass reinforced membrane adhered to approved substrate using Sarnacol adhesive. Consult Product Data Sheets for adhesive options and additional information.

Sarnaclad

A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 24 gauge, G90 galvanized metal sheet with a 20 mil (0.5 mm) unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0 m). Consult Product Data Sheet for additional information.

Perimeter Edge Flashing

Edge Grip

A prefabricated perimeter edge system provided by Sika Sarnafil. The system has concealed fasteners with no penetrations on the horizontal roof surface and includes fasteners and splice plates. Edge Grip is made from two distinct parts. A rigid retainer base plate and a decorative snap-on fascia cover. The retainer is made from 20 gauge galvanized steel in 10 foot (3048 mm) standard lengths and is provided with 9/32 inch (7 mm) slotted pre-punched holes for fastener spacing at 12 inches (152 mm) on center. As an option the retainer base plate is also available in 0.05 inch (1.3 mm) aluminum. The snap-on fascia cover is available in 10 foot (3048 mm) lengths and in a variety of thickness, colors, finishes, and widths. Kynar-500 colors are available for galvanized steel and natural mill finished aluminum. Clear and anodized colors are available for anodized finished aluminum. Matching corners, end caps, fascia sumps, spillouts, etc. are available as accessories. Consult Product Data Sheet for additional information.

- a) Retainer base plate shall be 0.05 inch aluminum in 10 ft. lengths.
- b) Snap-on fascia cover shall be 0.05 inch aluminum in 10 ft. lengths.
- c) Snap-on fascia cover shall have a anodized finish.
- d) Snap-on fascia cover color shall be White.

Edge Grip Extruded

A heavy-duty prefabricated perimeter edge system provided by Sika Sarnafil. The system has concealed fasteners with no penetrations on the horizontal roof surface and includes fasteners and splice plates. Edge Grip Extruded is made from two distinct parts. A heavy-duty extruded retainer base plate and a decorative snap-on fascia cover. The extruded retainer is made from 0.10 inch (2.5 mm) extruded aluminum in 10 foot (3048 mm) standard lengths and is provided with 0.187 inch (4.7 mm) pre-punched slotted holes for fastener spacing at 12 inches (152 mm) on center. The snap-on fascia cover is available in 10 foot (3048 mm) lengths and in a variety of thickness, colors, finishes, and widths. Kynar-500 colors are available for galvanized steel and natural mill finished aluminum. Clear and anodized colors are available for anodized finished aluminum. Matching corners, end caps, fascia sumps, spillouts, etc. are available as accessories. Consult Product Data Sheet for additional information.

- a) Retainer base plate shall be 0.10 inch aluminum in 10 ft. lengths.
- b) Snap-on fascia cover shall be 0.05 inch aluminum in 10 ft. lengths.
- c) Snap-on fascia cover shall have a anodized finish.
- d) Snap-on fascia cover color shall be White.

Sarnaclad

A PVC-coated, heat-weldable sheet metal capable of being formed into a variety of shapes and profiles. Sarnaclad is a 24 gauge, G90 galvanized metal sheet with a 20 mil (0.5 mm) unsupported Sarnafil membrane laminated on one side. The dimensions of Sarnaclad are 4 ft x 8 ft (1.2 m x 2.4 m) or 4 ft x 10 ft (1.2 m x 3.0 m). Consult Product Data Sheet for additional information.

Non-Typical Edge

Project-specific perimeter edge detail reviewed and accepted for one-time use by Sika Sarnafil's Technical Department. Consult Regional Technical Manager prior to job start for review and consideration for acceptance.

Miscellaneous Flashing

Sarnaflash

A prefabricated expansion joint cover made from Sarnafil membrane. Sarnaflash is designed for securement to vertical or horizontal surfaces to span and accommodate the movement of new and existing expansion gaps from 1 inch to 4-1/2 inches (25 mm to 114 mm) across. Available in 40 foot (12 m) rolls. Consult Product Data Sheet for additional information.

Sarnareglet

A heavy-duty, extruded aluminum flashing termination reglet used at walls and large curbs. Sarnareglet is produced from 6063-T5, 0.10 inch to 0.12 inch (2.5 mm to 3.0 mm) thick extruded aluminum. Sarnareglet has a 2-1/4 inch (57 mm) deep profile, and is provided in 10 foot (3 m) lengths. Use prefabricated Sarnareglet mitered inside and outside corners where walls intersect. Consult Product Data Sheet for additional information.

Sarnastack

A prefabricated vent pipe flashing made from 0.048 inch (48 mil/1.2 mm) thick Sarnafil G410 membrane. Available in five different sizes. Consult Product Data Sheet for sizes and additional information.

Sarnadrain-RAC

PVC-coated, heavy-duty aluminum roof drain insert that mechanically seals to the drainpipe interior. Sarnadrain-RAC is made of 0.080 inch (2 mm) thick 6063 aluminum with a urethane seal installed at the end of the drainpipe. The large 14 inch x 14 inch (0.36 m x 0.36 m) drain strainer is also made of 0.080 inch (2 mm) thick aluminum stock. The flange dimensions of Sarnadrain-RAC are 18 inches x 18 inches (0.46 m x 0.46 m). Consult Product Data Sheet for sizes and additional information.

Sarnacircle-"G"

Circular 0.048 inch (48 mil/1.2 mm) thick G410 membrane patch welded over T-joints formed by overlapping thick membranes.

Sarnacorners - Universal

Prefabricated outside and inside flashing corners made of 0.060 inch (60 mil/1.5 mm) thick membrane that are heat-welded to membrane or Sarnaclad base flashings. Available in one size which accommodate both inside and outside corners. Can be cut into one inside or one outside corner. Consult Product Data Sheet for additional information.

Open Post Flashing

Prefabricated post flashing, 0.048 inch (48 mil/1.2 mm) thick, with an open seam used to flash obstructed rooftop conduits and pipes 1/2 to 1-1/4 inch (12.7-31.8 mm) in diameter. Available in 2 sizes; 1/2 to 3/4 inch (12.7-19 mm) and 3/4 to 1-1/4 inch (19-31.8 mm) diameter. Open Post Flashings are heat welded in place and terminated at the top of the penetration completing the pipe penetration detail.

Sikaflex-1a Sealant

A proprietary sealant used at flashing terminations. Consult Product Data Sheet for additional information.

Sarnafiller

A two-component urethane adhesive used for pitch pocket filler. Cures with excellent elasticity and adhesion to various surfaces. Consult Product Data Sheet for additional information.

Sarnacol 2170 Adhesive

A solvent-based reactivating adhesive used to attach membrane to flashing substrate. Consult Product Data Sheets for additional information.

Sarnacol 2170 VC Adhesive

A solvent-based, low VOC, reactivating adhesive used to attach membrane to flashing substrate. Consult Product Data Sheets for additional information.

Sarnafelt

A non-woven polyester or polypropylene mat cushion layer that is necessary behind G410 or G459 Flashing Membrane when the flashing substrates are rough or incompatible with the flashing membrane. Consult Product Data Sheets for additional information.

INSULATION/OVERLAYMENT/RECOVER BOARD

C. Sarnatherm

A rigid isocyanurate foam insulation with black mat facers. Available in 4 x 4 ft (1.2 x 1.2 m) or 4 x 8 ft (1.2 x 2.4 m) sizes and various thicknesses. Consult Product Data Sheet for additional information.

D. Sarnatherm - Atlas ACFoam-III

A rigid isocyanurate foam insulation composed of a closed cell polyisocyanurate foam core laminated to a heavy, durable and dimensionally stable coated glass facer. Available in 4 x 4 ft (1.2 x 1.2 m) or 4 x 8 ft (1.2 x 2.4 m) sizes and various thicknesses. Consult Product Data Sheet for additional information.

E. Sarnatherm - Atlas ACFoam-IV

A rigid isocyanurate foam insulation composed of a closed cell polyisocyanurate foam core laminated to a high performance coated glass facer. Available in 4 x 4 ft (1.2 x 1.2 m) or 4 x 8 ft (1.2 x 2.4 m) sizes and various thicknesses. Consult Product Data Sheet for additional information.

F. Sarnatherm - Hunter H-Shield CG

A rigid isocyanurate foam insulation composed of a closed cell polyisocyanurate foam core laminated to a premium performance coated glass facer. Available in 4 x 4 ft (1.2 x 1.2 m) or 4 x 8 ft (1.2 x 2.4 m) sizes and various thicknesses. Consult Product Data Sheet for additional information.

Sarnatherm EPS

Expanded polystyrene closed cell foam insulation. Available in 4 ft x 4 ft (1.2 m x 1.2 m) or 4 ft x 8 ft (1.2 m x 2.4 m) sizes and various thicknesses. A one inch minimum isocyanurate or gypsum based thermal barrier must be placed between styrene boards and Sarnafil membrane. Sarnatherm EPS insulation is for use beneath the waterproofing layer. **Not allowed direct to steel deck for FM insured buildings. An approved thermal barrier must be installed between the EPS and deck.** Consult Product Data Sheets for additional information.

Sarnatherm - DOW STYROFOAM DECKMATE Plus

Extruded polystyrene closed cell foam insulation with high density skins. Available in 2 ft x 8 ft (0.6 m x 2.4 m) or 4 ft x 8 ft (1.2 m x 2.4 m) sizes and various thicknesses. A one inch minimum isocyanurate or gypsum based thermal barrier must be placed between styrene boards and Sarnafil membrane. **Not allowed direct to steel deck for FM insured buildings. An approved thermal barrier must be installed between the XPS and deck.** Consult Product Data Sheets for additional information.

Sarnatherm - Owens Corning Foamular 250

Extruded polystyrene closed cell foam insulation with continuous skins. Available in 4 ft x 4 ft (1.2 m x 1.2 m) or 4 ft x 8 ft (1.2 m x 2.4 m) sizes and various thicknesses. A one inch minimum isocyanurate or gypsum based thermal barrier must be placed between styrene boards and Sarnafil membrane. **Not allowed direct to steel deck for FM insured buildings. An approved thermal barrier must be installed between the XPS and deck.** Consult Product Data Sheets for additional information.

Sarnatherm - Owens Corning Foamular Thermapink 25

Extruded polystyrene closed cell foam insulation with continuous skins. Available in 4 ft x 4 ft (1.2 m x 1.2 m) or 4 ft x 8 ft (1.2 m x 2.4 m) sizes and various thicknesses. A one inch minimum isocyanurate or gypsum based

thermal barrier must be placed between styrene boards and Sarnafil membrane. **Not allowed direct to steel deck for FM insured buildings. An approved thermal barrier must be installed between the XPS and deck.** Consult Product Data Sheets for additional information.

DensDeck

A siliconized gypsum, fire-tested hardboard with glass-mat facers. DensDeck is provided in a 4 x 8 ft (1.2 x 2.4 m) board size and in thicknesses of 1/4, 1/2 and 5/8 inch (6, 13 and 16 mm). Consult Product Data Sheet for size, thickness and additional information.

DensDeck Prime

A fire-tested, gypsum hardboard with glass-mat facers and a pre-primed surface on one side. DensDeck Prime is provided in a 4 x 8 ft (1.2 x 2.4 m) board size and in thicknesses of 1/4, 1/2 and 5/8 inch (6, 13 and 16 mm). Consult Product Data Sheet for size, thickness and additional information.

DensDeck DuraGuard

A fire-tested, gypsum hardboard with a durable glass-mat facer coating. DuraGuard is provided in a 4 x 8 ft (1.2 x 2.4 m) board size and in thicknesses of 1/4, 1/2, and 5/8 inch (6, 13 and 16 mm). Consult Product Data Sheet for size, thickness and additional information.

Securock Gypsum-Fiber

A fire-tested, homogenous fiber reinforced gypsum roof board. Securock Gypsum-Fiber is provided in 4 feet x 4 feet (1.2 m x 1.2 m) and 4 feet x 8 feet (1.2 m x 2.4 m) board sizes and in thicknesses of 1/4 inch (6.6 mm), 3/8 inch (9.5 mm), 1/2 inch (12.7 mm) and 5/8 inch (15.9 mm). Consult Product Data Sheet for size, thickness and additional information.

ATTACHMENT COMPONENTS

G. Membrane Adhesive

Sarnacol 2170 Adhesive:

A solvent-based reactivating-type adhesive used to attach the membrane to the substrate, either horizontally or vertically. Consult Product Data Sheets for additional information. Application rates are as follows:

SARNACOL 2170 APPLICATION RATES FOR BARE BACK MEMBRANE				
	Adhesive Rates – Gallons per 100 Square Feet (Liters per Meter ²)			Approximate Sq. Ft./Pail (meter ²)
	Substrate	Membrane	Total	
Isocyanurate Paper Facer	1.25 (0.51)	+ 0.50 (0.20)	= 1.75 (0.71)	285 (26.48)
Smooth Plywood	1.00 (0.41)	+ 0.50 (0.20)	= 1.50 (0.61)	333 (30.94)
Metal	0.75 (0.31)	+ 0.50 (0.20)	= 1.25 (0.51)	400 (37.16)
Concrete Wall	1.25 (0.51)	+ 0.50 (0.20)	= 1.75 (0.71)	285 (26.48)
GP DensDeck	1.25 (0.51)	+ 0.50 (0.20)	= 1.75 (0.71)	285 (26.48)
GP DensDeck Prime GP DensDeck DuraGuard	1.00 (0.41)	+ 0.50 (0.20)	= 1.50 (0.61)	333 (30.94)
USG Securock Gypsum-Fiber	0.75 (0.31)	+ 0.50 (0.20)	= 1.25 (0.51)	400 (37.16)

SARNACOL 2170 APPLICATION RATES FOR MEMBRANE FLASHINGS USING SARNAFELT					
	Adhesive Rates – Gallons per 100 Square Feet (Liters per Meter ²)			Approximate Sq. Ft./Pail (meter ²)	
	Substrate (1 st coat)	Substrate (2 nd coat)	Membrane		Total
Smooth Plywood	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)
Concrete Wall	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)
Masonry Wall	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)
Granular Bitumen	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)
Smooth Aged Bitumen	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)

Notes:

Due to an increase in viscosity when outdoor temperatures during installation are below 40 degree F (5 degree C), add 1/2 gallon per 100 square feet (0.2 l per m²) to rate for estimating purposes. Do not install when air temperature is within 5 degree F of dew point. Solvent evaporation time increases

significantly when temperatures drop. Ensure first layer of Sarnacol 2170 is fully dry before second layer is applied to the back of the membrane for proper reactivation.

Use a water-filled, foam-covered lawn roller to consistently and evenly press the membrane into the adhesive layer.

Sarnacol 2170 VC Adhesive:

A solvent-based, low VOC, reactivating adhesive used to attach the membrane to the substrate, either horizontally or vertically. Consult Product Data Sheets for additional information. Application rates are as follows:

SARNACOL 2170 VC APPLICATION RATES FOR BARE BACK MEMBRANE				
	Adhesive Rates – Gallons per 100 Square Feet (Liters per Meter ²)			Approximate Sq. Ft./Pail (meter ²)
	Substrate	Membrane	Total	
Isocyanurate Paper Facer	1.25 (0.51)	+ 0.50 (0.20)	= 1.75 (0.71)	285 (26.48)
Smooth Plywood	1.00 (0.41)	+ 0.50 (0.20)	= 1.50 (0.61)	333 (30.94)
Metal	0.75 (0.31)	+ 0.50 (0.20)	= 1.25 (0.51)	400 (37.16)
Concrete Wall	1.25 (0.51)	+ 0.50 (0.20)	= 1.75 (0.71)	285 (26.48)
GP DensDeck	1.25 (0.51)	+ 0.50 (0.20)	= 1.75 (0.71)	285 (26.48)
GP DensDeck Prime GP DensDeck DuraGuard	1.00 (0.41)	+ 0.50 (0.20)	= 1.50 (0.61)	333 (30.94)
USG Securock Gypsum-Fiber	0.75 (0.31)	+ 0.50 (0.20)	= 1.25 (0.51)	400 (37.16)

SARNACOL 2170 VC APPLICATION RATES FOR MEMBRANE FLASHINGS USING SARNAFELT					
	Adhesive Rates – Gallons per 100 Square Feet (Liters per Meter ²)			Approximate Sq. Ft./Pail (meter ²)	
	Substrate (1 st coat)	Substrate (2 nd coat)	Membrane		Total
Smooth Plywood	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)
Concrete Wall	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)
Masonry Wall	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)
Granular Bitumen	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)
Smooth Aged Bitumen	1.00 (0.41)	+ 1.00 (0.41)	+ 0.50 (0.20)	= 2.50 (1.02)	200 (18.58)

Notes:

- a) Due to an increase in viscosity when outdoor temperatures during installation are below 40 degree F (5 degree C), add 1/2 gallon per 100 square feet (0.2 l per m²) to rate for estimating purposes. Do not install when air temperature is within 5 degree F of dew point. Solvent evaporation time increases significantly when temperatures drop. Ensure first layer of Sarnacol 2170 is fully dry before second layer is applied to the back of the membrane for proper reactivation.
- b) Use a water-filled, foam-covered lawn roller to consistently and evenly press the membrane into the adhesive layer.

Sarnacol 2121 Adhesive:

A water-based adhesive used to attach the membrane to horizontal or near-horizontal substrates. Consult Product Data Sheets for additional information. Application rates are as follows:

SARNACOL 2121 SQUEEGEE APPLICATION RATES FOR BARE BACK MEMBRANE					
	Adhesive Rates – Gallons per 100 Square Feet (Liters per Meter ²)				Approximate Sq. Ft./Pail (meter ²)
	Substrate	Membrane	Total		
Isocyanurate Paper Facer	1.50 (0.61)	+	0	= 1.50 (0.61)	333 (30.94)
Smooth Plywood	1.50 (0.61)	+	0	= 1.50 (0.61)	333 (30.94)
GP DensDeck Prime	1.25 (0.51)	+	0	= 1.25 (0.51)	400 (37.16)
USG Securock Gypsum-Fiber	2.00 (0.81)	+	0	= 2.00 (0.81)	250 (23.23)

SARNACOL 2121 ROLLER APPLICATION RATES FOR BARE BACK MEMBRANE					
	Adhesive Rates – Gallons per 100 Square Feet (Liters per Meter ²)				Approximate Sq. Ft./Pail (meter ²)
	Substrate	Membrane	Total		
Isocyanurate Paper Facer	0.75 (0.31)	+	0	= 0.75 (0.31)	666 (61.9)
Smooth Plywood	0.75 (0.31)	+	0	= 0.75 (0.31)	666 (61.9)
GP DensDeck Prime	0.75 (0.31)	+	0	= 0.75 (0.31)	666 (61.9)
USG Securock Gypsum-Fiber	1.00 (0.41)	+	0	= 1.00 (0.41)	500 (46.4)

Notes:

- a) There is a significant increase in drying time due to an increase in humidity or a decrease in temperature. Do not install when outdoor or substrate temperatures during drying period are expected to fall below 40 degree F (5 degree C).

Do not allow adhesive to skin-over or surface-dry prior to installation of membrane.

Care must be taken to insure that the adhesive has not dried before the membrane is laid in place. This is especially important during hot temperatures. Adjustments may be needed in the application technique to insure a wet lay in. It is recommended that only 6-10 feet (2-3 m) at a time is coated out ahead of the membrane to prevent dry laid membrane.

Use a water-filled, foam-covered lawn roller to consistently and evenly press the membrane into the adhesive layer.

Sarnacol 2166 Adhesive:

A one part, moisture curing, urethane adhesive used to attach Sarnafil membrane to approved recover and insulation boards, and lightweight concrete. Adhesive is applied using an adhesive cart. Consult Product Data Sheets for additional information. Application rate is as follows:

Coverage - Approximately 1 gallon per 200 to 250 square feet (3.7 L per 18.5 to 23.2 square meters). Rates are based on an application pattern of 1/8 to 3/16 inch (3 to 5 mm) beads, 3 inches (76 m) on center. Additional adhesive may be required for rougher surfaces.

Notes:

- a) There is a significant drying time change due to an increase in humidity or a decrease in temperature. Do not install when outdoor or substrate temperatures during drying period are expected to fall below 40 degree F (5 degree C).
- b) Do not allow adhesive to skin-over or surface-dry prior to installation of membrane.
- c) Use a water-filled, foam-covered lawn roller to consistently and evenly press the membrane into the adhesive layer.
- d) Minimum product temperature should be 50 degree F (10 degree C).
- e) Store between 50 degree F (10 degree C) and 80 degree F (27 degree C).
- f) Adhesive shall not be used during inclement weather.
- g) Adhesive shall not be applied to wet surfaces.

Insulation Board Adhesive

Sarnacol 2163 Adhesive:

A low odor, VOC compliant, one step, low-rise urethane foam used to attach insulation to approved compatible substrates. Adhesive is applied with a gravity fed applicator or by hand with a dual component caulk gun. Additional adhesive may be required for rougher surfaces. Consult Product Data Sheets for additional information. Application rate is as follows:

Coverage - Approximately 600 square feet (55.7 square m) per case. Rates are based on an application pattern of 4 ribbons, 1/4 to 1/2 inch (6 to 13 mm) beads, 12 inches (30 cm) on center per 4 x 4 feet (121.9 x 121.9 cm) insulation board. Coverage rates may vary over irregular surfaces.

Notes:

- a) Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).
- b) Place insulation board into the adhesive shortly after it has reached its maximum rise [typically within 30 to 45 seconds at 60 to 80 degree F (16 to 27 degree C)] and walk into place.
- c) Minimum product temperature before entering the dispenser should be 70 degree F (21 degree C).
- d) Store between 60 degree F (16 degree C) and 80 degree F (27 degree C).
- e) Adhesive shall not be used during inclement weather.

- f) Adhesive shall not be applied to wet or damp surfaces.
- g) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Sarnacol 2164 Adhesive:

A low odor, VOC compliant, single component, low-rise urethane foam used to attach insulation to approved compatible substrates. Consult Product Data Sheets for additional information. Application rate is as follows:

Coverage - Approximately 500 to 600 square feet (46.4 to 55.7 square m) per 3 gallons (11.3 L) unit. Rates are based on an application using a ribbon pattern, 1/2 to 3/4 inch (13 to 19 mm) wide beads, 12 inches (30 cm) on center per 4 x 4 feet (121.9 x 121.9 cm) insulation board. Coverage rates may vary over irregular surfaces.

Notes:

- a) Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).
- b) Place insulation board into wet adhesive immediately.
- c) Adhesive shall not be used during inclement weather.
- d) Adhesive shall not be applied to wet or damp surfaces.
- e) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Sarnacol LR-2001 Adhesive:

A two component (Part A and B) polyurethane low-rise adhesive for bonding insulation to approved compatible substrates. Consult Product Data Sheets for additional information. Application rates are as follows:

SARNACOL LR-2001 APPLICATION RATES FOR INSULATION		
	Approximate Square feet (<i>Meter</i> ²) per Drum Set	
	50 Gallons (189.27 liter) Set	15 Gallons (56.78 liter) Set
Wood	8,500 - 9,000 (789.68 - 836.13)	2,500 - 2,700 (232.26 - 250.84)
Concrete	8,500 - 9,000 (789.68 - 836.13)	2,500 - 2,700 (232.26 - 250.84)
Smooth Gypsum Plank	8,500 - 9,000 (789.68 - 836.13)	2,500 - 2,700 (232.26 - 250.84)
Cellular Concrete (consult Technical Dept.)	8,500 - 9,000 (789.68 - 836.13)	2,500 - 2,700 (232.26 - 250.84)
Cementitious Wood Fiber	7,500 - 8,000 (696.77 - 743.22)	2,250 - 2,400 (209.03 - 222.97)
Isocyanurate Paper Facer	8,500 - 9,000 (789.68 - 836.13)	2,500 - 2,700 (232.26 - 250.84)
Mineral Cap Sheet	8,500 - 9,000 (789.68 - 836.13)	2,500 - 2,700 (232.26 - 250.84)
Gravel B.U.R.	5,000 - 7,000 (464.52 - 650.32)	1,500 - 2,100 (139.35 - 195.10)
Smooth B.U.R./Mod. Bit.	8,500 - 9,000 (789.68 - 836.13)	2,500 - 2,700 (232.26 - 250.84)

Notes:

- a) Adhesive must be applied as a continuous layer.
- b) Use a water-filled, foam-covered lawn roller to consistently and evenly press insulation into adhesive layer.
- c) Storage temperatures in excess of 90 degree F (32 degree C) may affect shelf life.
- d) If exposed to temperatures below 40 degree F (5 degree C), restored to a minimum temperature of 60 degree F (15 degree C) before use.
- e) Job site conditions may affect performance. Adhesive shall not be used if surface or ambient temperatures below 40 degree F (5 degree C) are expected during application or subsequent curing time.
- f) In The addition of Sarnacol LR-2001 Catalyst to Part B may be required when temperatures are between 40 degree F (5 degree C) and 80 degree F (27 degree C).
- g) Adhesive shall not be applied to wet or damp surfaces.
- h) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Olympic Olybond500 Adhesive:

A two component (Part A and B) low-rise polyurethane foam used to attach insulation to approved compatible substrates. Adhesive is applied with a pace cart in bands 12 inches on center. Application rates are typically 1 gallon per square. Additional adhesive may be required for rougher surfaces. Consult Product Data Sheets for additional information.

Notes:

- a) Not recommended for use with insulation boards larger than 4 x 4 foot.
- b) Place insulation board into the adhesive shortly after it has reached its maximum rise (typically within 2 minutes) and walk into place.

- c) Job site conditions may affect performance. Adhesive shall not be used if surface or ambient temperatures are below 45 degree F (7 degree C) during application or subsequent curing time.
- d) Minimum product temperature before entering the dispenser should be 72 degree F (22 degree C).
- e) Store between 45 degree F (7 degree C) and 95 degree F (35 degree C).
- f) Protect from freezing, any product that does freeze must be removed from the job site and disposed of per State and Federal regulations.
- g) Adhesive shall not be used during inclement weather.
- h) Adhesive shall not be applied to wet or damp surfaces.
- i) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Millennium Weather-Tite Adhesive:

A one step low-rise polyurethane foam used to attach insulation to approved compatible substrates. Adhesive is applied with a gravity fed applicator or by hand with a dual component caulk gun in bands 12 inches on center. Additional adhesive may be required for rougher surfaces. Consult Product Data Sheets for additional information. Application rates are as follows:

	Approximate Square Feet (<i>Meter²</i>)
600 ml cartridge	50 to 65 (<i>15.24 to 19.81</i>) of insulation
1,500 ml cartridge	150 to 200 (<i>15.24 to 60.96</i>) of insulation

Notes:

- a) Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).
- b) Place insulation board into the adhesive shortly after it has reached its maximum rise [typically within 30 to 45 seconds at 60 to 80 degree F (16 to 27 degree C)] and walk into place.
- c) Minimum product temperature before entering the dispenser should be 60 degree F (16 degree C).
- d) Store between 60 degree F (16 degree C) and 80 degree F (27 degree C). Protect from freezing.
- e) Adhesive shall not be used during inclement weather.
- f) Adhesive shall not be applied to wet or damp surfaces.
- g) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Sarnaplate

Used with various Sarnafasteners to attach insulation boards to roof deck. Sarnaplate is a 3 inch (75 mm) square or round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating. Consult Product Data Sheet for additional information.

Sarnaplate-HD/CD

Used with Sarnafastener-HD or Sarnafastener-CD10 to attach insulation boards to wood or concrete roof decks. Sarnaplate-HD/CD is a 3 inch (75 mm) round stamping of SAE 1010 steel with an AZ 55 Galvalume coating. Consult Product Data Sheet for additional information.

Sarnaplate-Preassembled

Combination of a 3 inch round plate and a #12 fastener used to attach insulation boards to steel or wood roof decks. Sarnaplate-Preassembled consists of a 3 inch (75 mm) round, 26 gauge stamping of SAE 1010 steel with an AZ 55 Galvalume coating and Sarnafastener #12 with modified buttress thread. The fastener shank diameter is approximately 0.168 inch (4 mm) and the thread diameter is approximately 0.214 inch (5 mm). Consult Product Data Sheet for additional information.

Sarnafastener #12

A #12 corrosion-resistant fastener used with Sarnaplates to attach insulation boards to steel or wood roof decks. Sarnafastener #12 has a modified buttress thread, a shank diameter of approximately 0.168 inch (4 mm) and a thread diameter of approximately 0.214 inch (5 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement. Consult Product Data Sheet for additional information.

Sarnafastener-HD

A #14 corrosion-resistant fastener used with Sarnaplate-HD/CD to attach insulation boards or with Sarnastop and Sarnabar to attach membrane to structural concrete or wood roof decks. Sarnafastener-HD has a shank diameter of 0.190 inch (4.8 mm), a thread diameter of 0.245 inch (6.2 mm) and a #3 Phillips drive head with a diameter of 0.435 inch (11 mm). Consult Product Data Sheet for additional information.

Sarnafastener-XP

A #15, heavy-duty, corrosion-resistant fastener used with Sarnaplate to attach insulation or with Sarnadisc, Sarnastop and Sarnabar to attach Sarnafil G410 roof membrane to steel or 1/2-3/4 inch wood roof decks. Sarnafastener-XP has a shank diameter of approximately 0.21 inch (5.3 mm) and the thread diameter is approximately 0.26 inch (6.6 mm). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement. Consult Product Data Sheet for additional information.

Sarnafastener-XPS

A specially designed, heavy-duty, corrosion-resistant fastener used with Sarnastop or Sarnabar to attach Sarnafil G410 roof membrane to steel roof decks. Sarnafastener-XPS has a shank diameter of approximately 0.21 inch (5.3mm) and a thread diameter of approximately 0.26 inch (6.6). The driving head has a diameter of approximately 0.435 inch (11 mm) with a #3 Phillips recess for positive engagement and simplicity of application. Consult Product Data Sheet for additional information.

Sarnafastener-CD10

A nail-in, corrosion-resistant fastener used with Sarnaplate-HD/CD to attach insulation to normal weight concrete roof deck. Sarnafastener-CD10 has a shank diameter of 0.215 inch (5.5 mm), a split diameter of 0.265/0.275 inch (6.7/7.0 mm) and a flat head with a 0.435 inch (11 mm) diameter. Consult Product Data Sheet for additional information.

Sarnastop

An extruded aluminum, low profile bar used with certain Sarnafasteners to attach to the roof deck or to walls/curbs at terminations, penetrations and at incline changes of the substrate. Sarnastop is a 1 inch (25 mm) wide, flat aluminum bar 1/8 inch (3 mm) thick that has predrilled holes every 6 inches (152 mm) on center. Consult Product Data Sheet for additional information.

Sarnabar

An FM-approved, heavy-duty, 14 gauge, galvanized or stainless, roll-formed steel bar used to attach membrane to roof decks. The formed steel is pre-punched with holes every 1 inch (25 mm) on center to allow various Sarnafastener spacing options. Consult Product Data Sheet for additional information.

Sarnacord

A 5/32 inch (4 mm) diameter, red-colored, flexible thermoplastic extrusion that is welded to the top surface of the Sarnafil membrane and against the side of the Sarnabar, used to hold the membrane in position. Consult Product Data Sheet for additional information.

DECK PRIMERS

H. Sarnacol LR-2001 Deck Primer

Designed for use with Sarnacol LR-2001 adhesive to condition surfaces and promote adhesion between certain vapor barriers, acceptable deck substrates such as perlite, vermiculite and Zonolite with insulation board products. Consult Product Data Sheet for additional information.

I. Sarnavap Self-Adhered Primer

A solvent-based primer designed for use with Sarnavap Self-Adhered vapor barrier to prime wood, concrete, lightweight concrete, gypsum boards and decks prior to application Sarnavap Self-Adhered vapor barrier. Consult Product Data Sheet for additional information.

J. Sarnavap Self-Adhered Primer WB

A water-based primer designed for use with Sarnavap Self-Adhered vapor barrier to promote adhesion to most substrates. Particularly recommended when use of solvent-based primer is not advised or permitted. Consult Product Data Sheet for additional information.

WALKWAY PROTECTION

K. Sarnatred

A polyester reinforced, 0.096 inch (96 mil/2.4 mm), weldable membrane with surface embossment. Used as a protection layer from rooftop traffic. Sarnatred is supplied in rolls of 39.3 inches (1.0 m) wide and 32.8 feet (10 m) long. Consult Product Data Sheet for additional information.

Crossgrip Walkway

A rolled-out walkway protection mat used to protect Sarnafil roofing membrane from mechanical abuse. Crossgrip Walkway is 9/16 inch (14 mm) thick flexible pvc with a heavily textured surface. Crossgrip Walkway is loose laid on top of completed Sika Sarnafil roof assemblies. Where design windspeeds exceed 94 mph (150 km/h) the walkway must be secured with loops of Sarnafil membrane welded to the field sheet. Consult Product Data Sheet for additional information.

Sand-Coated Walkway

A fiberglass reinforced, 60 mil, weldable membrane with a thick sand-based coating on top. Net dimensions are approximately 150 mil (4 mm) thick by 26 inches (0.6 m), 39 inches (1.0 m), 78 inches (2.0 m) wide with varying lengths. The standard length is 32 feet (10 m). Consult Product Data Sheet for additional information.

Concrete Pavers

Normal weight concrete pavers specifically designed and produced for rooftop application. For large areas the use of paver pedestals or a drainage panel protection layer between the Sarnafil roof membrane and the pavers is required. For narrow walkways, a welded-in-place protection layer of Sarnafil membrane is required under the concrete pavers.

VAPOR BARRIER

L. Sarnavap-10

A 10 mil (0.25 mm) thick polyethylene vapor barrier/air barrier. Sarnavap-10 is supplied in a folded panel that is rolled onto a core. The core width is 5 feet (1.5 m). When unrolled off the core and unfolded, the sheet dimensions are 20 feet (6.9 m) wide by 100 feet (33 m) long. Consult Product Data Sheet for additional information.

M. Sarnavap Self-Adhered

A 32 mil (0.8 mm) self-adhesive vapor barrier that can also serve as temporary roof protection. Sarnavap Self-Adhered is available in rolls 44.9 inches x 133.8 feet (1.14 x 40.8 m). Consult Product Data Sheet for additional information.

Bituminous

A bituminous vapor barrier may be used beneath the insulation.

MISCELLANEOUS ACCESSORIES

N. Aluminum Tape

A 2 inch (50 mm) wide pressure-sensitive aluminum tape used as a separation layer between small areas of asphalt contamination and the membrane and as a bond-breaker under the coverstrip at Sarnaclad joints.

Sealing Tape Strip

Compressible foam with pressure-sensitive adhesive on one side. Used with metal flashings as a preventive measure against air and wind blown moisture entry.

Multi-Purpose Tape

A high performance sealant tape used with metal flashings as a preventive measure against air and wind blown moisture entry.

Sarnamatic 641mc or 661

220 volt, self-propelled, hot-air welding machine used to seal Sarnafil membrane seams.

Sarnasolv

A high quality solvent cleaner used for the general cleaning of residual asphalt, scuff marks, etc., from the membrane surface. Sarnasolv is also used daily to clean seam areas prior to hot-air welding in tear off or dirty conditions or if the membrane is not welded the same day it is unrolled. Consult Product Data Sheet for additional information.

Perimeter Warning Tape

Designed for use on PVC membranes as a reflective, highly visible pressure sensitive tape used to draw attention to roof perimeters and potential hazardous areas.

The tape is available in 2 inch wide rolls by 30 feet long and comes on a release liner for easy application. Perimeter Warning Tape exceeds reflectivity 3 requirements and Federal spec. L-S-300, Class 1.

SEALANTS AND PITCH POCKET FILLERS

- O. Sarnafil Sikaflex-1a Sealant (for termination details).

Sarnafiller (two-component urethane adhesive for pitch pocket toppings).

Depending on substrates, the following sealants are options for temporary overnight tie-ins:

- Type III hot asphalt conforming to ASTM D312 (latest version).
- Sarnafiller.
- Multiple layers of roofing cement and felt.
- Spray-applied, water-resistant urethane foam.

Mechanical attachment with rigid bars and compressed sealant.

MISCELLANEOUS FASTENERS AND ANCHORS

- A. All fasteners, anchors, nails, straps, bars, etc. shall be post-galvanized steel, aluminum or stainless steel. Mixing metal types and methods of contact shall be assembled in such a manner as to avoid galvanic corrosion. Fasteners for attachment of metal to masonry shall be expansion type fasteners with stainless steel pins. All concrete fasteners and anchors shall have a minimum embedment of 1-1/4 inch (32 mm) and shall be approved for such use by the fastener manufacturer. All miscellaneous wood fasteners and anchors used for flashings shall have a minimum embedment of 1 inch (25 mm) and shall be approved for such use by the fastener manufacturer.

RELATED MATERIALS

- B. Wood Nailer

Treated wood nailers shall be installed at the perimeter of the entire roof and around such other roof projections and penetrations as specified on Project Drawings. Thickness of nailers must match the insulation thickness to achieve a smooth transition. Wood nailers shall be treated for fire and rot resistance (wolmanized or osmose treated) and be #2 quality or better lumber. Creosote or asphalt-treated wood is not acceptable. Wood nailers shall conform to Factory Mutual Loss Prevention Data Sheet 1-49. All wood shall have a maximum moisture content of 19 percent by weight on a dry-weight basis.

Note: Wood nailers or wood blocking for snow protection system shall be installed prior to the installation of the roof membrane whenever possible.

Plywood

When bonding directly to plywood, a minimum 1/2 inch (12 mm) CDX (C side out), smooth-surfaced exterior grade plywood with exterior grade glue shall be used. Rough-surfaced plywood or high fastener heads will require the use of Sarnafelt behind the flashing membrane. Plywood shall have a maximum moisture content of 19 percent by weight on a dry weight basis.

EXECUTION

PRE-CONSTRUCTION CONFERENCE

- C. The Applicator, Owner's Representative/Designer and Manufacturer(s) shall attend a pre-construction conference.

The meeting shall discuss all aspects of the project including but not limited to:

- Safety
- Set up
- Construction schedule
- Contract conditions
- Coordination of the work

SUBSTRATE CONDITION

D. Applicator shall be responsible for acceptance or provision of proper substrate to receive new roofing materials.

Applicator shall verify that the work done under related sections meets the following conditions:

- Roof drains and scuppers have been reconditioned or replaced and installed properly.
- Roof curbs, nailers, equipment supports, vents and other roof penetrations are properly secured and prepared to receive new roofing materials.
- All surfaces are smooth and free of dirt, debris and incompatible materials.
- All roof surfaces shall be free of water, ice and snow.

SUBSTRATE PREPARATION

The roof deck and existing roof construction must be structurally sound to provide support for the new roof system. The Applicator shall load materials on the rooftop in such a manner as to eliminate risk of deck overload due to concentrated weight. The Owner's Representative shall ensure that the roof deck is secured to the structural framing according to local building code and in such a manner as to resist all anticipated wind loads in that location.

A. New Construction

Wood Deck:

- a) FM approved wood deck - The roof deck shall be minimum 3/4 inch (19 mm) thick treated plywood. The deck shall conform to FM requirements for Class 1 fire-retardant and rot-resistant wood decks. Deck shall be installed according to FM and local code requirements.

SUBSTRATE INSPECTION

B. A dry, clean and smooth substrate shall be prepared to receive the Sarnafil Adhered roof system.

The Applicator shall inspect the substrate for defects such as excessive surface roughness, contamination, structural inadequacy, or any other condition that will adversely affect the quality of work.

The substrate shall be clean, smooth, dry, free of flaws, sharp edges, loose and foreign material, oil and grease. Roofing shall not start until all defects have been corrected.

All roof surfaces shall be free of water, ice and snow.

Sarnafil shall be applied over compatible and accepted substrates only.

VAPOR BARRIER/AIR BARRIER INSTALLATION (AS REQUIRED BY DESIGNER)

General Criteria:

Interior (inside temperature/relative humidity) and exterior conditions may create a need for a vapor barrier. The design professional shall decide whether a vapor barrier is necessary. It is the design professional's responsibility to determine the type and location of a vapor barrier. If sealed properly, a vapor barrier can also act as an air barrier (positive pressure) for roofs intended over air-permeable decks (steel, wood, precast, etc.). When reroofing over the existing asphalt roof, the old roof may be considered to be an adequate vapor barrier/air barrier if the details are properly sealed.

A. Sarnavap-10

1. Steel Deck or Wood Deck (New Construction or Reroofing with Removal of Existing Roofing):

Sarnavap-10 is loose-laid over suitable substrate. Overlap all edges 4 inches (100 mm) and seal with butyl tape. Extend Sarnavap-10 to perimeter and deck penetrations and seal to provide continuity of the building's air/vapor envelope. Sarnavap-10 must be sealed on the vertical surface at roof penetrations also.

B. Sarnavap Self-Adhered

1. Primer Application

The substrate must be clean, dry and free of dust, grease or other contaminants. Shake well before using. Apply to clean and dry surfaces with a paint brush, roller or sprayer. Application rates will vary depending

on substrate. Sarnavap Self-Adhered vapor barrier must be installed on the same day as the primer application. Acceptable substrates for primer application include wood, concrete, lightweight concrete, gypsum boards and decks. Drying time is typically 30 minutes to 3 hours.

Spraying equipment recommendations:

- a) Spray tip size: between 20 and 25 mils.
- b) Pressure: 1300 psi continuous

To Install:

- a) Apply primer to prepared substrate.
- b) Allow primer to dry completely.
- c) Install Sarnavap Self-Adhered vapor barrier.

Notes:

- a) Do not install when it is raining, snowing, or on wet/humid surfaces.
- b) Install Sarnavap Self-Adhered Primer at temperatures 32 degree F (0 degree C) and above. Average coverage rate is 0.25 to 1.22 gallons per square (0.1 to 0.5 L per m²).
- c) Install Sarnavap Self-Adhered Primer WB at temperatures 41 degree F (5 degree C) and above. Average coverage rate is 0.25 to 0.75 gallon per square (0.1 to 0.3 L per m²). KEEP FROM FREEZING.
- d) Do not use Sarnavap Self-Adhered Primer WB to seal Sarnavap Self-Adhered vapor barrier membrane joints.
- e) Sarnavap Self-Adhered Primer WB is not suitable for plastic surfaces.
- f) Do not use Sarnavap Self-Adhered Primer WB on asphaltic boards.

2. Membrane Application Over Steel, Wood or Concrete Deck (New Construction or Reroofing with Removal of Existing Roofing):

Install Sarnavap Self-Adhered over a clean and dry substrate. In concrete applications allow concrete to cure for at least 7 days. Do not install when it is raining, snowing, or on wet/humid surfaces. Install in temperatures 32 degree F (0 degree C) and above. The use of a primer is required on the following substrates: wood, concrete, lightweight concrete, gypsum boards and decks. On metal decks use a metal plate (6 x 42 inches - 15 x 106 cm) to support the membrane end lap between metal flutes ensuring a complete end lap seal.

- a) Begin application at the bottom of the slope. Unroll Sarnavap Self-Adhered onto the substrate without adhering for alignment. Overlap each preceding sheet by 3 inches (75 mm) lengthwise following the reference line and by 6 inches (150 mm) at each end. Stagger end laps by at least 12 inches (300 mm). Do not immediately remove the silicone release sheet.
- b) Once aligned, peel back a portion of the silicone release sheet and press the membrane onto the substrate for initial adherence. Hold Sarnavap Self-Adhered tight and peel back the release sheet by pulling diagonally.

- c) Use a 75 lb. (34 kg) roller to press Sarnavap Self-Adhered down into the substrate including the laps. Finish by aligning the edge of the roller with the lower end of the side laps and rolling up the membrane. Do not cut the membrane to remove air bubbles trapped under the laps. Squeeze out air bubbles by pushing the roller to the edge of the laps.

WOOD NAILER INSTALLATION

- C. Install continuous wood nailers at the perimeter of the entire roof and around roof projections and penetrations as shown on the Detail Drawings.

Nailers shall be anchored to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons per lineal meter) in any direction. Individual nailer lengths shall not be less than 3 feet (0.9 meter) long. Nailer fastener spacing shall be at 12 inches (0.3 m) on center or 16 inches (0.4 m) on center if necessary to match the structural framing. Fasteners shall be staggered 1/3 the nailer width and installed within 6 inches (0.15 m) of each end. Two fasteners shall be installed at ends of nailer lengths. Nailer attachment shall also meet the requirements of the current Factory Mutual Loss Prevention Data Sheet 1-49.

Thickness shall be as required to match substrate or insulation height to allow a smooth transition.

Any existing nailer woodwork which is to remain shall be firmly anchored in place to resist a minimum force of 300 pounds per lineal foot (4,500 Newtons per lineal meter) in any direction and shall be free of rot, excess moisture or deterioration. Only woodwork shown to be reused in Detail Drawings shall be left in place. All other nailer woodwork shall be removed.

Stainless steel, corrosion resistant, fasteners are required when mechanically attaching any Sika Sarnafil product to wood nailers and wood products treated with ACQ (Alkaline copper Quaternary). When ACQ treated wood is used on steel roof decks or with metal edge detailing, a separation layer must be placed between the metal and ACQ treated wood.

INSULATION INSTALLATION

General Criteria:

- D. **For Factory Mutual insured buildings polystyrene insulation may not be applied direct to steel deck.**
- E. Insulation shall be installed according to insulation manufacturer's instructions.
General Criteria:

Insulation shall be neatly cut to fit around penetrations and projections.

Install tapered insulation in accordance with insulation manufacturer's shop drawings.

Install tapered insulation around drains creating a drain sump.

Do not install more insulation board than can be covered with Sarnafil membrane by the end of the day or the onset of inclement weather.

Use at least 2 layers of insulation when the total insulation thickness exceeds 2-1/2 inches (64 mm). Stagger joints at least 12 inches (0.3 m) between layers.

Mechanical Attachment

Insulation shall be mechanically fastened to the deck with approved fasteners and plates at a rate according to the insulation manufacturer's and Sika Sarnafil's recommendations for fastening rates and patterns. The quantity and locations of the fasteners and plates shall also cause the insulation boards to rest evenly on the roof deck/substrate so that there are no significant and avoidable air spaces between the boards and the substrate. Each insulation board shall be installed tightly against the adjacent boards on all sides.

Fasteners are to be installed consistently in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by the fastener manufacturer and Sika Sarnafil.

Use fastener tools with a depth locator and torque-limiting attachment as recommended or supplied by fastener manufacturer to ensure proper installation.

Sarnacol 2163 Adhesive

With a utility knife, cut away the plastic plugs from the Sarnacol 2163 mixing head. Attach a mixing tip to the threaded mixing head. Place the cartridge into the applicator. At the beginning of the tube, some of the material should be pumped out initially to make sure of a proper mix. Apply using a gravity fed applicator or by hand with a dual component caulk gun over properly installed and prepared substrates in bands 12 inches (305 mm) on center. Bands are 1/4 to 1/2 inch (6 to 13 mm) wide before foaming. Adhesive will quickly, within 30 to 45 seconds at 60 to 80 degree F (15 to 27 degree C), transform from a liquid into a low rise foam. Immediately set insulation boards into wet adhesive. Do not allow the adhesive to skin over. Walk insulation boards into place to ensure full embedment. Within 5 to 15 minutes the boards are securely attached to the substrate. In warmer weather this process is a little quicker. In colder weather the process is a little slower. CAUTION: Walking insulation boards in immediately after placement into adhesive may cause slippage/movement until adhesive starts to set up. On roof slopes greater than 1/2

inch (13 mm) in 12 inches (305 mm), begin adhering insulation at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and apply weight to all insulation boards to ensure adequate securement. Only areas that can be made completely watertight in the same day's operations shall be coated. Un-used adhesive can be applied at a later date by simply replacing the mixing tip.

For multiple layers of insulation spray adhesive over the base layer once fully secured and follow procedures above for attachment of each insulation layer.

Approved Insulation Boards:

- b) Sarnatherm Polyisocyanurate, 1 inch (25 mm) minimum thickness (required for Systems Warranty).

Accepted, one inch minimum, Polyisocyanurate.

DensDeck

Securock Gypsum-Fiber

Approved polystyrene insulation (EPS/EXPS) overlaid with a recovery board.

If plywood or OSB is proposed as a membrane underlayment, a polyisocyanurate composite board shall be used. Individual plywood or OSB panels are not recommended due to board stiffness and potential for bowing.

Approved Substrate/Deck:

- a) Structural Roof Decking: Concrete, Gypsum, Cementitious Wood Fiber (Tectum), Wood or Steel.
- b) Base sheets: Standard or Granular surfaced.
- c) Smooth Built-Up Roof Surfaces: Re-Roof Applications.

Re-cover Applications:

- a) A moisture survey must be performed. Any wet materials must be removed and replaced with compatible materials. For existing B.U.R., modified bitumen or mineral surface cap sheets inspections shall be performed for adhesion between the plies, insulation and deck. Deficiencies such as blisters, buckles, wrinkles and fishmouths shall be cut out or mechanically fastened. Apply Sarnacol 2163/2164 Universal Primer to all substrates prior to the application of Sarnacol 2163 adhesive.

Installation Guidelines:

- a) Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).
- b) For ease of application, maintain a minimum material temperature of 70 degree F (21 degree C) prior to use.
- c) Store between 60 degree F (16 degree C) and 80 degree F (27 degree C).

- d) Adhesive shall not be used during inclement weather.
- e) Adhesive shall not be applied to wet or damp surfaces.
- f) Do not use warped or curled insulation boards.
- g) For uneven surfaces, trimming or slitting of boards may be necessary.
- h) Approximate Set-Time:
 - Air Temperature between 60 to 90 degree F (15 to 32 degree C) = 5 to 8 minutes.
 - Air Temperature between 32 to 60 degree F (0 to 15 degree C) = 8 to 15 minutes.
- i) Coverage:
 - Approximately 600 square feet per case. Rates are based on an application pattern of 4 ribbons, 1/4 to 1/2 inch (6 to 13 mm) beads, 12 inches (30 cm) on center per 4 x 4 feet (121.9 x 121.9 cm) insulation board. Coverage rates may vary over irregular surfaces.
- j) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Sarnacol LR-2001 Adhesive

Apply using pneumatic spray equipment over properly installed and prepared substrates at a rate according to Sika Sarnafil requirements. Sarnacol LR-2001 Primer may be required prior to application of adhesive if excessive dirt or dust remains on substrate. Contact Sika Sarnafil Technical Department for specific primer requirements. Apply adhesive in a smooth, even coating with no gaps, globs, puddles or similar inconsistencies. Only areas that can be made completely watertight in the same day's operations shall be coated.

Allow adhesive to rise up approximately 1/8 inch and set insulation boards into adhesive. Continue to install boards into adhesive. After set up time has been reached (approx. 5 to 10 minutes, will vary based on temperature and amount of catalyst added) walk insulation boards into adhesive to ensure full embedment. CAUTION: Walking insulation boards in immediately after placement into adhesive may cause slippage/movement until adhesive starts to set up. On roof slopes greater than 1/2 inch (13 mm) in 12 inches (305 mm), begin adhering insulation at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and apply weight to all insulation boards to ensure adequate securement.

For multiple layers of insulation spray adhesive over the base layer once fully secured and follow procedures above for attachment of each insulation layer.

Approved Insulation Boards Adhered to Approved Roof Substrate/Deck:

- c) Sarnatherm Polyisocyanurate, 1 inch minimum (25 mm) thickness (required for Systems Warranty).
Accepted, one inch minimum, Polyisocyanurate.

DensDeck

Securock Gypsum-Fiber

Approved polystyrene insulation (EPS/EXPS) overlaid with a recovery board.

If plywood or OSB is proposed as a membrane underlayment, a polyisocyanurate composite board shall be used. Individual plywood or OSB panels are not recommended due to board stiffness and potential for bowing.

For uneven surfaces, trimming or slitting of boards may be necessary.

A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Re-cover Applications:

A moisture survey must be performed. Any wet materials must be removed and replaced with compatible materials. For existing B.U.R., modified bitumen or mineral surface cap sheets inspections shall be performed for adhesion between the plies, insulation and deck. Deficiencies such as blisters, buckles, wrinkles and fishmouths shall be cut out or mechanically fastened.

Installation Guidelines:

- a) Adhesive must be applied as a continuous layer.
- b) Use a water-filled, foam-covered lawn roller to consistently and evenly press insulation into adhesive layer.
- c) Storage temperatures in excess of 90 degree F (32 degree C) may affect shelf life of adhesive.
- d) If exposed to temperatures below 40 degree F (5 degree C), restored adhesive to a minimum temperature of 60 degree F (15 degree C) before use.
- e) Job site conditions may affect performance. Adhesive shall not be used if surface or ambient temperatures below 40 degree F (5 degree C) are expected during application or subsequent curing time.
- f) Adhesive shall not be applied to wet or damp surfaces.
- g) The addition of Sarnacol LR-2001 Catalyst to Part B may be required when temperatures are between 40 degree F (5 degree C) and 80 degree F (27 degree C). Refer to chart below for approximate values.
- h) Adhesive shall not be applied to wet or damp surfaces.

Sarnacol LR-2001 Catalyst:

Recommended for use in cold climates to accelerate set up time and allow insulation to be walked into place in a minimal amount of time (approximately 5 to 10 minutes). If adhesive is not catalyzed, preliminary fastening of the insulation corners or weighing of individual boards will typically be required in temperatures below 80 degree F (27 degree C) since adhesive set up time will be slower. The amount of catalyst to be added to Part B will vary based on temperature of surface to be sprayed.

Surface Temperature	Catalyst added to 50 Gallons (189.3 liter) Part B Drum
40 degree F (5 degree C)	7 to 8 pints (3.3 to 3.8 liter)
50 degree F (10 degree C)	5 to 7 pints (2.4 to 3.3 liter)
60 degree F (15 degree C)	4 to 5 pints (1.9 to 2.4 liter)
70 degree F (22 degree C)	3 to 4 pints (1.4 to 1.9 liter)
80 degree F (27 degree C)	2 to 3 pints (0.9 to 1.4 liter)

Sarnacol LR-2001 Catalyst is available in 1 gallon (3.8 liter) containers. Add in small quantities until experience is gained for proper judgment. Use a minimum 1/2 horsepower collapsible drum mixer such as Binks Model #31296 or equivalent for mixing. In order to achieve a consistent blend of materials for proper reaction of adhesive, a thorough mixing is required, at least 15 minutes. The Part B side must be at least 70 degree F (22 degree C) prior to adding catalyst. The catalyst must be stirred prior to adding to the Part B side to promote proper mixing. Consult Product Data Sheets for additional information.

Olympic Olybond500 Adhesive

Apply using PaceCart equipment over properly installed and prepared substrates in bands 12 inches (13 mm) on center. Allow to rise approximately 1/2 to 3/4 inch (13 to 19 mm). Lay insulation boards in adhesive and walk into place to ensure full embedment. CAUTION: Walking insulation boards in immediately after placement into adhesive may cause slippage/movement until adhesive starts to set up. On roof slopes greater than 1/2 inch (13 mm) in 12 inches (305 mm), begin adhering insulation at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and apply weight to all insulation boards to ensure adequate securement. Only areas that can be made completely watertight in the same day's operations shall be coated.

For multiple layers of insulation spray adhesive over the base layer once fully secured and follow procedures above for attachment of each insulation layer.

Approved Insulation Boards Adhered to Approved Roof Substrate/Deck:

d) Sarnatherm Polyisocyanurate, 1 inch (25 mm) minimum thickness (required for Systems Warranty).

Accepted, one inch minimum, Polyisocyanurate.

DensDeck

Securock Gypsum-Fiber

Approved polystyrene insulation (EPS/EXPS) overlaid with a recovery board.

Owens Corning DuraPink Plus is the only approved extruded polystyrene (EXPS). Overlay with a recovery board.

If plywood or OSB is proposed as a membrane underlayment, a polyisocyanurate composite board shall be used. Individual plywood or OSB panels are not recommended due to board stiffness and potential for bowing.

For uneven surfaces, trimming or slitting of boards may be necessary.

A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Re-cover Applications:

A moisture survey must be performed. Any wet materials must be removed and replaced with compatible materials. For existing B.U.R., modified bitumen or mineral surface cap sheets inspections shall be performed for adhesion between the plies, insulation and deck. Deficiencies such as blisters, buckles, wrinkles and fishmouths shall be cut out or mechanically fastened.

Installation Guidelines:

- a) Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).
- b) Place insulation board into the adhesive shortly after it has reached its maximum rise (typically within 2 minutes) and walk into place.
- c) Job site conditions may affect performance. Adhesive shall not be used if surface or ambient temperatures are below 45 degree F (7 degree C) during application or subsequent curing time.
- d) Minimum product temperature before entering the dispenser should be 72 degree F (22 degree C).
- e) Store between 45 degree F (7 degree C) and 95 degree F (35 degree C).
- f) Protect from freezing, any product that does freeze must be removed from the job site and disposed of per State and Federal regulations.
- g) Adhesive shall not be used during inclement weather.
- h) Adhesive shall not be applied to wet or damp surfaces.

Millennium Weather-Tite Adhesive

Apply using gravity fed applicator or by hand with a dual component caulk gun over properly installed and prepared substrates in bands 12 inches (305 mm) on center. Bands are 1/4 to 1/2 inch (6 to 13 mm) wide before foaming. Adhesive will quickly, within 30 to 45 seconds at 60 to 80 degree F (15 to 27 degree C), transform from a liquid into a low rise foam. Immediately set insulation boards into wet adhesive. Walk insulation boards into place to ensure full embedment. Within 5 to 8 minutes the boards are securely attached to the substrate. In warmer weather this process is a little quicker. In colder weather the process is a little slower. CAUTION: Walking insulation boards in immediately after placement into adhesive may cause slippage/movement until adhesive starts to set up. On roof slopes greater than 1/2 inch (13 mm) in 12 inches (305 mm), begin adhering insulation at low point and work upward to avoid slippage. One person should be designated to walk in, trim/slit and apply weight to all insulation boards to ensure

adequate securement. Only areas that can be made completely watertight in the same day's operations shall be coated.

For multiple layers of insulation spray adhesive over the base layer once fully secured and follow procedures above for attachment of each insulation layer.

Approved Insulation Boards Adhered to Approved Roof Substrate/Deck:

- a) Sarnatherm Polyisocyanurate, 1 inch (25 mm) minimum thickness (required for Systems Warranty).
- b) Accepted, one inch minimum, Polyisocyanurate.
- c) DensDeck
- d) Securock Gypsum-Fiber
- e) Approved polystyrene insulation (EPS/EXPS) overlaid with a recovery board.
- f) If plywood or OSB is proposed as a membrane underlayment, a polyisocyanurate composite board shall be used. Individual plywood or OSB panels are not recommended due to board stiffness and potential for bowing.
- g) For uneven surfaces, trimming or slitting of boards may be necessary.
- h) A minimum of 1 Sarnabar placed 4 feet (1.2 m) from the roof edge and fastened 12 inches (305 mm) on center to the structural deck with acceptable fasteners is required after installation of the Sarnafil roof membrane. The Sarnabar is to have a cover strip hot air welded over it.

Re-cover Applications:

A moisture survey must be performed. Any wet materials must be removed and replaced with compatible materials. For existing B.U.R., modified bitumen or mineral surface cap sheets inspections shall be performed for adhesion between the plies, insulation and deck. Deficiencies such as blisters, buckles, wrinkles and fishmouths shall be cut out or mechanically fastened.

Installation Guidelines:

- a) Not recommended for use with insulation boards larger than 4x4 feet (1.2x1.2 m).
- b) Place insulation board into the adhesive shortly after it has reached its maximum rise [typically within 30-45 seconds at 60 to 80 degree F (16 degree C to 27 degree C)] and walk into place.
- c) Minimum product temperature before entering the dispenser should be 60 degree F (16 degree C).
- d) Store between 60 degree F (16 degree C) and 80 degree F (27 degree C). Protect from freezing.
- e) Adhesive shall not be used during inclement weather.
- f) Adhesive shall not be applied to wet or damp surfaces.

Attachment with hot Type III asphalt:

Insulation shall be adhered to the concrete deck or another approved substrate with hot Type III asphalt according to the asphalt manufacturer's instructions. The temperature of the asphalt shall be at the asphalt

manufacturers instructions for EVT. The asphalt temperature and application methodology shall be maintained throughout the installation as recommended by the asphalt manufacturer, the NRCA and ARMA. The installation shall be such to cause the insulation boards to rest evenly on the roof deck/substrate so that there are no significant and avoidable air spaces between the boards and the substrate. The maximum insulation board size with hot-asphalt attachment is 4 ft x 4 ft (1.2 m x 1.2 m). Each insulation board shall be installed tightly against the adjacent boards on all sides and walked-in-place to assure even and consistent contact with the substrate. Aluminum tape shall be installed over joints where asphalt has been pushed to the board's surface.

When hot asphalt is used to attach the insulation board to the deck, a Sarnabar shall be installed above the adhered roof membrane 4 ft (1.3 m) from the edge of the roof along the entire perimeter. The Sarnabar shall be fastened 12 inches (0.3 m) on center and a membrane cover strip is welded over it.

INSTALLATION OF SARNAFIL MEMBRANE

The surface of the insulation or substrate shall be inspected prior to installation of the Sarnafil roof membrane. The substrate shall be clean, dry, free from debris and smooth with no surface roughness or contamination. Broken, delaminated, wet or damaged insulation boards shall be removed and replaced.

F. Sarnacol 2170 / 2170 VC Adhesive:

Over the properly installed and prepared substrate surface, adhesive shall be applied using solvent-resistant 3/4 inch (19 mm) nap paint rollers. The adhesive shall be applied to the substrate at a rate according to Sika Sarnafil requirements. The adhesive shall be applied in smooth, even coating with no gaps, globs, puddles or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be coated with adhesive. The first layer of adhesive shall be allowed to dry completely prior to installing the membrane.

When the adhesive on the substrate is dry, the Sarnafil roof membrane is unrolled. Adjacent sheets shall be overlapped 3 inches (75 mm). Once in place, one-half of the sheet's length shall be turned back and the underside shall be coated with adhesive at a rate of 1/2 gallon per 100 square feet (0.2 liters per m²). When the membrane adhesive has dried slightly to produce strings when touched with a dry finger, the coated membrane shall be rolled onto the previously-coated substrate being careful to avoid wrinkles. **Do not allow adhesive on the underside of the Sarnafil membrane to dry completely.** The amount of membrane that can be coated with adhesive before rolling into substrate will be determined by ambient temperature, humidity and crew. The bonded sheet shall be pressed firmly in place with a water-filled, foam-covered lawn roller by frequent rolling in two directions. The remaining un-bonded half of the sheet shall be folded back and the procedure repeated.

Notes:

- a) The Applicator shall count the amount of pails of adhesive used per area per day to verify conformance to the specified adhesive rate.

No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.

Sarnacol 2121 Adhesive:

Installation Method A:

Over the properly installed and prepared substrate, Sarnacol 2121 adhesive shall be poured out of the pail and spread using notched 1/4 x 1/4 x 1/4 inch (6 x 6 x 6 mm) squeegees. The adhesive shall be applied at a rate according to Sika Sarnafil requirements. No adhesive is placed on back of the G410 membrane. Do not allow adhesive to skin-over or surface-dry prior to installation of G410 membrane.

Immediately unroll G410 membrane carefully into wet adhesive. Adjacent rolls overlap previous rolls by 3 inches (75 mm). This process is repeated throughout the roof area. Immediately after application into adhesive, each roll shall be pressed firmly into place with a water-filled, foam-covered lawn roller by frequent rolling in two directions.

Installation Method B:

3. Over the properly installed and prepared substrate, Sarnacol 2121 adhesive shall be poured out of the pail and spread using a medium nap roller. The adhesive shall be applied at a rate according to Sika Sarnafil requirements. No adhesive is placed on back of the G410 membrane. Do not allow adhesive to skin-over or surface-dry prior to installation of G410 membrane.

Immediately unroll G410 membrane carefully into wet adhesive. Adjacent rolls overlap previous rolls by 3 inches (75 mm). This process is repeated throughout the roof area. Immediately after application into adhesive, each roll shall be pressed firmly into place with a water-filled, foam-covered lawn roller by frequent rolling in two directions.

Notes:

- a) Sarnacol 2121 shall not be used if temperatures below 40 degree F (5 degree C) are expected during application or subsequent drying time.

No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.

Care must be taken to insure that the adhesive has not dried before the membrane is laid in place. This is especially important during hot temperatures. Adjustments may be needed in the application technique to insure a wet lay in. It is recommended that only 6-10 feet (2-3 m) at a time is coated out ahead of the membrane to prevent dry laid membrane.

Sarnacol 2121 shall not be used on vertical surfaces or sloped surfaces greater than a 2 inch (50 mm) rise per 1 horizontal foot (0.3 m).

Sarnacol 2166 Adhesive:

Surface to receive the adhesive shall be clean and dry. Position the standard bareback rolls of membrane to ensure a consistent 3 inch overlap is achieved. Apply Sarnacol 2166 adhesive using an adhesive cart. Coverage rate of Sarnacol 2166 is approximately 1 gallon per 200 to 250 square feet (3.7 L per 18.5 to 23.2 square meters). Coverage rate will vary depending on temperature, humidity, and surface conditions. Place membrane into the adhesive immediately. Do not apply any adhesive to the membrane seam area. Clean adhesive in the seam while it is still wet, using clean rags and Sarnasolv; DO NOT USE WATER. Do not let the adhesive set up or cure before the membrane is installed. Using a weighted foam covered roller, ensure there is full contact with the adhesive.

At time of use open and pour cans into adhesive cart. Only use enough adhesive to cover membrane already laid out. Seal any partially used can.

Adjust adhesive cart to apply outside bead 3 inches from the outside edge of the board.

Begin applying adhesive to the substrate. Pace adhesive cart speed to apply a 1/8 to 3/16 inch (3 to 5 mm) bead. Exercise caution when working on any roof. Avoid walking backwards when applying this product. Adhesive may be applied by hand directly from the can for small roofs or in areas that are not accessible by the adhesive cart.

The membrane shall be carefully unrolled into adhesive as soon as adhesive beads have been applied to the substrate. Overlap edges 3 inches (76 mm). Firmly press the membrane into adhesive layer with a water-filled, foam-covered lawn roller by frequent rolling in two directions. Bonding times may be longer in dry or lower temperature conditions.

Notes:

- a) Sarnacol 2166 shall not be used if temperatures below 40 degree F (5 degree C) are expected during application or subsequent drying time.
- b) Store between 50 degree F (10 degree C) and 80 degree F (27 degree C) in a dry area out of direct sunlight.
- c) Cans must not be opened until time of use.
- d) Exposure to moisture will cure the adhesive.
- e) No adhesive shall be applied in seam areas. All membrane shall be applied in the same manner.
- f) Sarnacol 2166 shall not be used on vertical surfaces or sloped surfaces greater than a 2 inch (50 mm) rise per 1 horizontal foot (0.3 m).
- g) Adhesive shall not be used during inclement weather.
- h) Adhesive shall not be applied to wet surfaces.
- i) Adhesive will be thicker and pour more slowly in colder temperatures.

HOT-AIR WELDING OF SEAM OVERLAPS

G. General

All seams shall be hot-air welded. Seam overlaps should be 3 inches (76 mm) wide when automatic machine-welding and 4 inches (100 mm) wide when hand-welding, except for certain details.

Welding equipment shall be provided by or approved by Sika Sarnafil. All mechanics intending to use the equipment shall have successfully completed a training course provided by a Sika Sarnafil Technical Service Representative prior to welding.

All membrane to be welded shall be clean and dry.

Hand-Welding

Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding.

The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding.

The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow", the hand roller is positioned perpendicular to the nozzle and rolled lightly. For straight seams, the 1-1/2 inch (40 mm) wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch (20 mm) wide nozzle shall be used.

Machine Welding

Machine welded seams are achieved by the use of Sika Sarnafil's automatic welding equipment. When using this equipment, Sika Sarnafil's instructions shall be followed and local codes for electric supply, grounding and over current protection observed. Dedicated circuit house power or a dedicated portable generator is recommended. No other equipment shall be operated simultaneously off the generator.

Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

Quality Control of Welded Seams

The Applicator shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark gray material from the underside of the top membrane. On-site evaluation of welded seams shall be made daily by the Applicator at locations as directed by the Owner's Representative or Sika Sarnafil's representative. One inch (25 mm) wide cross-section samples of welded seams shall be taken at least three times a day. Correct welds display failure from shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the Applicator at no extra cost to the Owner.

MEMBRANE FLASHINGS

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Approval shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing, the affected area shall be removed and replaced at the Applicator's expense. Flashing shall be adhered to compatible, dry, smooth, and solvent-resistant surfaces. Use caution to ensure adhesive fumes are not drawn into the building.

H. Sarnacol Adhesive for Membrane Flashings

Over the properly installed and prepared flashing substrate, Sarnacol adhesive shall be applied according to instructions found on the Product Data Sheet. The Sarnacol adhesive shall be applied in smooth, even coats with no gaps, globs or similar inconsistencies. Only an area which can be completely covered in the same day's operations shall be flashed. The bonded sheet shall be pressed firmly in place with a hand roller.

No adhesive shall be applied in seam areas that are to be welded. All panels of membrane shall be applied in the same manner, overlapping the edges of the panels as required by welding techniques.

Install Sarnastop/Sarnabar/Sarnacord according to the Detail Drawings with approved fasteners into the structural deck at the base of parapets, walls and curbs. Sarnastop is required by Sika Sarnafil at the base of all tapered edge strips and at transitions, peaks, and valleys according to Sika Sarnafil's details.

Sika Sarnafil's requirements and recommendations and the specifications shall be followed. All material submittals shall have been accepted by Sika Sarnafil prior to installation.

All flashings shall extend a minimum of 8 inches (0.2 m) above roofing level unless otherwise accepted in writing by the Owner's Representative and Sika Sarnafil Technical Department.

All flashing membranes shall be consistently adhered to substrates. All interior and exterior corners and miters shall be cut and hot-air welded into place. No bitumen shall be in contact with the flashing membrane.

All flashing membranes shall be mechanically fastened along the counter-flashed top edge with Sarnastop at 6 to 8 inches (0.15 to 0.20 m) on center.

Sarnafil flashings shall be terminated according to Sika Sarnafil recommended details.

All flashings that exceed 30 inches (0.75 m) in height shall receive additional securement. Consult Sika Sarnafil Technical Department for securement methods.

METAL FLASHINGS

I. Metal details, fabrication practices and installation methods shall conform to the applicable requirements of the following:

Factory Mutual Loss Prevention Data Sheet 1-49 (latest issue).

Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - latest issue.

Metal, other than that provided by Sika Sarnafil, is not covered under the Sika Sarnafil warranty.

Complete all metal work in conjunction with roofing and flashings so that a watertight condition exists daily.

Metal shall be installed to provide adequate resistance to bending to allow for normal thermal expansion and contraction.

Metal joints shall be watertight.

Metal flashings shall be securely fastened into solid wood blocking. Fasteners shall penetrate the wood nailer a minimum of 1 inch (25 mm).

Airtight and continuous metal hook strips are required behind metal fascias. Hook strips are to be fastened 12 inches (0.3 m) on center into the wood nailer or masonry wall.

Counter flashings shall overlap base flashings at least 4 inches (100 mm).

Hook strips shall extend past wood nailers over wall surfaces by 1-1/2 inch (38 mm) minimum and shall be securely sealed from air entry.

SARNAFLAD METAL BASE FLASHINGS/EDGE METAL

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

J. Sarnaclad metal flashings shall be formed and installed per the Detail Drawings.

All metal flashings shall be fastened into solid wood nailers with two rows of post galvanized flat head annular ring nails, 4 inches (100 mm) on center staggered. Fasteners shall penetrate the nailer a minimum of 1 inch (25 mm).

Metal shall be installed to provide adequate resistance to bending and allow for normal thermal expansion and contraction.

K. Adjacent sheets of Sarnaclad shall be spaced 1/4 inch (6 mm) apart. The joint shall be covered with 2 inch (50 mm) wide aluminum tape. A 4 inch minimum (100 mm) wide strip of Sarnafil flashing membrane shall be hot-air welded over the joint. Exercise caution at perimeter of roof.

EDGE METAL

All flashings shall be installed concurrently with the roof membrane as the job progresses. No temporary flashings shall be allowed without the prior written approval of the Owner's Representative and Sika Sarnafil. Acceptance shall only be for specific locations on specific dates. If any water is allowed to enter under the newly completed roofing due to incomplete flashings, the affected area shall be removed and replaced at the Applicator's expense.

A. Edge Grip

1. Position the roof membrane over edge of roof and down outside face of wall covering wood nailer(s) completely. Allow 1/2 inch (13 mm) of excess membrane to extend down past the wood nailer. Hot-air weld all seams making sure there are no voids in welds.
2. Apply a 3/8 inch (10 mm) continuous bead of Sikaflex – 1a sealant to the clean bottom of formed retainer. Install formed retainer from right to left as seen from rooftop. Overlap joints of straight run sections a minimum of 1 inch (25 mm) and corner sections a minimum of 5 inches (127 mm). Field cut sections as necessary.
3. Fasten formed retainer into side of nailer 12 inches (0.3 m) on center. Use fasteners provided with Edge Grip system; 1-1/2 inch (38 mm) hex head stainless steel fasteners with neoprene washers.

4. Fasteners shall provide a minimum 240 lbs. (109 kg) pull-out resistance; suitable for the substrates to which being installed.
5. Install concealed joint splice plates intersecting sections of snap-on fascia cover joints.
6. Position snap-on fascia cover so that it's top engages the formed retainer top. Rotate downward engaging bottoms of snap-on fascia cover and formed retainer. Allow 1/4 inch (6 mm) gap between snap-on fascia sections for thermal expansion. Field cut where necessary.

B. Edge Grip Extruded

1. Position the roof membrane over edge of roof and down outside face of wall covering wood nailer(s) completely. Allow 1/2 inch (13 mm) of excess membrane to extend down past the wood nailer. Hot-air weld all seams making sure there are no voids in welds.
2. Apply a 3/8 inch (10 mm) continuous bead of Sikaflex – 1a sealant to the clean bottom of heavy-duty extruded retainer. Install extruded retainer from right to left as seen from rooftop. Field cut sections as necessary.
3. Install retainer splice under intersecting sections of extruded retainer.
4. Fasten extruded retainer into side of nailer 12 inches (0.3 m) on center. Use fasteners provided with Edge Grip Extruded system; 1-1/2 inch (38 mm) hex head stainless steel fasteners with neoprene washers. Allow 1/8 inch (3 mm) gap between extruded retainer sections for thermal expansion [1/4 inch (6 mm) if temperature is below 40 degrees F (4 C)].
5. Fasteners shall provide a minimum 240 lbs. (109 kg) pull-out resistance; suitable for the substrates to which being installed.
6. Install concealed joint splice plates at intersecting sections of snap-on fascia cover joints.
7. Position snap-on fascia cover so that it's top engages the extruded retainer top. Rotate downward engaging bottoms of snap-on fascia cover and extruded retainer base plate. Allow 1/4 inch (6 mm) gap between snap-on fascia sections for thermal expansion. Field cut where necessary.

WALKWAY INSTALLATION

Sarnatred Walkway

Roofing membrane to receive Sarnatred Walkway shall be clean and dry. Place chalk lines on deck sheet to indicate location of Walkway. Apply a continuous coat of Sarnacol 2170 or 2170 VC adhesive to the deck sheet and the back of Walkway in accordance with Sika Sarnafil's technical requirements and press Walkway into place

with a water-filled, foam-covered lawn roller. Clean the deck membrane in areas to be welded. Hot-air weld the entire perimeter of the Walkway to the Sarnafil deck sheet. Check all welds with a rounded screwdriver. Re-weld any inconsistencies. **Important:** Check all existing deck membrane seams that are to be covered by Walkway with rounded screwdriver and reweld any inconsistencies before Walkway installation. Do not run Walkway over Sarnabars.

PERIMETER WARNING TAPE

Areas of membrane where tape is to be applied must be cleaned to a “like new” condition. Failure to properly clean the membrane will result in less than satisfactory adhesion. The membrane should be cleaned as follows:

- 1) New membrane: Remove loose dirt and dust by wiping clean with water. For areas where dirt is embedded, scrub the application area with a commercial cleaner such as Simple Green, 409 or other similar all purpose cleaner using a Scotch Brite scrubbing pad or similar product. Wash away residual cleaning material with clean water.
- 2) Weathered membrane: For older membranes or areas where there is excessive dirt buildup, use the above cleaning procedure followed by cleaning with a natural fiber rag wet with MEK, and wipe away all residual cleaning solution and remaining dirt until membrane has a “like new” appearance.

After surface is clean and dry, apply tape to surface taking care to avoid trapping air and creating blisters as tape is smoothed over with hand pressure. If a chalk line is used be sure to keep chalk dust clear of application area.

Do not apply Perimeter Warning Tape to surfaces where the temperature is below 40 degrees Fahrenheit.

Perimeter Warning Tape may be slippery when wet.

TEMPORARY CUT-OFF

All flashings shall be installed concurrently with the roof membrane in order to maintain a watertight condition as the work progresses. All temporary waterstops shall be constructed to provide a 100 percent watertight seal. The stagger of the insulation joints shall be made even by installing partial panels of insulation. The new membrane shall be carried into the waterstop. Waterstop shall be sealed to the deck or substrate so that water will not be allowed to travel under the new or existing roofing. The edge of the membrane shall be sealed in a continuous heavy application of sealant as described in Section 0. When work resumes, the contaminated membrane shall be cut out. All sealant, contaminated membrane, insulation fillers, etc. shall be removed from the work area and properly disposed of off site. None of these materials shall be used in the new work.

If inclement weather occurs while a temporary waterstop is in place, the Applicator shall provide the labor necessary to monitor the situation to maintain a watertight condition.

If any water is allowed to enter under the newly-completed roofing, the affected area shall be removed and replaced at the Applicator's expense.

COMPLETION

Prior to demobilization from the site, the work shall be reviewed by the Owner's Representative and the Applicator. All defects noted and non-compliances with the Specifications or the recommendations of Sika Sarnafil shall be itemized in a punch list. These items must be corrected immediately by the Applicator to the satisfaction of the Owner's Representative and Sika Sarnafil prior to demobilization.

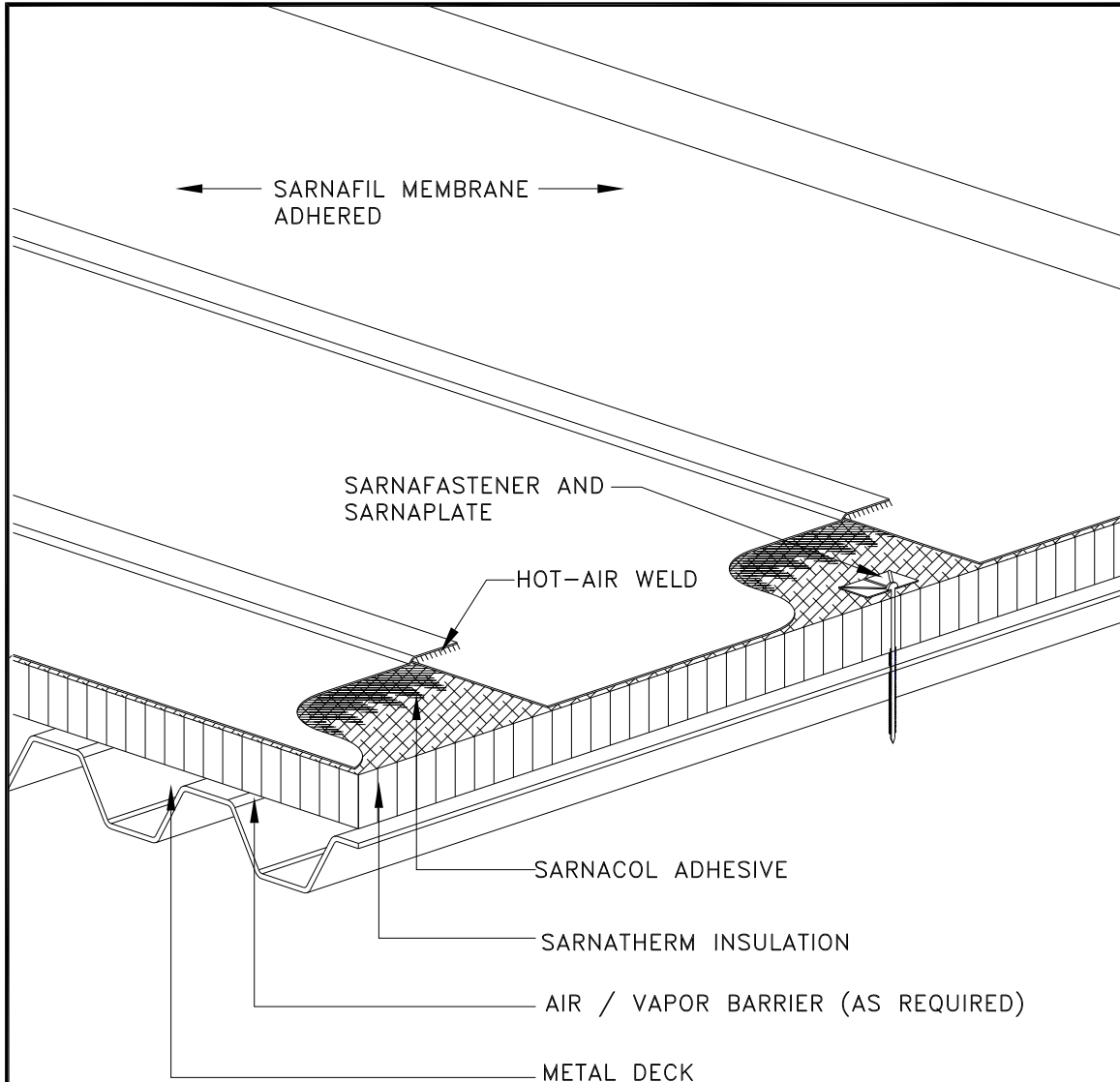
All Warranties referenced in this Specification shall have been submitted and have been accepted at time of contract award.

DETAILS

See accompanying Sika Sarnafil detail drawings. Refer to the Sika Sarnafil Typical System Details section for additional details.



G410 ADHERED DETAIL DRAWINGS

DRAWING		FILE NAME
AD-ISO	Adhered System Isometric	AD-ISO



NOTE: VAPOR BARRIER SHALL BE SEALED AT EDGES

ADHERED SYSTEM

  <p>781-828-5400 sikacorp.com</p>	JOB NAME:			
	SCALE: N.T.S.	DATE: 4/10	FILE NO.: AD-ISO	DRW. NO.:
<small>AS A MEMBRANE MANUFACTURER, SIKA SARNAFIL, A DIVISION OF SIKA CORPORATION REVIEWS DETAILS PREPARED BY THE CONSULTANT, ARCHITECT AND/OR ENGINEER FOR A PROJECT SOLELY FOR THE PURPOSE OF DETERMINING IF A SIKA SARNAFIL WARRANTY MAY ISSUE FOR THE PROJECT. THIS REVIEW IS NOT TO BE CONSTRUED AS APPROVAL OF DETAILS BY SIKA SARNAFIL AND IS NOT BEING CONDUCTED IN LIEU OF SOUND ENGINEERING AND ARCHITECTURAL PRACTICES AND JUDGMENT AND SHOULD NOT BE RELIED UPON FOR THAT PURPOSE. SIKA CORPORATION ASSUMES NO LIABILITY WITH RESPECT TO THE DESIGN OF THE ROOFING OR WATERPROOFING SYSTEM. THE ARCHITECT, CONSULTANT AND/OR ENGINEER OR DESIGN PROFESSIONAL FOR A PARTICULAR PROJECT BEARS THE SOLE RESPONSIBILITY FOR THE DESIGN OF THE ROOFING OR WATERPROOFING SYSTEM, FOR THE PREPARATION AND APPROVAL OF THE DETAILS AND SHOP DRAWINGS, AND FOR DETERMINING THEIR SUITABILITY FOR A PARTICULAR PROJECT OR APPLICATION. WHILE SIKA SARNAFIL PROVIDES GENERAL INSTRUCTIONS FOR THE INSTALLATION OF ITS MEMBRANE AS WELL AS TRAINING FOR SIKA SARNAFIL AUTHORIZED APPLICATORS, THE MEANS AND METHODS USED BY THE CONTRACTOR FOR SURFACE PREPARATION AS WELL AS THE MEANS AND METHODS EMPLOYED BY THE CONTRACTOR IN THE INSTALLATION OF THE SIKA SARNAFIL MEMBRANE ARE THE RESPONSIBILITY OF THE CONTRACTOR.</small>				

END OF SECTION 075423

07 92 43 Silicone Building Sealant

SECTION 079243 – SILICONE BUILDING SEALANT

Dow Corning® 795 SILICONE BUILDING SEALANT

***** This product guide can be used to specify Dow Corning® 795 Silicone Building Sealant, a one-component, neutral-cure, RTV (room temperature vulcanizing) silicone rubber sealant for structural and non-structural glazing, structural attachment for panel systems, and above-grade weathersealing joints with most common construction materials for both new and remedial construction. This narrow scope product specification can be inserted into SECTION 08 88 10 - STRUCTURAL SILICONE GLAZING; SECTION 07 92 00 - JOINT SEALANTS; or SECTION 07 01 91 - JOINT SEALANT RENOVATION. The various paragraphs will need to be inserted in the appropriate locations in Part 1, 2, or 3 of those sections. It can also be used as a separate limited section focused specifically on application of Dow Corning® 795 Silicone Building Sealant. *****

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes one-component, neutral-cure, RTV (room temperature vulcanizing) silicone rubber sealant for:
 - 1. Above-grade weathersealing joints with most common construction materials for both new and remedial construction.
- B. Related sections:
 - 1. Section 08 40 00 - Entrances, Storefronts, and Curtain Walls
 - 2. Section 08 80 00 - Glazing:

1.2 REFERENCES

- A. American Society of Civil Engineers (ASCE): ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- B. American Society for Testing and Materials (ASTM):
 - 1. ASTM C639 - Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants.

2. ASTM C719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
3. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants.
4. ASTM C920 - Elastomeric Joint Sealants.
5. ASTM C1135 - Standard Test Method for Determining Tensile Adhesion Properties of Structural Sealants.
6. ASTM C1193 - Standard Guide for Use of Joint Sealants.
7. ASTM C1248 - Standard Test Method for Staining Porous Substrate by Joint Sealants.
8. ASTM C1330 - Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
9. ASTM D2240 - Rubber Property Durometer Hardness.
10. ASTM E330 - Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
11. ASTM C1184 – Standard Specification for Structural Silicone Sealants
12. ASTM C1401 – Guide for Structural Sealant Glazing

C. Government Services Administration (GSA), Commercial Item Descriptions (CID):

1. GSA CID A-A-272A - Sealing Compound: Silicone Rubber Base (For Caulking, Sealing, and Glazing in Buildings and Other Structures).
2. GSA CID A-A-1556 -Sealing Compound Elastomeric Type, Single Component (For Caulking, Sealing, and Glazing in Buildings and Other Structures).

1.3 DEFINITIONS

- A. Structural bite: Minimum width or contact surface of structural silicone sealant on both glass panel and support frame. (ASTM C1401)
- B. Glueline thickness: Width of installed structural silicone sealant. (ASTM C1401)

1.4 PERFORMANCE CRITERIA

- A. Installed structural silicone glazing shall withstand these loads without breakage, loss, failure of seals, product deterioration, and other defects.
 - 1. Dead and live loads: Determined by ASCE 7 and calculated in accordance with applicable codes.
 - 2. Effects of applicable windload acting inward and outward normal to plane of wall in accordance with ASTM E330.
 - 3. Thermal loads and movement from ambient temperature range of 120 degrees F
 - 4. Movement and deflection of structural support framing.
 - 5. Seismic loads: System shall be designed and installed to comply with applicable seismic requirements for Project location and Seismic Zone defined by ICC/IBC.

- B. Provide and install exterior sealants and other glazing accessories to resist water and air penetration.

1.5 SUBMITTALS

- A. Provide in accordance with Section 01 33 00 - Submittal Procedures:
 - 1. Product data for silicone sealant, primer, joint backing, and other accessories. Include material safety data sheets (MSDSs) and certifications showing compliance with specified standards.
 - 2. Shop drawings detailing sealant joints and indicating dimensions, materials, structural bite, glueline thickness, joint profile, and support framing.
 - 3. Manufacturer's instructions for installation and field quality control testing.
 - 4. Copy of warranties specified in Paragraph 1.8 for review by Architect.

1.6 PRODUCT HANDLING

- A. Deliver products in manufacturer's original containers clearly labeled with product identification, date of manufacture, and shelf life.
- B. Store materials in clean, dry area at temperatures below [86 degrees F.] [30 degrees C.]
- C. Do not use sealants and primers after manufacturer's stated shelf life.

1.7 PROJECT CONDITIONS

- A. Do not install silicone sealants during inclement weather, strong winds, or when such conditions are expected. Allow wet surfaces must be dry and frost free.
- B. Optimum sealant application temperature: Between [50 and 90 degrees F.] [10 and 32 degrees C.]
- C. Do not install sealants when temperature is:
 - 1. [5 degrees F] [3 degrees C] below dew point.
 - 2. Above [122 degrees F.] [50 degrees C.]

1.8 WARRANTY

- A. Provide under provisions of Section 01 78 00 - Closeout Submittals:
 - 1. Installer's [5] -year workmanship warranty.
 - 2. Manufacturer's 20-year material warranty for properly installed silicone sealant.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Dow Corning Corporation, P.O. Box 994, Midland, MI 48686-0994; (800) 248-2481;
www.dowcorning.com/construction.
- B. Requests to use equivalent products of other manufacturers shall be submitted in accordance with Section 01 63 00 - Product Substitution Procedures.

2.2 SEALANT

- A. Type: One-component, neutral-cure, RTV (room temperature vulcanizing) silicone rubber sealant for structural and non-structural glazing, structural attachment of panel systems, and above-grade weathersealing joints with most common construction materials; *Dow Corning*® 795 Silicone Building Sealant, as manufactured by Dow Corning Corporation.
- B. Compliance: Sealant shall meet or exceed requirements of these standards.
 - 1. ASTM C920, Type S, Grade NS, Class 50, Use NT, G, A, and O.

2. ASTM C1184, Type S, Use G, A, and O.
 3. GSA CID A-A-272A - Sealing Compound: Silicone Rubber Base (For Caulking, Sealing, and Glazing in Buildings and Other Structures).
 4. GSA CID A-A-1556 -Sealing Compound Elastomeric Type, Single Component (For Caulking, Sealing, and Glazing in Buildings and Other Structures).
-
- C. Color: [White]
 - D. Shelf life: 12 months.
 - E. Tack-free time: 3 hours.
 - F. Working time: 20 to 30 minutes.
 - G. Curing time: 7 to 14 days.
 - H. Full adhesion time: 14 to 21 days.
 - I. Flow, sag, or slump: [0.1 inch] [2.5 mm], tested in accordance with ASTM C639.
 - J. Volatile organic compound (VOC) content: 28 grams/liter.
 - K. Cured sealant properties after 21 days at [77 degrees F] [25 degrees C] and 50 percent relative humidity.
 1. Joint movement capability: Plus and minus 50 percent, tested in accordance with ASTM C719.
 2. Hardness: 35-durometer hardness, Shore A, tested in accordance with ASTM D2240.
 3. Maximum peel strength: [32 ppi] [5.7 kg/cm], tested in accordance with ASTM C794.
 4. Tensile adhesion modulus, tested in accordance with ASTM C1135:
 - a. At 25 percent extension: [45 psi.] [0.31 MPa.]
 - b. At 50 percent extension: [60 psi.] [0.414 MPa.]
 5. Staining: None on concrete, marble, granite, limestone, and brick, when tested in accordance with ASTM C1248.
 6. Service temperature range: [Minus 40 to plus 300 degrees F] [Minus 40 to plus 149 degrees C].
 7. Weathering after 10,000 hours, tested in accordance with ASTM C1135 using QUV Weatherometer:
 - a. At 25 percent extension: [35 psi.] [0.24 MPa.]

- b. At 50 percent extension: [50 psi.] [0.35 MPa.]

2.3 ACCESSORIES

- A. Substrate primer: As recommended for project conditions and provided by silicone sealant manufacturer.
- B. Sealant backing: Provide backing complying with ASTM C1330 [Type B non-absorbent, bi-cellular material with surface skin.] [Type O open-cell polyurethane.] [as recommended by sealant manufacturer.]
 - 1. Size: Greater than joint opening by 25 percent minimum.
- C. Bond breaker tape: Provide tape to prevent adhesion to joint fillers or joint surfaces at back of joint and allow sealant movement.
 - 1. Type: Polyethylene or other plastic tape recommended by sealant manufacturer.
- D. Glazing setting blocks and spacers: Compatible with silicone sealant and recommended by sealant manufacturer.
 - 1. Acceptable materials: Silicone, Alcryn, polyurethane foam type, and vinyl extrusions.
 - 2. EPDM, neoprene, Santoprene, Krayton, and other similar organic materials are not acceptable.
 - 3. Prior to installation, setting blocks and spacers shall be tested for compatibility.
- E. Masking tape: Non-staining, non-absorbent type compatible with silicone sealant and adjacent surfaces.

PART 3 - EXECUTION

3.1 GENERAL

- A. Prepare substrates and apply silicone sealant in accordance with manufacturer's instructions and reviewed shop drawings.

- B. Use silicone sealant only in applications recommended by manufacturer. Do not use sealant for:
 - 1. Below-grade applications.
 - 2. Surfaces to be immersed in water for prolonged time.
 - 3. Materials bleeding oils, plasticizers, and solvents.
 - 4. Surfaces to be painted.
 - 5. Surfaces in direct contact with food.
 - 6. Medical and pharmaceutical applications.

- C. Do not apply in totally confined spaces without ventilation for curing.

3.2 PREPARATION

- A. Inspect [new substrates to receive silicone sealant.]
 - 1. Ensure surfaces are clean, dry, and free of frost, dust, dirt, grease, oil, curing compounds, form release agents, laitance, efflorescence, mildew, and previous films and coatings.
 - 2. Metal framing surfaces to receive glazing are flat and smooth without slots, serrations, and other irregularities.
 - 3. Verify aluminum framing has alodine, anodized, fluorocarbon paint, polyester powder coat finish, or other acceptable finish or material. Mill-finish aluminum is not an acceptable substrate for structural silicone sealant.

- B. Remove existing joint sealant materials. Clean joints and remove joint sealant residue. Repair deteriorated or damaged substrates as recommended by silicone sealant manufacturer to provide suitable substrate. Allow patching materials to cure.

- C. Clean substrates to receive silicone sealant.
 - 1. Porous surfaces: Abrasive-clean followed by blasting with oil-free compressed air.
 - 2. Nonporous surfaces: Use two-cloth solvent wipe in accordance with ASTM C1193.

- D. Adhesion test: Apply silicone sealant to small area and perform adhesion test in accordance with ASTM C1193, Method A, to determine if primer is required to achieve adequate adhesion. If necessary, apply primer at rate and in accordance with manufacturer's instructions.
- E. Masking: Apply masking tape as required to protect adjacent surfaces and to ensure straight bead line and facilitate cleaning.

3.3 APPLICATION

- A. Spacers and setting blocks: Install as indicated on drawings and reviewed shop drawings. Ensure joint openings and recesses are accurately sized.
- B. Sealant backing: Install without gaps, twisting, stretching, or puncturing backing material. Use gage to ensure uniform depth to achieve correct profile, coverage, and performance.
- C. Bond breaker: Install on backside of joint where backing is not feasible.

3.4 FIELD QUALITY CONTROL

- A. Perform adhesion tests in accordance with manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant Joint Hand-Pull Tab.
 - 1. Perform [5] [] tests for first [1,000 linear feet] [300 meters] of applied silicone sealant and [1] [] test for each [1,000 feet] [300 meters] sealant thereafter or perform 1 test per floor per building elevation minimum.
 - 2. For sealants applied between dissimilar materials, test both sides of joint.
- B. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
- C. Follow all requirements and maintain test log for structural/weatherseal applications and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

END OF SECTION

079243

Division 08 - Openings

08 11 16 Aluminum Exterior Door

SECTION 081116 - Aluminum Exterior Door

PART 1 - GENERAL

SCHEDULE 0 - SECTION INCLUDES

PRODUCT DATA SHEET 0 - Swing Doors: Impact-resistant aluminum swing doors, frames, including aluminum extrusions, finish, glass, door hardware, water-barrier thresholds, and weather strips, for high velocity hurricane zone (HVHZ) construction. (Estate, Sentinel)

SCHEDULE 1 - RELATED SECTIONS

PRODUCT DATA SHEET 0 - Section 06100 - Rough Carpentry: Wood blocking and fasteners to structure.

PRODUCT DATA SHEET 1 - Section 07920 - Joint Sealants: Exterior and interior sealants at window perimeters.

PRODUCT DATA SHEET 2 - Section 08800 - Glass and Glazing: Additional glazing requirements.

SCHEDULE 2 - REFERENCES

PRODUCT DATA SHEET 0 - American Architectural Manufacturers Association:
1.01 AAMA 701/702: Pile weatherstripping and replaceable weatherseals.
1.02 AAMA 2603: Organic coatings on aluminum.
1.03 AAMA 2605: High-performance organic coatings on aluminum.

PRODUCT DATA SHEET 1 - American Society of Civil Engineers
1.01 ASCE 7: Minimum Design Loads for Buildings and other Structures.

PRODUCT DATA SHEET 2 - American Society for Testing and Materials:
1.01 ASTM B 221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
1.02 ASTM E 283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
1.03 ASTM E 330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
1.04 ASTM E 331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

PRODUCT DATA SHEET 3 - Florida Building Code - Building, 2004 (FBC):
1.01 Sections governing construction in a high-velocity wind zone (HVWZ).
A. FBC 1620: HVWZ Wind Loads (Structural).
B. FBC 2410: HVWZ General (Glass and Glazing).
C. FBC 2411: HVWZ Windows, Doors, Glass and Glazing.
1.02 Miami Dade County Test Application Standards (TAS) adopted by FBC:
A. TAS 201-95.1: Impact Test Procedures.
B. TAS 202-95.1: Criteria for Testing Impact Resistant Building Envelope Components (Uniform Static Air Pressure Method).
C. TAS 203-95.1: Criteria for Testing Products Subject to Cyclic Wind Pressure

Loading.

SCHEDULE 3 - PERFORMANCE REQUIREMENTS

- PRODUCT DATA SHEET 0 - Impact-Resistant Aluminum Window and Door Performance:
- 1.01 Structural Test: ASTM E 330.
 - 1.02 Water Infiltration Resistance: ASTM ES47/E 331 and FBC TAS 202.
 - 1.03 Air Infiltration Resistance: ASTM E 283.
 - 1.04 Windborne Debris Impact Resistance: Pass large missile impact tests; Florida Building Code, FBC TAS 201.
 - 1.05 Hurricane Wind Pressure Resistance: After passing large missile impact test, pass cyclic pressure tests following FBC TAS 203.

SCHEDULE 4 - SUBMITTALS

- PRODUCT DATA SHEET 0 - Shop Drawings: Refer to Section 01300 for complete submittal procedures. Indicate elevations, locations, markings, quantities, material, head jamb and sill conditions, metal thickness, sizes, shapes, dimensions, finishes and wind pressures.
- PRODUCT DATA SHEET 1 - Product Data: Provide detailed data on Manufacturers catalog data on each product to be used, including Miami Dade County Product Approval (NOA) and Florida Building Code (FBC) HVHZ Product Approval.
- PRODUCT DATA SHEET 2 - Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

SCHEDULE 5 - QUALITY ASSURANCE

- PRODUCT DATA SHEET 0 - Manufacturer Qualifications: Not less than 10 years of experience in manufacturing impact-resistant aluminum windows and doors.
- PRODUCT DATA SHEET 1 - Installer Qualifications: Skilled and experienced to install manufacturer's units of the types specified.

SCHEDULE 6 - DELIVERY, STORAGE, AND HANDLING

- PRODUCT DATA SHEET 0 - Store products in manufacturer's unopened packaging in a clean, dry area until ready for installation.
- PRODUCT DATA SHEET 1 - Protect exposed metal and glass surfaces to prevent damage to finish.

SCHEDULE 7 - WARRANTIES

- PRODUCT DATA SHEET 0 - Warranty Period: Contact CGI Windows and Doors, Inc. for details on 10 year limited warranty.
- 1.01 Structural, Hardware and Certain Finishes: 10 years.
 - 1.02 Stress Cracks on Glass: 1 year.
 - 1.03 Delamination on Laminated Glass Units: 5 years.
 - 1.04 Insulated Glass (sealed component): 10 years.

PART 2 - PRODUCTS

SCHEDULE 0 - MANUFACTURERS

- PRODUCT DATA SHEET 0 - Acceptable Manufacturer: CGI Windows and Doors, Inc. , which is

located at: 10100 N. W. 25th St. ; Miami, FL 33172; Toll Free Tel: 800-442-9042 ; Tel: 305-593-6590; Email: [request info \(lquist@cgiwindows.com\)](mailto:request info (lquist@cgiwindows.com)) ; Web: www.cgiwindows.com

PRODUCT DATA SHEET 1 - Requests for substitutions will be considered in accordance with provisions of Section 01600.

SCHEDULE 1 - SWING DOORS (ESTATE)

PRODUCT DATA SHEET 0 - Swing Doors: "Sentinel" Series 450 Doors, Sidelites and Transoms by CGI Windows and Doors, Inc.

PRODUCT DATA SHEET 1 - Swing Door Design:

- 2.01 Swing Direction: Out-swing configuration.
- 2.02 Door Panels: 2 inches (51 mm) thick (nominal) door panels.
- 2.03 Complete frame, threshold and weatherstripping.
- 2.04 Extruded snap-on glazing beads.
- 2.05 Extruded astragal adaptor.
- 2.06 Door Features:
 - A. Configuration: Out-swing configuration.
 - B. Glazing Beads: Square glazing bead profile (contemporary).
- 2.07 Size: Refer to Drawings.

PRODUCT DATA SHEET 2 - Performance Requirements:

- 2.01 Outswing Door, Transoms and Sidelites: 100 psf Positive and Negative (110 Negative with heat strengthened glass).
- 2.02 Inswing Door (no water infiltration resistance required): 100 psf Positive and Negative (110 Negative with heat strengthened glass).
- 2.03 Inswing Door: 50 psf Positive and 100 psf Negative (110 Negative with heat strengthened glass) where water infiltration resistance is required.

PRODUCT DATA SHEET 3 - Air Infiltration Resistance:

- 2.01 Outswing Door: Transoms and Sidelites: no more than 0.07 cfm/sqft of glass area at static air pressure difference of 6.24 psf.
- 2.02 Inswing Door: Air leakage no more than 0.04 cfm/sqft of glass area, at a static air pressure difference of 1.57 psf.

PRODUCT DATA SHEET 4 - Water Infiltration Resistance:

- 2.01 Outswing Doors, Transoms and Sidelites: Water Infiltration Resistance: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 15 psf.
- 2.02 Inswing Doors: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 7.5 psf.

PRODUCT DATA SHEET 5 - Construction: Heavyweight extruded aluminum sections for wet glazing, precision cut and assembled with sealant filled hairline joints and no visible screws. Provide grooves in extrusions to receive 3 lines of weather stripping where doors abut frames.

- 2.01 Member Wall Thickness: 0.125 inch (3.2 mm) minimum; 0.150 inch (3.8 mm) at hardware mounting locations.
- 2.02 Member Sizes (widths including glazing beads):
 - A. Top Rail and Stiles: 1.918 inches (48.7 mm) thick by 5.5 inches (157 mm).
 - B. Bottom Rails: 1.918 inches (48.7 mm) thick by 8 inches (203 mm).
- 2.03 Sightlines:
 - A. Top Rails: 6.25 inches (15.88 cm).

- B. Jambs: 6.75 inches (17.146 cm).
- C. Sills: 8 inches (20.32 cm).
- 2.04 Door Corner Construction: Assemble using two 3/8 inch (8.9 mm) threaded compression rods in rails, secured at each end with washers and hex nuts.
- 2.05 Glazing Beads: Snap-in design, for interior wet glazing, 0.060 inch (1.5 mm) wall thickness, with at least 0.50 inch (12.7 mm) glass bite for impact-resistant glazing.
- 2.06 Finishes: Uniform at all visible surfaces exterior and interior.
- 2.07 Residential Hardware: Including concealed three point locking mechanism with integrated key lock cylinder and thumbturn (single action/one step locking).
- 2.08 Hinges: Hager - Standard weight, three knuckle with concealed anti-friction nylatron bearing, 134 metal leaves with .312 concealed metal pin and plug.
 - A. Metal Type: Stainless steel.
- 2.09 Commercial Hardware: Including concealed three point locking mechanism with integrated key lock cylinder and thumbturn (single action/one step locking).
- 2.10 Sidelite and Transom Panels:
 - A. Product: Series 450 Sidelite, Transom Panels, and Mullions, by CGI.
 - B. Design and Performance: Sidelite and transom panels shall interlock with each other and with any CGI approved vertical aluminum tube mullions, at all points of interface, to form a structural unit at each opening. Compliance with impact, wind, water, and structural deflection requirements.
 - C. For assemblies with an overall height of less than 108.75 inches utilize self-mating sidelites. For assemblies with an overall height of 108.75 inches or greater, provide structural mullions between sidelites and sidelites, and between sidelites and doors.
- 2.11 Factory Glazing:
 - A. Insulated Laminated Impact Resistant Glass Units: 1 inch (25.4 mm) thick (nominal) consisting of a sacrificial exterior lite and a clear, non-yellowing, non-crazing interlayer sandwiched between two panes of glass.
 - 1. Exterior Sacrificial Lites/Panes:
 - a. Tint in Outer Panes: None, clear.
 - 2. Airspaces: 5/16 inch (8 mm) minimum air space.
 - 3. Laminated Units:
 - a. Consisting of clear, non-yellowing, non-crazing interlayer sandwiched between two panes of glass.
 - b. Tint: Low E.

PRODUCT DATA SHEET 6 - Standards:

- 2.01 Miami Dade County Notices of Acceptance (NOA): 03-0422.02 and 03-0422.03.
- 2.02 Aluminum Alloy and Temper: AA 6063-T5 and T6; ASTM B 221.

PART 3 - EXECUTION

SCHEDULE 0 - PREPARATION

PRODUCT DATA SHEET 0 - Before start of unit installation, check openings for adequacy of pressure preservative treated wood blocking that will receive frames. Check the size, quantity, spacing, clearances, and rigidity of fastenings and their conformance to the specified NOA.

SCHEDULE 1 - PREPARATION

PRODUCT DATA SHEET 0 - Coordinate with Section 06100 - Wood blocking and fasteners to structure:

- 3.01 3/4 inch (19 mm) or 1-1/2 inch (38.1 mm) as per specified NOA rectangular or beveled pressure preservative treated South Yellow Pine blocking, set in a full bed of sealant.

3.02 Fasten with to structure with drilled concrete fasteners spaced as required in NOA, so that blocking is continuous and is tightly butted to fill corners of each opening.

PRODUCT DATA SHEET 1 - Coordinate with Section 07920 - Exterior and interior sealants at unit perimeters:

3.01 Sealant at exterior perimeter of aluminum frames, in deeply grooved stucco or in 1/4 inch (6 mm) gaps where other exterior finish materials terminate next to frames.

3.02 Sealant in 1/8 inch (3.2 mm) gap at frame interior perimeters where sills and interior finish materials such as gypsum board and tile terminate next to frames.

PRODUCT DATA SHEET 2 - Perform cutting, fitting, forming, drilling, and grinding of frames, without damage to finish, as needed to fit project conditions and make watertight. Replace components with damage to exposed finishes.

SCHEDULE 2 - WINDOW INSTALLATION

PRODUCT DATA SHEET 0 - Install windows following manufacturer's instructions.

PRODUCT DATA SHEET 1 - Attach window frame and shims to perimeter blocking at openings to accommodate construction tolerances and other irregularities. Maintain integrity of air barriers and vapor retarder sheets.

PRODUCT DATA SHEET 2 - Align windows plumb and level, free of warp or twist.

PRODUCT DATA SHEET 3 - Adjust vents to close snugly and put in smooth operating order.

SCHEDULE 3 - DOOR INSTALLATION

PRODUCT DATA SHEET 0 - Install doors and frames in accordance with manufacturer's instructions, requirements of NOA for hurricane and impact-resistant construction, and approved shop drawings.

PRODUCT DATA SHEET 1 - Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations, requirements of governing NOA, and within specified tolerances.

PRODUCT DATA SHEET 2 - Where aluminum surfaces contact alkaline substrates such as concrete or mortar, and metals other than stainless steel or zinc, protect from direct contact by painting reactive substrate and dissimilar metals with a heavy coating of bituminous paint in the field.

PRODUCT DATA SHEET 3 - Hang doors and adjust hardware to achieve specified clearances and proper door operation.

PRODUCT DATA SHEET 4 - Demonstrate doors and hardware are in good working order.

SCHEDULE 4 - CLEANING

PRODUCT DATA SHEET 0 - Refer to manufacturer's instructions for proper cleaning and maintenance of the products.

END OF SECTION 081116

SECTION 083513.34 - NANAWALL SL73 – THERMALLY BROKEN ALUMINUM FRAMED HURRICANE RATED FOLDING SYSTEM WITH MIAMI DADE COUNTY, FLORIDA NOA

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes: Sliding/folding aluminum and glass door system, including aluminum frame, threshold, panels, sliding/folding and locking hardware, weather stripping, glass and glazing; designed to provide an opening glass wall, with sizes and configurations as shown on drawings and specified herein, NanaWall SL73, Thermally Broken Aluminum Framed Hurricane Rated Folding System with Miami Dade County, Florida NOA by Nana Wall Systems, Inc.

1.02 REFERENCES

- A. Metro-Dade County, FL Building Code Compliance Office Protocol:
1. TAS 201, Impact Test Procedures
 2. TAS 202, Criteria for Testing Impact and Non Impact Resistant Building Envelope Components Using Uniform Static Air Pressure
 3. TAS 203, Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.
- B. American Architectural Manufacturers Association (AAMA):
1. AAMA 520, Voluntary Specification for Rating the Severe Wind-Driven Rain Resistance of Windows, Doors and Unit Skylights
 2. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum.
 3. AAMA 1304, Voluntary Specifications for Forced Entry Resistance of Side-Hinged Door Systems.
 4. AAMA 2604, Voluntary Specifications, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
 5. AAMA 2605, Voluntary Specifications, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- C. 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 331, Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
4. ASTM E 547, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.
5. ASTM E 1886, Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
6. ASTM E 1996, Standard Specifications for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Storm Shutters Impacted by Wind Borne Debris in Hurricanes.
7. ASTM E 2268, Standard Test Method for Water Penetration of Exterior Windows, Skylights, and Doors by Rapid Pulsed Air Pressure Difference
8. ASTM F 842, Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies.

D. American National Standards Institute (ANSI):

1. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used In Buildings.

E. Consumer Product Safety Commission (CPSC):

1. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials.

F. 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.
3. NFRC 400, Procedure for Determining Fenestration Product Air Leakage.

1.03 SUBMITTALS

- A. 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.
- B. Product Data: Manufacturer's literature including independently tested data listing performance criteria and Owner's Manual with installation instructions.
- C. Contract Closeout Submittal: Submit copy of the entire Miami-Dade County, FL Notice of Approval and 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 20 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.
- B. Performance Criteria: Approved with Dade County NOA and in accordance with Miami Dade County Test Protocols TAS 201 (large and small missile impact), TAS 202 (structural pressure, air infiltration, water infiltration, and forced entry), and TAS 203 (cyclic pressure).

SPECIFIER'S NOTE: Miami Dade County, Florida approval is for any number of panels with any panel size up to a maximum of 3'0" wide increments and 8'0" high. A unit with either a raised sill or low profile saddle sill (with no water rating) is approved. With panel sizes of 3' x 8', SL73 inswing with raised sill has a DP rating of +70 psf / -100 psf, SL73 outswing with raised sill and SL73 inswing/outswing with saddle sill has DP ratings of +/- 70 psf. With smaller panel sizes and using comparative analysis, higher DP ratings of up to + 80 psf / -110 psf for inswing with raised sill and +80 psf / -90 psf for outswing with raised sill and inswing/outswing with saddle sill are possible.

[OR as a supplement to Dade County NOA or in areas not subject to Dade County NOA, provide from manufacturer that has independently tested typical units with the following minimum results.

1. Air infiltration: Provide system with maximum air leakage of 0.30 cfm/sq ft when tested according to ASTM E 283 and NFRC 400 at a static air pressure difference of 1.57 psf and 6.24 psf.
2. Water Penetration under Static Pressure:
 - a. Provide system with a raised sill (inswing or outswing) that do not evidence water penetration when tested according to ASTM E 331 and ASTM E 547 at a static air pressure difference of 12 psf.
 - b. Provide system with a saddle sill with typical field installed weep holes and drainage by others (see drainage instructions from NanaWall) that do not evidence water penetration when tested according to ASTM E331 and ASTM E 547 at a static air pressure difference of 5.25 psf for an inswing unit and 6.00 psf for an outswing unit.
3. Water Penetration under Dynamic Pressure: Provide system with a raised sill that do not evidence more than allowable water entry when tested according to AAMA 520 and ASTM E 2268 at a dynamic rated air pressure difference of 6-18 psf for an inswing unit (Performance Level 2) and 5-15 psf for an outswing unit (Performance Level 1).

4. Structural Test Performance: Provide system that when tested according to ASTM E 330 at 150 % of positive and negative design pressures with panel sizes of 3' wide and 8' high achieved with an inswing unit with a raised sill DP rating of +70 psf / -100 psf and an outswing unit with a raised sill and inswing/outswing units with saddle sills DP ratings of +/- 70 psf.
5. Forced Entry Resistance: Provide system that when tested according to ASTM F 842 and AAMA 1304 there was no entry.
6. Large missile Impact and Cyclic Pressure: Provide system with panel size 3' wide and 8' high that when tested according to ASTM E 1886 and ASTM E 1996 met performance requirements with missile impacts corresponding to Missile Level D and Wind Zone 4 for + 90 psf / -110 psf DP for an inswing unit with a raised sill and +/- 90 psf DP for an outswing unit with a raised sill and inswing/outswing units with saddle sills.

SPECIFIER 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. (Comparative analysis charts for units published by manufacturer show which panel sizes (if any) would meet the structural loading design pressures specifically required for the project. Check for limitations on the use of these charts in the jurisdiction of the project). See manufacturer's latest published data.

- C. Thermal Performance U value: 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.
- D. 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.
- E. Installer Qualifications: Installer experienced in the installation of manufacturer's product or other similar products 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.
- B. Warranty Period: Ten years for rollers and for seal failure of insulated glass supplied. For all other components, one year (two years if unit is installed by manufacturer's certified trained installer) from date of delivery

🔍 PART 2 - PRODUCTS

2.01 SUPPLIER

NANA WALL SYSTEMS, INC.

707 Redwood Highway, Mill Valley, CA 94941

Toll Free: (800) 873-5673

Telephone: (415) 383-3148

Fax: (415) 383-0312

Website: www.nanawall.com

Email: info@nanawall.com

2.02 MATERIALS

A. Frame and Panels: From manufacturer's standard profiles, provide head track, side jambs, and panels with dimensions shown on drawings.

1. Provide panels with: Standard one lite
2. Provide standard bottom rail [OR manufacturer's standard kickplate with height specified].
3. 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, powder coated conforming to AAMA 2604 or fluoropolymer kynar painted conforming to AAMA 2605.
4. Thermally broken with 3/4"-15/16" (20-24 mm) polyamide plastic reinforced with glass fibers with additional insulating foam. **Pour and de-bridge thermal break will not be accepted.**
5. Aluminum Finish:

NanaWall Powder Coating Finish - RAL #9010 - Pure White

B. Glass:

1. Provide manufacturer's standard dry glazing in accordance with Dade county approval. **In order to be able to replace glass, wet glazing will not be allowed.**

1 1/8" thick Low E insulated light green tint impact

C. Locking Hardware and Handles:

1. Main entry panel:

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. 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 operates the rods at the top and the bottom for the secondary swing panel.

Stainless steel lever handles in a brushed satin finish

[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. 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 standard shaped handles on inside only for the secondary swing panel.]

Stainless steel lever handles in a brushed satin finish

[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 and one point locking at the top and bottom consisting of locking rods operated by a 180° turn of a flat handles on the inside]

Push-pull handles in a white nylon finish and stainless steel flat handles in a brushed satin 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 main entry pair of panels on models without a swing panel, provide manufacturer's standard L-shaped handles on the inside and on the outside and lock set with profile cylinder. Operation of lock set is by turn of key from the outside and with a thumbturn from the inside with a two point locking hardware operated by 180° turn of the handle.]

Stainless steel L shaped handles in a brushed satin finish

[OR on main entry panel, provide manufacturer's standard U/L shaped 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.

2. On all other secondary panels and pairs of folding panels, provide manufacturer's standard 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.** Standard handle finish:

Stainless steel standard handles in a brushed satin finish

3. Provide handle height centered at 41 3/8" [OR as specified] from bottom of panel.
4. Aluminum locking rods with standard fiber glass reinforced polyamide end caps at top and bottom. Rods to have a stroke of 15/16" (24 mm).
If there are more than one unit, keyed alike [OR keyed differently].
5. 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. Weight of panels to be borne by the bottom of the guide channel in the sill will not be allowed.**
6. Provide upper guide carriage and lower running carriage with four vertical stainless steel wheels and two horizontal polyamide wheels. The vertical wheels to ride on top of sill track and lie above the water run-off level. Carrying capacity of lower running carriage to be 220 lbs. (100 kgs). **Wheels riding below the water run-off level and/or wheels riding on aluminum will not be allowed.**

7. Threshold:

Provide thermally broken with polyamide raised sill in the same finish as panel finish

A cover plate over the sill track will not be allowed.

8. Hinges: Zinc die cast with finish closest match to finish of frame and panels [OR stainless steel hinges]. Provide stainless steel security hinge pins with set screws.
9. Adjustment: Provide folding/sliding hardware capable of specified amount of compensation and adjustments without needing to remove panels from tracks, in width, 1/16" (1.5 mm) per hinge and in height, 1/16" (2 mm) up and down.
10. Other Components:

Weather stripping: Provide manufacturer's standard double layer EPDM, Q-Ion gasket or brush seals with a two layer fiber glass reinforced 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.**

Provide tapered pins or stainless steel screws for connecting frame components.

2.03 FABRICATION

A. Use extruded aluminum frame and panel profiles, corner connectors and hinges, sliding and folding hardware, locking hardware and handles, 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.

1. 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. Inward [OR outward] opening unit. On configurations with a pair of swing panels, looking from inside, primary swing panel on the left [OR right]

2.04 ACCESSORIES (EDIT FOR PROJECT REQUIREMENTS.)

A. Provide the NanaScreen™, 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

B. Provide other side lites, transoms, corner posts, or single or double doors as per drawings provided.

▣ 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 deflection with live and dead loads is limited to 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.

B. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on the floor.

C. Installation of units constitutes acceptance of existing conditions.

3.02 INSTALLATION

- A. Install frame in accordance with Dade County NOA and 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. Accessories: Screens; install in accordance with screen manufacturer's recommendations and installation instructions.
-

END OF SECTION 083513.34

08 51 13 Aluminum Window System

PART 1 - GENERAL

SCHEDULE 0 - SECTION INCLUDES

PRODUCT DATA SHEET 0 - Aluminum Windows: Impact-resistant aluminum windows, including aluminum extrusions, finish, glass, operating hardware, screens, internal sealants and weather stripping, for high velocity hurricane zone (HVHZ) construction. (Estate, Sentinel)

PRODUCT DATA SHEET 1 - Swing Doors: Impact-resistant aluminum swing doors, frames, sidelites, transoms, and structural mullions, including aluminum extrusions, finish, glass, door hardware, water-barrier thresholds, and weather strips, for high velocity hurricane zone (HVHZ) construction. (Estate, Sentinel)

SCHEDULE 1 - RELATED SECTIONS

PRODUCT DATA SHEET 0 - Section 06100 - Rough Carpentry: Wood blocking and fasteners to structure.

PRODUCT DATA SHEET 1 - Section 07920 - Joint Sealants: Exterior and interior sealants at window perimeters.

PRODUCT DATA SHEET 2 - Section 08800 - Glass and Glazing: Additional glazing requirements.

SCHEDULE 2 - REFERENCES

PRODUCT DATA SHEET 0 - American Architectural Manufacturers Association:
1.01 AAMA 701/702: Pile weatherstripping and replaceable weatherseals.
1.02 AAMA 2603: Organic coatings on aluminum.
1.03 AAMA 2605: High-performance organic coatings on aluminum.

PRODUCT DATA SHEET 1 - American Society of Civil Engineers
1.01 ASCE 7: Minimum Design Loads for Buildings and other Structures.

PRODUCT DATA SHEET 2 - American Society for Testing and Materials:
1.01 ASTM B 221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
1.02 ASTM E 283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
1.03 ASTM E 330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
1.04 ASTM E 331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

PRODUCT DATA SHEET 3 - Florida Building Code - Building, 2004 (FBC):
1.01 Sections governing construction in a high-velocity wind zone (HVWZ).
A. FBC 1620: HVWZ Wind Loads (Structural).
B. FBC 2410: HVWZ General (Glass and Glazing).
C. FBC 2411: HVWZ Windows, Doors, Glass and Glazing.
1.02 Miami Dade County Test Application Standards (TAS) adopted by FBC:
A. TAS 201-95.1: Impact Test Procedures.

- B. TAS 202-95.1: Criteria for Testing Impact Resistant Building Envelope Components (Uniform Static Air Pressure Method).
- C. TAS 203-95.1: Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

SCHEDULE 3 - PERFORMANCE REQUIREMENTS

- PRODUCT DATA SHEET 0 - Impact-Resistant Aluminum Window and Door Performance:
- 1.01 Structural Test: ASTM E 330.
 - 1.02 Water Infiltration Resistance: ASTM ES47/E 331 and FBC TAS 202.
 - 1.03 Air Infiltration Resistance: ASTM E 283.
 - 1.04 Windborne Debris Impact Resistance: Pass large missile impact tests; Florida Building Code, FBC TAS 201.
 - 1.05 Hurricane Wind Pressure Resistance: After passing large missile impact test, pass cyclic pressure tests following FBC TAS 203.

SCHEDULE 4 - SUBMITTALS

- PRODUCT DATA SHEET 0 - Shop Drawings: Refer to Section 01300 for complete submittal procedures. Indicate elevations, locations, markings, quantities, material, head jamb and sill conditions, metal thickness, sizes, shapes, dimensions, finishes and wind pressures.
- PRODUCT DATA SHEET 1 - Product Data: Provide detailed data on Manufacturers catalog data on each product to be used, including Miami Dade County Product Approval (NOA) and Florida Building Code (FBC) HVHZ Product Approval.
- PRODUCT DATA SHEET 2 - Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

SCHEDULE 5 - QUALITY ASSURANCE

- PRODUCT DATA SHEET 0 - Manufacturer Qualifications: Not less than 10 years of experience in manufacturing impact-resistant aluminum windows and doors.
- PRODUCT DATA SHEET 1 - Installer Qualifications: Skilled and experienced to install manufacturer's units of the types specified.

SCHEDULE 6 - DELIVERY, STORAGE, AND HANDLING

- PRODUCT DATA SHEET 0 - Store products in manufacturer's unopened packaging in a clean, dry area until ready for installation.
- PRODUCT DATA SHEET 1 - Protect exposed metal and glass surfaces to prevent damage to finish.

SCHEDULE 7 - WARRANTIES

- PRODUCT DATA SHEET 0 - Warranty Period: Contact CGI Windows and Doors, Inc. for details on 10 year limited warranty.
- 1.01 Structural, Hardware and Certain Finishes: 10 years.
 - 1.02 Stress Cracks on Glass: 1 year.
 - 1.03 Delamination on Laminated Glass Units: 5 years.
 - 1.04 Insulated Glass (sealed component): 10 years.

PART 2 - PRODUCTS

SCHEDULE 0 - MANUFACTURERS

PRODUCT DATA SHEET 0 - Acceptable Manufacturer: CGI Windows and Doors, Inc. , which is located at: 10100 N. W. 25th St. ; Miami, FL 33172; Toll Free Tel: 800-442-9042 ; Tel: 305-593-6590; Email: [request info \(lquist@cgiwindows.com\)](mailto:request info (lquist@cgiwindows.com)) ; Web: www.cgiwindows.com

PRODUCT DATA SHEET 1 - Requests for substitutions will be considered in accordance with provisions of Section 01600.

SCHEDULE 1 - ALUMINUM WINDOWS (ESTATE)

PRODUCT DATA SHEET 0 - Project-Out / Awning Windows: "Estate Collection" Series 238 Project-Out / Awning Windows by CGI Window and Doors, Inc.

2.01 Example Sizes and Related Design Pressures: Refer to product approvals for latest results.

A. Unit Size: 24 by 54 inches, 110 psf positive, 195 psf Negative.

2.02 Air Infiltration Resistance: Air leakage no more than 0.04 cfm/sqft of glass area at pressure differential of 6.24 psf (air infiltration tests conducted at pressure differential of 1.57 psf may not be used to justify compliance).

2.03 Water Infiltration Resistance: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 16.5 psf.

2.04 Construction: Heavy extruded aluminum-alloy sections, precision cut and assembled with hairline joints and no visible fasteners when vents are closed. Provide grooves in extrusions to receive double weather stripping between vents and frames. Swing casement and project-out vents outward.

2.05 Member Wall Thicknesses:

A. Frames: At least 0.080 inch (2.03 mm).

B. Vents: At least 0.090 inch (2.29 mm).

2.06 Frame Depth: At least 2.075 inches (53 mm). Provide 0.50 (12.7 mm) inch flanges at perimeter frames.

2.07 Sightlines: Jambs, sill and head - 3.5 inches (89 mm) from tip of flange to glass.

2.08 Corner Construction at Casement and Project-Out Window Frames and Vents: Assemble with sealed hairline joints, made rigid by fastening with No. 10 stainless steel screws and the following.

A. At Frames: 4 stainless steel corner keys and 4 aluminum corner keys.

B. At Vents: 4 stainless steel corner keys.

2.09 Glazing Beads: Extruded aluminum snap-in design, with 0.500 inch (12.7 mm) glass bite for impact-resistant glazing.

2.10 Weatherstripping: Dual continuous rows of weatherstripping.

2.11 Finishes: Uniform at all visible surfaces exterior and interior, vents open or shut.

2.12 Factory Glazing:

A. Laminated Impact Resistant Glass Units: 7/16 inch (11 mm) thick (nominal) consisting of clear, non-yellowing, non-crazing interlayer sandwiched between two panes of glass.

1. Outer and Inner Panes of Laminated Units: 3/16 inch (4.8 mm).

a. Tint in Outer Panes: None, clear.

2. Interlayer Opacity: None, standard.

3. Low E and high performance glass coatings as indicated on Drawings.

2.13 Window Features:

A. Glazing Beads: Square glazing bead profile (contemporary).

2.14 Standards: Miami Dade County NOA (Notices of Acceptance).

- 2.15 Aluminum Alloy and Temper: AA 6063-T5 and T6 temper.
- 2.16 Hardware: Factory applied and field adjusted.
 - A. Operators: Dual-arm rotary operator with crank handle, running in stainless steel operator track. Provide snubber blocks.
 - B. Hinges: Pair of stainless steel 4-bar concealed hinges.
 - C. Sash Locks, with Keepers: Two cam locks with lever handle. Provide one 1/8 inch (3.2 mm) thick stainless steel keeper at each cam lock.
 - D. Hardware Color: Salt-air resistant multi-coat baked enamel in metallic finish.
 - 1. Color: White.
 - E. Operator Finish: E-Gard Finish.

SCHEDULE 2 - SWING DOORS (ESTATE)

PRODUCT DATA SHEET 0 - Swing Doors: "Sentinel" Series 450 Doors, Sidelites and Transoms by CGI Windows and Doors, Inc.

PRODUCT DATA SHEET 1 - Swing Door Design:

- 2.01 Swing Direction: Out-swing configuration.
- 2.02 Door Panels: 2 inches (51 mm) thick (nominal) door panels.
- 2.03 Complete frame, threshold and weatherstripping.
- 2.04 Extruded snap-on glazing beads.
- 2.05 Extruded astragal adaptor.
- 2.06 Door Features:
 - A. Configuration: Out-swing configuration.
 - B. Glazing Beads: Square glazing bead profile (contemporary).
- 2.07 Size: Refer to Drawings.

PRODUCT DATA SHEET 2 - Performance Requirements:

- 2.01 Outswing Door, Transoms and Sidelites: 100 psf Positive and Negative (110 Negative with heat strengthened glass).
- 2.02 Inswing Door (no water infiltration resistance required): 100 psf Positive and Negative (110 Negative with heat strengthened glass).
- 2.03 Inswing Door: 50 psf Positive and 100 psf Negative (110 Negative with heat strengthened glass) where water infiltration resistance is required.

PRODUCT DATA SHEET 3 - Air Infiltration Resistance:

- 2.01 Outswing Door: Transoms and Sidelites: no more than 0.07 cfm/sqft of glass area at static air pressure difference of 6.24 psf.
- 2.02 Inswing Door: Air leakage no more than 0.04 cfm/sqft of glass area, at a static air pressure difference of 1.57 psf.

PRODUCT DATA SHEET 4 - Water Infiltration Resistance:

- 2.01 Outswing Doors, Transoms and Sidelites: Water Infiltration Resistance: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 15 psf.
- 2.02 Inswing Doors: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 7.5 psf.

PRODUCT DATA SHEET 5 - Construction: Heavyweight extruded aluminum sections for wet glazing, precision cut and assembled with sealant filled hairline joints and no visible screws. Provide grooves in extrusions to receive 3 lines of weather stripping where doors abut frames.

- 2.01 Member Wall Thickness: 0.125 inch (3.2 mm) minimum; 0.150 inch (3.8 mm) at hardware mounting locations.
- 2.02 Member Sizes (widths including glazing beads):
 - A. Top Rail and Stiles: 1.918 inches (48.7 mm) thick by 5.5 inches (157 mm).
 - B. Bottom Rails: 1.918 inches (48.7 mm) thick by 8 inches (203 mm).
- 2.03 Sightlines:
 - A. Top Rails: 6.25 inches (15.88 cm).
 - B. Jambs: 6.75 inches (17.146 cm).
 - C. Sills: 8 inches (20.32 cm).
- 2.04 Door Corner Construction: Assemble using two 3/8 inch (8.9 mm) threaded compression rods in rails, secured at each end with washers and hex nuts.
- 2.05 Glazing Beads: Snap-in design, for interior wet glazing, 0.060 inch (1.5 mm) wall thickness, with at least 0.50 inch (12.7 mm) glass bite for impact-resistant glazing.
- 2.06 Finishes: Uniform at all visible surfaces exterior and interior.
- 2.07 Residential Hardware: Including concealed three point locking mechanism with integrated key lock cylinder and thumbturn (single action/one step locking).
- 2.08 Hinges: Hager - Standard weight, three knuckle with concealed anti-friction nylatron bearing, 134 metal leaves with .312 concealed metal pin and plug.
 - A. Metal Type: Stainless steel.
- 2.09 Commercial Hardware: Including concealed three point locking mechanism with integrated key lock cylinder and thumbturn (single action/one step locking).
- 2.10 Sidelite and Transom Panels:
 - A. Product: Series 450 Sidelite, Transom Panels, and Mullions, by CGI.
 - B. Design and Performance: Sidelite and transom panels shall interlock with each other and with any CGI approved vertical aluminum tube mullions, at all points of interface, to form a structural unit at each opening. Compliance with impact, wind, water, and structural deflection requirements.
 - C. For assemblies with an overall height of less than 108.75 inches utilize self-mating sidelites. For assemblies with an overall height of 108.75 inches or greater, provide structural mullions between sidelites and sidelites, and between sidelites and doors.
- 2.11 Factory Glazing:
 - A. Insulated Laminated Impact Resistant Glass Units: 1 inch (25.4 mm) thick (nominal) consisting of a sacrificial exterior lite and a clear, non-yellowing, non-crazing interlayer sandwiched between two panes of glass.
 - 1. Exterior Sacrificial Lites/Panes:
 - a. Tint in Outer Panes: None, clear.
 - 2. Airspaces: 5/16 inch (8 mm) minimum air space.
 - 3. Laminated Units:
 - a. Consisting of clear, non-yellowing, non-crazing interlayer sandwiched between two panes of glass.
 - b. Tint: Low E.

PRODUCT DATA SHEET 6 - Standards:

- 2.01 Miami Dade County Notices of Acceptance (NOA): 03-0422.02 and 03-0422.03.
- 2.02 Aluminum Alloy and Temper: AA 6063-T5 and T6; ASTM B 221.

PART 3 - EXECUTION

SCHEDULE 0 - PREPARATION

PRODUCT DATA SHEET 0 - Before start of unit installation, check openings for adequacy of pressure

preservative treated wood blocking that will receive frames. Check the size, quantity, spacing, clearances, and rigidity of fastenings and their conformance to the specified NOA.

SCHEDULE 1 - PREPARATION

PRODUCT DATA SHEET 0 - Coordinate with Section 06100 - Wood blocking and fasteners to structure:

3.01 3/4 inch (19 mm) or 1-1/2 inch (38.1 mm) as per specified NOA rectangular or beveled pressure preservative treated South Yellow Pine blocking, set in a full bed of sealant.

3.02 Fasten with to structure with drilled concrete fasteners spaced as required in NOA, so that blocking is continuous and is tightly butted to fill corners of each opening.

PRODUCT DATA SHEET 1 - Coordinate with Section 07920 - Exterior and interior sealants at unit perimeters:

3.01 Sealant at exterior perimeter of aluminum frames, in deeply grooved stucco or in 1/4 inch (6 mm) gaps where other exterior finish materials terminate next to frames.

3.02 Sealant in 1/8 inch (3.2 mm) gap at frame interior perimeters where sills and interior finish materials such as gypsum board and tile terminate next to frames.

PRODUCT DATA SHEET 2 - Perform cutting, fitting, forming, drilling, and grinding of frames, without damage to finish, as needed to fit project conditions and make watertight. Replace components with damage to exposed finishes.

SCHEDULE 2 - WINDOW INSTALLATION

PRODUCT DATA SHEET 0 - Install windows following manufacturer's instructions.

PRODUCT DATA SHEET 1 - Attach window frame and shims to perimeter blocking at openings to accommodate construction tolerances and other irregularities. Maintain integrity of air barriers and vapor retarder sheets.

PRODUCT DATA SHEET 2 - Align windows plumb and level, free of warp or twist.

PRODUCT DATA SHEET 3 - Adjust vents to close snugly and put in smooth operating order.

SCHEDULE 3 - DOOR INSTALLATION

PRODUCT DATA SHEET 0 - Install doors and frames in accordance with manufacturer's instructions, requirements of NOA for hurricane and impact-resistant construction, and approved shop drawings.

PRODUCT DATA SHEET 1 - Set frames plumb, square, level, and aligned to receive doors. Anchor frames to adjacent construction in strict accordance with manufacturer's recommendations, requirements of governing NOA, and within specified tolerances.

PRODUCT DATA SHEET 2 - Where aluminum surfaces contact alkaline substrates such as concrete or mortar, and metals other than stainless steel or zinc, protect from direct contact by painting reactive substrate and dissimilar metals with a heavy coating of bituminous paint in the field.

PRODUCT DATA SHEET 3 - Hang doors and adjust hardware to achieve specified clearances and proper door operation.

PRODUCT DATA SHEET 4 - Demonstrate doors and hardware are in good working order.

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



SCHEDULE 4 - CLEANING

PRODUCT DATA SHEET 0 - Refer to manufacturers instructions for proper cleaning and maintenance of the products.

END OF SECTION 085113

09 29 00.D14 Magnum Wall Board

SECTION 092900.D14 – MAGNUM WALL BOARD

**MAGNUM BOARD® PRODUCTS Interior Exterior Sheathing – Ceiling Board -Backer/Underlayment -Trim – Siding
Materials Specification – 120209-1400, Issue 5**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Magnum® wall board

NOTE: ALL MAGNUM® MATERIALS ARE HIGH ABUSE, HIGH IMPACT.

1.2 RELATED SECTIONS

- A. Section 05400 – Cold Formed Metal Framing
- B. Section 06100 – Rough Carpentry: Wood Framing.
- C. Section 06100 – Rough Carpentry: Sheathing
- D. Section 06200 – Finish Carpentry: Adjacent Work to receive fire treated sheathing.
- E. Section 06400 – Architectural Woodwork: Adjacent Work to receive fire treated sheathing.
- F. Section 07210 -Insulation: Exterior wall insulation
- G. Section 07900 – Sealant: Joint sealant and acoustical sealant
- H. Section 08100 – Metal Support Assemblies
- I. Section 092150 – Veneer Plaster

1.3 REFERENCES

- A. AC308 Acceptance criteria for fiber-reinforced magnesium-oxide based sheets
- B. ASTM International (ASTM):
 1. ASTM C1185-03 Flexural Strength.

2. ASTM C1325-04 Dimensions and Tolerances
3. ASTM C1186-02 Moisture Movement
4. ASTM C1186-02 Water Absorption
5. ASTM C1325-04 Compression Indentation
6. ASTM C1325-04 Nail Head Pull-Through
7. ASTM C1325-04 Falling Ball Impact
8. ASTM C1325-04 Shear Bond Strength
9. ASTM C1396-06a Humidified Deflection
10. AC376 and ASTM E72 section 15 Wet Racking Shear
11. ASTM G155 Zenon Arc Accelerated Weathering
12. ASTM E84-05 Surface Burning Characteristics
13. ASTM E136-04 Behavior of Materials in a Vertical Tube at 750°C
14. University of Pittsburg Protocol Measurement of Acute Lethality of Thermal Decomposition Products – Toxicity Test
15. ASTM C1185 Frost Resistance (Freeze / Thaw)
16. ASTM E119-08a Standard Test Methods for Fire Tests of Building Construction and Materials
17. ANSI / UL263 (ASTM E119 and NFPA 251) Underwriters Laboratory Standard Test Method for Building Construction and Materials– One Hour Wall Rating
18. ASTM G21 Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

C. Fire Rated Assemblies: Provide materials and construction identical to those tested in fire endurance rated assemblies by an independent testing agency acceptable to the authorities having jurisdiction.

1. Test method: ASTM E 119 / UL 263
2. Test method: CAN / ULC-S101M
3. Ratings: As indicated on the drawings; designations listed are from:
 - a. UL Fire Resistance Directory
 - b. ULC Fire Resistance Directory

1.4 SUBMITTALS

A. Submit under provisions of 01300.

B. Product Data:

1. Manufacturers data sheets on each product to be used

1. Storage and handling requirements and recommendations

2. Installation methods C.. Closeout Submittals:

1. Warranty: 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.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Installer specializing in performing Work of this section with minimum three-(3) years of experience.
- B. Follow good construction installation practices and Magnum Building Products® Installation Guidelines as applicable.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store Magnum Board® in accordance with this procedure
- B. Ship materials on sturdy pallets and well covered to keep from weather, damage and dirt.
- C. Keep material dry prior to and during installation.
- D. Stack flat on dun-age – do not allow material to bow, or to sit directly on the ground.
- E. Do not stack other materials on top of Magnum Board®.
- F. Protect Magnum Board® from jobsite dirt.
- G. Protect edges, ends and faces of Magnum Board® from damage.
- H. Store Magnum Board® inside and protected from damage by weather and direct sunlight.

PART 2 PRODUCTS

2.1 Manufacturers

A. Contact: Magnum Building Products, LLC -10150 Highland Manor Drive – Suite 200 –

B. Substitutions: Not permitted

2.2 Magnum Board – All Products / Applications

A. Sheathing

1.	Test Number	Ultimate Load (lbf)	lbf/lineal ft.
	1	3600	450
	2	3600	450
	3	2900	363
	Average	3367	421
	Std. Dev.	404	51

Sizes

a. Lengths: 8’

b. Widths: 4’ standard

2. Thicknesses

k. 5/8” (15MM)

3. Edges

b. Taper: 8MM thicknesses to 19MM thicknesses

4. Physical Characteristics

a. Flexural Modulus: Tested, results forthcoming.

b. Flexural Strength:

6MM Machine = 2296 PSI Cross = 2054 PSI

12MM Machine = 1038 PSI Cross = 1508 PSI

Meets all requirements of AC308 and ASTM C1185

c. Wet Racking Shear Strength:

d. Fungus / Mold: Non-nutrient when tested in accordance with ASTM G21

2.3 ACCESSORIES A. Screws: SG#8 Hilti or equivalent B. Pins: ETF AKN-100-1050A or equivalent

NOTE: Fastener length depends on thickness of Magnum Board® Product being installed.

PART 3. EXECUTION

3.1 EXAMINATION

A. Verify site conditions are ready to receive work and framing and opening dimensions as indicated on the Drawings.

B. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding. 3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

END OF SECTION 092900.D14

SECTION 093000 - MORTAR AND GROUT

Product Information



D-70 ProFlex™ High Performance Extremely Flexible Mortar

Product Description:

D-70 ProFlex™ Mortar is a high performance, extremely flexible, premium latex-modified, thin set used for interior or exterior installations to set glass, porcelain, ceramic, granite, slate, marble, limestone, and dimension stone tiles. Use over properly prepared concrete; structurally-sound, exterior grade plywood (interior/dry use only); cementitious backer board; Durabond D-222™; existing, well-bonded vinyl/VCT or ceramic tile; cutback adhesive residue (dry only); and floors equipped with radiant heat. D-70 ProFlex Mortar has excellent sag resistance for vertical installations.

Product Benefits:

- Extremely Tacky Consistency
- Extremely Flexible (deflection up to L/240)
- Extremely Durable
- Single-Component Latex-Modified (water-add only)
- Exceeds ANSI A118.4 and A118.11 Requirements
- Freeze/Thaw Stable
- For All Tile Absorption Rates (from porcelain to saltillo)
- For Interior and Exterior Installations
- For Vertical and Horizontal Installations

Directions for Use:

Read and understand the datasheet completely before beginning installation. Follow applicable ANSI, TCNA and NTCA installation standards.

Surface Preparation:

Surface must be clean, dry and smooth; free of voids, projections, loose materials, oil, grease, sealers, curing compounds, waxes and all other surface contaminants that may inhibit proper bond.

Mixing:

Using a slow speed mixer (< 150 rpm), mix 5 to 6 quarts of clean, potable water to 50 pounds of D-70 ProFlex Mortar. Mix to creamy consistency. Allow mixture to stand 15 minutes, and re-mix prior to application. Do not re-temper by adding more water. Mix with water only.

TYPICAL PHYSICAL PROPERTIES

Open Time (@ 70°F)	>70 minutes
Adjustability Time	40 minutes
Pot Life (@ 70°F)	1-2 hours
Initial Set (@ 70°F)	8-10 hours
Final Set (@ 70°F)	10-15 hours

Exceeds ANSI A118.4 and A118.11 requirements

Shear Strength, 28 Days

Porcelain Tile	576 psi (ANSI REQ 200)
Glazed Wall Tile	560 psi (ANSI REQ 300)
Quarry Tile	425 psi
Quarry to Wood*	300 psi (ANSI REQ 150)

28 Day Compressive Strength 3600 psi

All numbers represent minimum test results.

* Wood failure (wood typically fails between 250 to 300 psi)

Application:

Apply a thin coat of D-70 ProFlex Mortar with the flat edge of trowel to achieve a good mechanical bond to the substrate. Comb additional mortar with the appropriate size notched trowel. If any evidence of skinning or setting occurs, re-comb mortar with notched trowel. Apply mortar to an area no greater than can be tiled in 20 to 30 minutes. Apply tile using a twisting motion into a fresh bed of mortar to ensure maximum contact and bond. Periodically check back of tile to ensure proper transfer (interior applications—minimum 80% coverage; exterior, wet, or plywood applications minimum 95% coverage). A finished mortar bed thickness of at least 3/32" is required.

Application Over Plywood: Maximum joist spacing shall be 16" on center. Plywood shall be Underlayment Exterior Grade or C-C Plugged Exterior Grade plywood (or better). If the existing floor is less than 1" thick, glue and nail 15/32" or 1/2" APA Underlayment Exterior Grade or C-C Plugged Exterior Grade plywood to the floor. Glue and nail using 5D or 6D (1 1/2" or 2") cement coated screw shank nails 6" on center along the panel edges and a maximum of 8" on center each way throughout the panel. Allow 1/8" gap between underlayment sheet edges and all areas that abut walls, drains, posts, etc., these areas shall be filled with mortar when tiles are installed. Clean and rough sand the plywood. Due to the limitations of plywood as a substrate, D-70 ProFlex Mortar is not intended for use on plywood in exterior, wet interior, or applications subject to heavy/commercial traffic.

D-70



211 Boston Street • Middleton, MA 01949 • Customer Service or Technical Service 1-800-7/BOSTIK

www.bostik-us.com

Application Over Existing vinyl/VCT Flooring: Vinyl must be clean and well-bonded to substrate. Do not install over cushion-backed or perimeter bonded sheet vinyl. Remove any loose pieces of vinyl or flooring. Ensure the exposed substrate is suitable for application.

Application Over Existing Ceramic Tile: Tile must be clean and well bonded to the substrate. Mechanical abrasion with Carborundum disk followed by a clear water wash is recommended. Installation must be thoroughly rinsed and dry before setting.

Application Over Cutback (Asphalt) Adhesive Residue: Remove as much cutback residue as possible with a sharp razor scraper or similar tool. Sweep or vacuum to remove all loose adhesive and dust. Installation over cutback residue is limited to well bonded dry areas only. Note: Cutback adhesive residue should be completely removed by shot blasting in Heavy or Extra Heavy service requirements as defined by TCA guidelines for service requirements.

Curing:

Keep all foot traffic off the installation until tile is firmly set (approximately 12 hours). Set times are dependent upon temperature and humidity.

Grouting:

Depending on ambient, slab, and material temperatures, grouting can generally begin after 12 hours with any quality Durabond grout. Allow 48 hours before grouting with Bostik EzPoxy™ or any 100% solids epoxy grout. Allow 24 hours before grouting with Bostik TruColor™ Pre-Mixed Grout or any urethane-based grout.

Clean-Up:

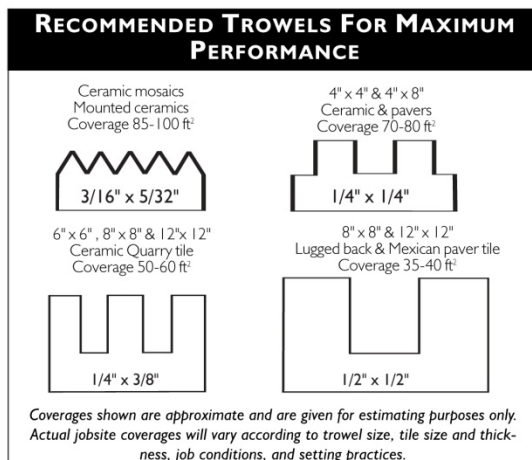
Clean all tools and equipment with soap and water. Do not allow material to dry on surface of tile.

Packaging:

DURABOND D-70 is available in 50 lb. bags in gray and white formulas. For the name of the distributor nearest you contact Customer Service at 800-7/BOSTIK.

Limitations:

- Do not use for installing moisture sensitive stones (e.g., granite, marble).
- Do not use in installations where deflection exceeds L/240 (1" in 30").
- Natural stone such as marble, limestone & travertine may not tolerate deflection in excess of L/720. Refer to the Marble Institute of America Design Manual for details on specific types of stone.
- Cutback adhesive residue should be completely removed by shot blasting in Heavy or Extra Heavy service requirements as defined by TCA guidelines for service requirements.
- Do not apply over oriented strand board (OSB), Masonite, particleboard, luaun, or similar unstable substrates.
- Do not use where hydrostatic pressure can occur.
- Due to the limitations of plywood as a substrate, D-70 ProFlex Mortar is not intended for use on plywood in exterior, wet interior, or applications subject to heavy/commercial traffic.



PLANT LOCATIONS

TEMECULA, CA 92590

CONYERS, GA 30207

PAULSBORO, NJ 08066

www.bostik-us.com

October 16, 2009; Supersedes all previously published literature.

LIMITED WARRANTY

Bostik, Inc. warrants that the product conforms with Bostik's written specifications and is free from manufacturing defects. A PURCHASER'S SOLE REMEDY FOR NONCOMPLIANCE WITH THIS WARRANTY SHALL BE THE REPLACEMENT OF THE PRODUCT OR REFUND OF THE PURCHASE PRICE. Purchasers may address their warranty claims to Bostik, Inc., 211 Boston St., Middleton, MA 01949, Attn: Customer Service or call Bostik at 1-800-7/BOSTIK. TO THE MAXIMUM EXTENT ALLOWED BY LAW, BOSTIK DISCLAIMS ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND LIABILITY FOR DIRECT, INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.



211 Boston Street • Middleton, MA 01949 • Customer Service or Technical Service 1-800-7/BOSTIK

www.bostik-us.com

TruColor™ by Bostik

PRE-MIXED GROUT



PRODUCT DESCRIPTION

Bostik TruColor™ Pre-Mixed Grout is a patented, water-based, urethane grout offering the ultimate in color accuracy, stain protection and crack resistance for residential and commercial tile installations. This breakthrough formulation installs up to 50% faster than traditional grouts, and never needs to be sealed. Its perfect balance of flexibility and toughness enables it to exhibit unmatched performance and crack resistance. TruColor exceeds the grout-relevant portion of the ANSI 118.3 epoxy standard (modified ANSI 118.3-UG).

TruColor's quartz aggregate is color coated to ensure perfect color consistency every time; unlike other grouts that contain loose color pigments which can cause staining or be washed away.

TruColor contains Bostik's Blockade™ antimicrobial protection, which inhibits the growth of bacteria, mold, or mildew on the surface of the dried grout and enables it to resist stains caused by mold.

TruColor is a technology engineered to appeal to today's green-conscience marketplace, specifically those seeking to obtain U.S. Green Building Council LEED® certification for their projects. Its unique combination of features and benefits produces one-of-a-kind specification potential for architects and designers worldwide.

PRODUCT BENEFITS

- Consistent color every time—color is derived from colored quartz aggregate. No powdered pigment additives.
- No color fading, streaking or shading—even when wet!
- Crack resistant flexibility
- No sealing required ever!
- Pre-mixed and ready to use
- Chemical and stain resistant
- Fast, easy installation—installs up to 50% faster than other grouts
- Warranted
- Re-usable (when stored properly in original container)
- UV stable – Colors will not yellow, darken or fade

TYPICAL PHYSICAL PROPERTIES

Water Cleanability	Pass
Density	13.8 lbs/gallon
Vertical Joint Sag	Pass
Installation Temperature	40°F – 100°F
Shelf Life	up to 2 years
Water Absorption	< 1%
Compressive Strength	3,500 psi*
Tensile Strength	510 psi
VOC Content	35 g/L (as calculated by SCAQMD Rule# 1168)
Recycled Content	Yes - 8% post consumer glass
Freeze Thaw Stable	8 cycles

*Test results were performed in an actual grout joint.

TYPICAL WORKING PROPERTIES

Working Time	3 hours
Tack Free Time	8 hours
Ready for Light Foot Traffic	24 hours
Ready for Heavy Foot Traffic	72 hours
Stain Resistant	72 hours*
Showers, steam showers, pools, outdoors	7 days

*Wait 7 days before cleaning tile and grout surface

- Blockade™ antimicrobial protection
- Dust-free mixing
- 3 hour working time
- Easy water clean up
- Non-sag formula ideal for vertical surfaces
- Contributes to USGBC LEED® Credits: MR 4.1 & 4.2 (Recycled Content), and EQ 4.1 (Low-Emitting Materials).
- Grout does not contain cement-based components that contribute to efflorescence.

09300 9 Tile Setting Materials & Accessories
 Pre-Mixed Grout

DECEMBER 17, 2010. SUPERSEDES ALL PREVIOUSLY PUBLISHED LITERATURE. T59



211 Boston Street • Middleton, MA 01949 • Customer Service or Technical Service 1-800-7/BOSTIK • www.bostik-us.com

PRODUCT USES

Bostik TruColor Grout can be used in grout joint widths from 1/16" to 1/2" on vertical or horizontal surfaces in both interior and exterior installations of ceramic, porcelain, glass and natural stone tiles.

DIRECTIONS FOR USE

Read and understand Technical Data Sheet and Material Safety Data Sheet completely before beginning installation. Follow applicable ANSI, TCNA and NTCA installation standards. Always do a test area to ensure product satisfaction, including adhesion to substrate, and/or to become familiar with proper application techniques prior to use.

SURFACE PREPARATION

Ensure tile is firmly set and mortar is completely dry (typically 8 to 12 hours—always follow manufacturer's instructions) before grouting. Remove all spacers, water, debris and adhesive from tile joints. For best results, surface of tile should be at room temperature (70°F to 75°F). Urethane materials are affected by temperature and humidity variations. Cool temperatures and/or high humidity will slow cure time. To facilitate cleaning, pre-seal all porous tile and natural stone with a water-based sealer before grouting; ensure that sides of tiles are sealed as well. For glass tile, polished marble, stone and other soft surfaces, test grout on a small area to ensure compatibility and scratch-free application. Make sure tile and grout joints are clean and free from solvents/residues before grouting.

MIXING

DO NOT add any water, liquid, or other material to TruColor Grout! This will cause grout failure and void all warranties. A translucent, milky liquid may be present on the surface of the grout upon opening the container. This is from normal settling during shipment. Use a margin trowel or a drill mixer on low or medium speed for no more than 30 seconds to bring grout into suspension. Avoid high speed mixing. This will introduce air into the grout mixture that can cause sagging in grout joints. Let drill mixed material stand idle for 10 minutes prior to grouting. Mix thoroughly with a margin trowel throughout use of the grout.

APPLICATION

Do not apply or clean-up this product like traditional cement or epoxy-based grouts; TruColor is a new technology that requires a simpler and easier application and clean-up process. Spread grout over the face of the tile using a green, sharp-edged, firm rubber (epoxy/urethane) grout float. Work grout back and forth at a 45° angle to the face of the tile to ensure complete filling of the joints.

Spread only within an area that you can reach (typically 10 - 12 square feet) to apply and clean TruColor Grout at any one time. Remove all excess grout by holding the rubber float at a 90° angle, working diagonally across the face of the tile to prevent grout removal from joints.

Initial Cleaning: Immediately clean the surface of the tile to remove excess grout and haze using a damp sponge (not wet, wrung nearly dry). Do not attempt to re-clean any urethane haze from the surface of the tile after initial cleaning. Leave the sponge completely flat on the surface of the tile to prevent grout removal from the joints.

To speed up installation, or for quarry and other porous tile and/or outdoor applications, pre-wet tile surface using a damp, clean sponge prior to spreading grout, being careful not to leave standing water on the surface of the tile or in the grout joints.

CLEANUP

For best results, remove grout haze as you work, particularly in warm or dry climates. If working alone, only grout as far as you can reach (10-12 square foot area) before doing the initial cleaning. If working as a team, one person should grout, with the other cleaning immediately behind the first person.

Initial Cleaning: Clean/rinse sponge in water and wring nearly dry. During installation, urethane grout requires very little water to clean; adding water during cleanup will dilute the urethane binder and cause curing issues.

Clean surface of the tile with a flat sponge being sure to clean all excess grout and haze. Wipe up spilled water immediately; do not allow it to sit on grout surface or in ungrouted joints.

Change water mixture after each 100 square feet, for each new bucket of grout, or when dirty. Check work as you clean. Repair any low spots with additional grout. Unlike other grouts, DO NOT over wash too vigorously. Allow cleaned areas to dry and inspect tile/stone surface. Do not attempt to re-clean any urethane haze from the surface of the tile after initial cleaning. If a second cleaning is necessary, wait 24 hours and then repeat the cleaning process using a white, damp Doodlebug™ pad to remove any remaining urethane haze. See Limitations below for further haze removal instructions. Contact Bostik Technical Service if persistent haze remains after cleaning.

If needed, cover only with Kraft or breathable paper after initial 24-hour curing period.

LIMITATIONS

- Do not apply or clean-up this product like traditional cement based or epoxy grouts; TruColor is a new technology that requires a simpler and easier application and clean-up process.
- Follow manufacturer's instructions for all other setting materials, waterproofing, anti-fracture membranes, etc., used on the job.
- Minimum recommended grout joint width is 1/16".
- Maximum recommended grout joint width is 1/2".
- Ensure that grout joints are fully packed, especially in tight and irregular joints. Take special care in all wet and outdoor applications.
- Do not use as a setting mortar.
- Not for use in heavy industrial applications (i.e., chemical plants), in areas subjected to harsh or persistent chemicals, or areas exposed to very aggressive cleaning routines such as pressure washing or steam cleaning. Bostik EzPoxy 100% Solids Grout and Mortar is recommended for these ultra-aggressive environments.
- Bostik TruColor Grout is not a replacement for a waterproofing membrane. When a waterproofing system solution is required, please consult Bostik Technical Service.
- Protect grout from stains and chemicals during the cure process.
- Do not grout when tile surface is above 85°F.
- Do not use vinegar or acid solutions for clean up.
- If correct installation procedures were not followed and a difficult to remove haze is present, wait 72 hours after grout installation and clean with a citrus cleaner or Krud Kutter® brand cleaner using a Doodlebug™ pad that has been wrung nearly dry.
- Always use protective clothing (gloves and eye protection) when working with grout.
- Prior to re-grouting applications, remove 1/8" of old grout and remove any surface contaminants. Be sure to rinse any residual cleaner/solvent out of grout joints, then allow joints to completely dry before re-grouting.
- Do not use for commercial re-grouting or wet environment re-grouting installations, including showers, steam showers, and outdoor applications.
- Seal porous tile surfaces with a water-based sealer, including the sides of the stone, prior to grouting with TruColor Grout.
- Outdoor installations must be protected for 7 days.
- Shower/steam shower/wet area installations must be protected

from moisture and allowed to cure for 7 days.

- Wait 7 days before cleaning tile and grout surface.
- Wait 7 days prior to exposing grout to full submersion.
- Use care on soft, highly polished surfaces to avoid scratching. Test a small area. Use of a sealer is always recommended on polished marble, stone, slate and other natural, porous tiles.
- Use an approved waterproof sealer or membrane over mud bed applications. Follow manufacturers' recommendations for all waterproofing materials. For liquid-applied waterproofing materials (such as Bostik's Hydroment® UltraSet™ Advanced, Hydroment Gold, Durabond® D-222 and Hydroment Black-Top™), apply to within 1" of any drains to prevent weep hole blockage. The use of pre-sloped, waterproof trays (instead of mud beds) is highly recommended.
- Use of enzymatic floor cleaners will void all warranties.
- Follow all TCNA guidelines for the proper installation of change of plane or expansion joints.

WARRANTY

INSTALLATION SYSTEM WARRANTY: To obtain a Bostik System Warranty, TruColor Grout must be used with Bostik branded (Hydroment or Durabond) installation products. Please refer to specific ceramic tile installation warranty literature for duration and details.

GROUT ONLY WARRANTY: Bostik, Inc. warrants that TruColor Grout will be free from manufacturing defects and will not break down or deteriorate under normal usage for a period of 2 years (commercial) and 10 years (residential-original buyer/non-transferable) when applied according to directions and industry standard guidelines.

PACKAGING

Bostik TruColor Pre-Mixed Grout is available in 20 popular colors in both 18-lb. and 9-lb. pails.

STORAGE AND SHELF LIFE

Bostik TruColor Pre-Mixed Grout is guaranteed to remain suitable for use up to a period of two (2) years if stored unopened at temperatures above 32°F (0°C). After opening, TruColor can be saved for reuse if properly resealed in original container (always wipe the pail lip clean prior to resealing to ensure proper seal is achieved with the Vapor Lock lid). If product freezes, return to room temperature and use as directed.

COVERAGE CHART (SQ. FT.)

18-LB. UNIT

Tile Size (Inches)	Joint Width					
	1/16"	1/8"	3/16"	1/4"	3/8"	1/2"
1" x 1" x 1/4"	63	32	--	--	--	--
2" x 2" x 1/4"	126	63	--	--	--	--
4 1/4" x 4 1/4" x 5/16"	214	107	71	54	36	27
4" x 8" x 1/2"	168	84	56	42	28	21
6" x 6" x 1/2"	189	95	63	47	32	24
8" x 8" x 3/8"	337	168	112	84	56	42
12" x 12" x 3/8"	505	253	168	126	84	63
13" x 13" x 3/8"	547	274	182	137	91	68
16" x 16" x 3/8"	673	337	224	168	112	84
18" x 18" x 3/8"	758	379	253	189	126	95
24" x 24" x 3/8"	1010	505	337	253	168	126

9-LB. UNIT

Tile Size (Inches)	Joint Width					
	1/16"	1/8"	3/16"	1/4"	3/8"	1/2"
1" x 1" x 1/4"	32	16	--	--	--	--
2" x 2" x 1/4"	63	32	--	--	--	--
4 1/4" x 4 1/4" x 5/16"	107	54	36	27	18	13
4" x 8" x 1/2"	84	42	28	21	14	11
6" x 6" x 1/2"	95	47	32	24	16	12
8" x 8" x 3/8"	168	84	56	42	28	21
12" x 12" x 3/8"	253	126	84	63	42	32
13" x 13" x 3/8"	274	137	91	68	46	34
16" x 16" x 3/8"	337	168	112	84	56	42
18" x 18" x 3/8"	379	189	126	95	63	47
24" x 24" x 3/8"	505	253	168	126	84	63




CHEMICAL RESISTANCE PROPERTIES


CHEMICAL	EXPOSURE
Acetic Acid, 3%	Pass
Acetic Acid, 10%	Pass
Ammonium Chloride	Pass
Citric Acid Solution, 30 g/L	Pass
Citric Acid Solution, 100 g/L	Pass
Lactic Acid	Pass
Phosphoric Acid, 3%	Pass
Phosphoric Acid, 10%	Pass
Sulfamic Acid, 3%	Pass
Sulfamic Acid, 10%	Pass
Bleach	Pass
Hydrochloric Acid, 3%	Pass
Hydrochloric Acid, 10%	Pass
Potassium Hydroxide, 30 g/L	Pass
Potassium Hydroxide, 100 g/L	Pass

Results shown are typical and reflect test procedures used by the Tile Council of North America (TCNA) for ANSI 118.3 and modified ANSI 118.3-UG.

TRUCOLOR PRE-MIXED GROUT

COLOR	18 LB. PAIL	9 LB. PAIL
Linen HI 63 • Driftwood D-G16	G922131	G922132
Almond HI 53 • Coffee D-G28	G922061	G922062
Antique White HI 35 • Biscuit D-G14	G922041	G922042
Alabaster HI 89 • Birch D-G50	G922031	G922032
Natural HI 46 • Natural D-G02	G922101	G922102
Mobe Pearl HI 45 • Oyster D-G03	G922141	G922142
Champagne HI 38 • Haystack D-G07	G922081	G922082
Jamoca HI 62 • Camel D-G21	G922191	G922192
Delorean Gray HI 60 • Steel D-G22	G922201	G922202
Classic Bone HI 58 • Bone D-G19	G922161	G922162
Sand Beige HI 48 • Chocolate D-G10	G922171	G922172
Latte HI 92 • Acorn D-G47	G922021	G922022
Portabella HI 84 • Sycamore D-G45	G922151	G922152
White HI 52 • White D-G01	G922011	G922012
French Gray HI 42 • Storm Gray D-G06	G922071	G922072
Kahlua Cream HI 43 • Sandcastle D-G04	G922111	G922112
Misty Gray HI 44 • Ocean Gray D-G05	G922051	G922052
Char Black HI 39 • Jet Black D-G08	G922091	G922092
Summer Wheat HI 50 • Walnut D-G15	G922181	G922182
Shadow HI 95 • Cobblestone D-G44	G922121	G922122




Middleton, MA 01949
 1-800-7/BOSTIK
 1-800-726-7845
www.bostik-us.com

PLANT LOCATIONS

Temecula, CA 92590
 Conyers, GA 30094
 Paulsboro, NJ 08066

LIMITED WARRANTY
 Bostik, Inc. warrants that the product conforms with Bostik's written specifications and is free from manufacturing defects. A PURCHASER'S SOLE REMEDY FOR NONCOMPLIANCE WITH THIS WARRANTY SHALL BE THE REPLACEMENT OF THE PRODUCT OR REFUND OF THE PURCHASE PRICE. Purchasers may address their warranty claims to Bostik, Inc., 211 Boston St., Middleton, MA 01949, Attn: Customer Service or call Bostik at 1-800-7/BOSTIK. TO THE MAXIMUM EXTENT ALLOWED BY LAW, BOSTIK DISCLAIMS ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND LIABILITY FOR DIRECT, INCIDENTAL, CONSEQUENTIAL, OR SPECIAL DAMAGES. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.


211 Boston Street • Middleton, MA 01949 • Customer Service or Technical Service 1-800-7/BOSTIK • www.bostik-us.com

END OF SECTION 093000

Revision 1
 U.S. D.O.E. Solar Decathlon 2011
 Mortar and Grout

Published 3/22/2011
 Page - 206
 09 30 00

09 30 13 Glass Mosaic Tiling
SECTION 093013 - GLASS MOSAIC TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass tile wall
 - 2. Setting and grouting materials.

- B. Related Sections:
 - 1. Division 1: Administrative, procedural, and temporary work requirements.
 - 2. Section 09 29 00 - Gypsum Board Substrate
 - 3. Section [10 28 13 - Toilet Accessories: Toilet, bath, and shower accessories.
 - 4. Section 22 40 00- Plumbing Fixtures

- C. Allowances:
 - 1. Include a unit cost allowance of \$4.41 per square foot for tile.
 - 2. Installation is not included in amount of allowance, and is to be included in Contract Sum.

1.2 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. A108/A118/A136.1-1999 - American National Standard for Installation of Ceramic Tile.
 - 2. A137.1-1988 - Specifications for Ceramic Tile.

- B. ASTM International (ASTM) D4263-83(1999) - Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method.

- C. Tile Council of America (TCA) - Handbook for Ceramic Tile Installation - 2005.

1.3 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Manufacturer's installation, cleaning, and maintenance instructions.
- B. Quality Control Submittals:
 - 1. Test Reports: Certified test reports issued by a nationally recognized testing laboratory showing product compliance with specified performance characteristics and physical requirements.
 - 2. Certificate of Compliance: Manufacturer's certification that products furnished meet specified performance characteristics and physical requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Company specializing in manufacture of glass tiles with minimum three years [documented] experience.
 - 2. Single source with capabilities to produce products of consistent appearance and physical properties.
- B. Installer Qualifications: Company specializing in installation of glass and ceramic tiles with minimum 3 years experience.
- C. Tile and Trim Units: Meet ANSI A137.1, Standard Grade.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver setting and grouting material containers bearing hallmark certifying compliance with reference standards.
- B. Protect containers from freezing and overheating according to manufacturer's instructions.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperature range in areas to receive tile of [50 to 100] [60 to 90] degrees F during installation and for minimum seven days after completion.
- B. Substrate: Free from ice and snow.
- C. Protect portland cement based mortars and grouts from direct sunlight, radiant heat, forced ventilation, and drafts until cured.

1.7 WARRANTIES

- A. Provide manufacturer's [] year [labor] [and] [materials] warranty providing coverage against deterioration and failure of setting and grouting materials and other installation materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer - Tile: www.cooltiles.com
- B. Acceptable Manufacturers - Setting and Grouting Materials:
 - 1. Bostik Findley.
 - 2. Laticrete International, Inc.
 - 3. Mapei Corp. USA.
 - 4. TEC.

2.2 TILE MATERIALS

- A. Glass Tile:
 - 1. Product line: HotGlass Glass Tile Cartglass Classic Blended 3/4" Tile on Mesh Backed Sheets Collection
 - 2. Size: Nominally 3/4 inch x 3/4 inch x 1/8 inch thick.
 - 3. Color: Rose Ash Blend
 - 4. Sheet backing: Mesh
 - 5. Sheet size: 12 7/8" x 12 7/8"

6. Grout joint: 1/16"

2.3 SETTING MATERIALS

- A. Thin-Set Mortar: Latex-portland cement type; ANSI A118.4.
 1. [Hydroment Reflex Ultra Premium Latex-Modified Thin-Set Mortar] [Hydroment Tile-Mate Thin Set mixed with Hydroment 447 Flex-A-Lastic Admixture] by Bostik Findley.
 2. [Laticrete 317 Floor N' Wall Thin Set Mortar mixed with Laticrete 333 Super Flexible Additive] [Laticrete 254 Platinum Multipurpose Thin Set Mortar] by Laticrete.
 3. Granirapid Ker 129 or Ker 130 Dry Set Mortar mixed with Ker 138 Liquid Flexible Latex Additive by Mapei.
 4. TEC Full Set Plus Premium Thin Set Mortar mixed with XtraFlex Mortar Additive by TEC.

2.4 GROUTING MATERIALS

- A. Epoxy Grout: ANSI A118.3.
 1. Hydroment Color-Poxy by Bostik Findley.
 2. [Spectralock Grout] [Spectralock Pro] by Laticrete.
 3. 400 Series Kerapoxy by Mapei Corp. USA.
 4. TEC TA-470 Epoxy Grout by TEC.
 5. Color: [_____] [To be selected from manufacturer's full color range.]

2.5 INSTALLATION ACCESSORIES

- A. Waterproof Membrane:
 1. Type: Single component, cold liquid applied, load bearing, with fabric reinforcing, compatible with setting and grouting materials.
 2. Source: Laticrete 9235 Waterproofing Membrane by Laticrete International, Inc. [or approved substitute].

- B. Joint Sealers: Silicone or epoxy type; specified in Section [07 92 00.] [_____].

2.6 MIXES

- A. Latex-Portland Cement Mortar: Mix mortar with 100 percent acrylic admixture; do not use water.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean surfaces to remove loose and foreign matter that could impair adhesion.
- B. Remove ridges and projections. Fill voids and depressions with patching compound compatible with setting materials.
- C. Allowable Substrate Tolerances:
 - 1. Maximum variation in substrate surface: 1/8 inch in 8 feet.
 - 2. Maximum height of abrupt irregularities: 1/16 inch.
- D. Test concrete substrates to ASTM D4263; do not install tile until surfaces are dry.

3.2 INSTALLATION

- A. Install waterproof membrane in accordance with manufacturer's instructions.
- B. Allow waterproof membrane to cure minimum seven days before installing tile.
- C. Install tile in accordance with ANSI A108.6, thin-set with epoxy adhesive.
- D. Butter back of tiles with additional mortar when required to make up for variations in tile thickness.
- E. Minimize pieces less than one half size. Locate cuts to be inconspicuous.

- F. Lay tile to pattern shown on Drawings. Do not interrupt tile pattern through openings.

- G. Joint Width: 1/8 inch, plus or minus 1/16 inch.

- H. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

- I. Fit tile around projections and at perimeter. Use factory cut and polished edges at exposed tile edges. Ensure that trim will completely cover cut edges.

- J. Allow tile to set for a minimum of 48 hours before grouting.

- K. Grout tile joints in accordance with ANSI A108.10 without excess grout. Completely cover tile edges with grout.

- L. Control Joints:
 - 1. Provide control joints at:
 - a. Changes in backup material.
 - b. Changes in plane.
 - c. Over joints in substrate.
 - d. Maximum [36] [] feet on center at interior locations and maximum [16] [] feet on center at exterior locations.
 - 2. Form joints per TCA Method EJ-171.
 - 3. Install joint backing and joint sealer as specified in Section 07 92 00

3.3 ADJUSTING

- A. Remove and replace pieces that have been damaged during installation.

PROTECTION

Provide protection for completed work using no staining sheet coverings.

END OF SECTION 093013

095453- STRETCH FABRIC CEILING

PART 1 — GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Construction Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to work of this Section.

1.02 SUMMARY

A. This Section includes stretched membrane ceiling systems complete with accessories for interior installations.

B. Related Sections:

1. Division 1 – Section Alternates
2. Division 16- Section Electrical for additional or larger size wires, as required to properly support lighting fixtures to be furnished and installed by the Electrical Contractor.

1.03 REFERENCE STANDARDS

A. Requirements, abbreviations and acronyms for reference standards are defined in Section 01095.

B. Fire Rating: BARRISOL stretched ceiling shall have a fire hazard of Class I in the USA within the requirements of the ASTM E84 Flame Spread Test.

C. Other Testing: BARRISOL stretched ceiling shall successfully meet criteria for: UBC 17-5 Room Fire Test Standard, N.Y.S. Pittsburgh Protocol Toxicity Test City of New York Building Department.

D. Stretched ceiling system must be UL approved.

1.04 QUALITY ASSURANCE

A. The work of this section shall be performed by a company which specializes in the type of stretched ceiling system required by this project, with a minimum of 5 years documented successful experience and shall be performed by skilled workmen thoroughly trained in the necessary craft. Work shall be performed in compliance with Owner's insurance underwriters' requirements and UL Approvals and Testing for materials, assemblies and procedures.

B. The membrane shall be stretched over the subsurface and hooked into the BARRISOL rails without glue or clips.

C. The stretch ceiling membrane shall be removable by hand and approved tools for visible inspection, to provide access above the stretched membrane, and to provide for subsequent re-installation.

D. The membrane shall not be less than 17/100 mm thick and shall not have a weight of more than 35g per square foot for all finishes except Brushed Suede.

E. Brushed Suede membrane shall not be less than 35/100 mm thick and shall not have a weight of more than 35g per square foot.

F. The width of sheeting between two factory welds shall not be less than 5'6".

G. All membranes / sheets (except brushed Suede) shall be washable.

1.05 SUBMITTALS

- A. Product Data: Shall be clearly marked to indicate all technical information which specifies full compliance with requirements of this Section, Contract Documents, and the manufacturers' published installation recommendations, including but not limited to the following: samples and printed materials.
- B. Dealer Certification: Submit in writing the manufacturers' certification.
- C. Warranty: Submit manufacturers' limited warranty against defects in product, harpoon welds, sheet welds and colorfastness for a period of two years and workmanship for a period of ten years.
- D. Samples for Initial Selection Purpose: Submit samples of all standard colors and finishes for membranes and rails.
- E. Samples for Verification Purpose: Submit 6" square samples of each type and color of membrane and rails specified.
- F. Certified Test Reports: Submit test data from an independent testing agency, acceptable to authorities having jurisdiction, evidencing that ceiling assembly comply with requirements indicated for fire performance characteristics.

1.06 PROJECT CONDITIONS

- A. Do not begin installation until spaces to receive stretched ceilings have been enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead mechanical and electrical work is completed, tested and approved.
- B. Permit wet work to dry prior to commencement of installation.
- C. Maintain uniform temperatures and humidity prior to, during and after installation.
- D. The ceiling cavity must be airtight.
- E. If a ventilation system is used, air intakes and outlets must have the right dimensions to be correctly balanced.

1.07 COORDINATION

- A. Coordinate layout and installation of ceiling system with other construction that penetrates the ceiling or is supported by them, including light fixtures, HVAC, fire suppression system, and partition assemblies.

1.08 STORAGE AND HANDLING

- A. Store all materials off the ground and protected from dirt and dust of construction operations.
- B. Materials are to be acclimated to installation conditions for 48 hours prior to installations.
- C. Handle all materials in a manner that will protect them from damage.

PART 2 — PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. The BARRISOL Stretch Ceiling as manufactured by BARRISOL Normalu S.A., 68680 Kembs, France (or manufactured under license). For the authorized licensed dealer in your area contact: PRODUCT OF BARRISOL-NORMALU S.A.S. - 68680 KEMBS - FRANCE

Tél. : +33 (0)3 89 83 20 20 - Fax : +33 (0)3 89 48 43 44

E-mail : mail@barrisol.com

www.barrisol.com

2.02 COMPONENTS

A. Stretch PVC (polyvinyl chloride base, guaranteed cadmium free) membrane-ceiling sheet: A ceiling membrane will be custom produced according to exact field measurements. The membrane will be connected together by factory welds to achieve the appropriate size. The Architect to select one of the following:

1. Finishes:

Matt, Satin, Lacquer, Translucent, Metallic, Brushed Suede, Perforated finish (1 mm available in all finishes, 4 mm available in matt and lacquer finishes, and 10 mm available in special matt finish 36/100 mm only). Antibacterial (available in white matt except by special order), Special Anti-static sheet (available in white lacquer except by special order).

B. Harpoon: A semi rigid PVC harpoon (depending on rail type selected) is welded at the factory onto the perimeter of the ceiling membrane. Specify harpoon to be white or black.

C. Seams / Welds: the seams will be lapped and factory welded. The seam location to be specified by the architect.

D. Rails: Specify one of the following :

1. BARRISOL visible rails, PVC or Aluminium. Note PVC invisible rails do not meet the intent of this specification.

2. BARRISOL STAR concealed rails, Aluminium.

E. Rings: Reinforcement rings in Class A PVC available in the shape and size to fit light fixtures, sprinkler heads, HVAC, smoke detectors, etc.

F. Acoustical Materials: Can be installed above the BARRISOL ceiling but not on it.

This acoustical material must meet the requirements of the acoustical specialist and comply with the requirements of the Contract Documents.

G. Acoustical BARRISOL: BARRISOL ceiling can be acoustical in its microperforation version with 20000 holes /sqft. / Test available on request).

PART 3 — EXECUTION

3.01 SURVEY

- A. Install BARRISOL Stretch Ceiling System in accordance with approved submittals, reflected ceiling plan in Architectural Drawings, manufacturer's published recommendations and Contract Documents.
- B. Examine the condition of the installation site and the conditions. Notify the Contractor or Architect in writing of any unsatisfactory conditions. Do not proceed with the work until such conditions have been corrected in a manner satisfactory to the BARRISOL installers.
- C. Survey the installation site for exact field measurements for custom production of the ceiling membrane. Take actual field measurements for each ceiling.
- D. Inspect each space which is to receive wall fixed mounted rails. The surface where the rails will be fixed must be smooth, flat, and finished prior to installation of the rails.
- E. The stretched ceiling should only be installed if the wet work is completed and dry, the space is enclosed weather tight and dustfree, all painting and wall covering is completed and dry, the work of other trades is completed included electrical work, sprinkler systems, HVAC, etc.....

TYPE(S) OF CEILING

116 STRETCH CEILINGS

Location: - Site as specified

Setting Out: - As indicated on drawings

Structural Soffit(s): - As indicated on drawings

Type: - BARRISOL membrane sheet with supporting trims

Manufacturer: - BARRISOL NORMALU SAS, Kembs, France

Installer: - BARRISOL NORMALU SAS. - 68680 KEMBS - FRANCE

Tél. : +33 (0)3 89 83 20 20 - Fax : +33 (0)3 89 48 43 44

E-mail : mail@barrisol.com- www.barrisol.com

Colour: - Specify from Barrisol colour card incl. ref. no.

Finish: - Matt/Satin/Lacquer/Metallic/Translucent/Perforated/Suede

Sheet: - Material to be confirmed as complying with BS476 parts

6&7 class "O", plus Part 12, BS2782 and Euro classification

EN13501-1. Panel width before seams to be min. 1.62m all

finishes, or 2.2m Matt White, or 2.0m Translucent installed

as option. Matt or Satin finishes should be a smooth finish

not textured or granulated

Track (choice): - Star Track (semi concealed) Aluminium – B350/01,

350/11, B350/16 without cover bead OR Classic Track

(exposed) PVC White – B301, B350/03

Profile: - As indicated on drawings. Shapes and forms to be within
manufacturers guidelines

Support system: - Typical suspension for double rail using galvanized MF
system or similar

Service Fittings: - As indicated on drawings

Accessories: - As indicated on drawings

Vapour Barrier: - Sheet to comply with BS3177 vapour test

TYPE(S) OF CEILING

116 STRETCH CEILINGS TREMPO

Location: - Site as specified

Setting Out: - As indicated on drawings

Structural Soffit(s): - As indicated on drawings

Type: - BARRISOL membrane sheet with supporting trims

Manufacturer: - BARRISOL NORMALU SAS, Kembs, France

Installer: - BARRISOL NORMALU SAS - 68680 KEMBS - FRANCE

Tél. : +33 (0)3 89 83 20 20 - Fax : +33 (0)3 89 48 43 44

E-mail : mail@barrisol.com- www.barrisol.com

Colour: - Specify from Barrisol colour card incl. Ref. no.

Finish: - Matt/Satin/Lacquer/Metallic/Translucent/Perforated/Suede

Sheet: - Material to be confirmed as complying with BS476 parts
6&7 class "O", plus Part 12, BS2782 and Euro classification
EN13501-1.

- Will be joined by lacing to the Barrisol Trempo track attached
to the periphery of the walls, or partition walls in the case of
large surfaces. A class "O" steel safety small chain will be
attached every 3 metres.

- Large panels will be divided in width approximately every
6 metres to retain their even surface and joined with a special
double track aluminium rail or invisible joint finish or with a
lighting strip with built-in interlocking rails.

Track (choice) : - Aluminium Track with perforation to allow the hook to be
installed.

Profile: - As indicated on drawings. Shapes and forms to be within
manufacturers guidelines

Support system: - Typical suspension for double rail using galvanized MF
system or similar

Service Fittings: - As indicated on drawings

Accessories: - As indicated on drawings

Vapour Barrier: - Sheet to comply with BS3177 vapour test

TYPE(S) OF CEILING

116 STRETCH CEILINGS MICROACOUSTIC (ACOUSTICS)

Location: - Site as specified

Setting Out: - As indicated on drawings

Structural Soffit(s): - As indicated on drawings

Type: - BARRISOL-MICROPERF membrane sheet with supporting trims

Manufacturer: - BARRISOL NORMALU SAS, Kembs, France

Installer: - BARRISOL NORMALU SAS - 68680 KEMBS - FRANCE

Tél. : +33 (0)3 89 83 20 20 - Fax : +33 (0)3 89 48 43 44

E-mail : mail@barrisol.com- www.barrisol.com

Colour: - Specify from Barrisol colour card incl. Ref. no.

Finish: - Matt/Satin/Lacquer/Metallic/Translucent/Perforated

Sheet: - Material to be confirmed as complying with BS476 parts

6&7 class "O", plus Part 12, BS2782 and Euro classification

EN13501- 1. Panel width before seams to be min. 1.62m all

finishes. Matt or Satin finishes should be a smooth finish not

textured or granulated. The material will be perforated with

approximately 300.000 microholes/m² should be installed

at the predetermined height to obtain the desired acoustics.

The perforated sheet should have a "s = 0.45 and a NRC of 0.45

at a distance of 100mm.

Track (choice): - Star Track (semi concealed) Aluminium – B 350/01, 350/11,

B350/16 without cover bead OR Classic Track (exposed)

PVC White-B301, B350/03

Profile: - As indicated on drawings. Shapes and forms to be within manufacturers guidelines

Support system: - Typical suspension for double rail using galvanized MF system or similar

Service Fittings: - As indicated on drawings

Accessories: - As indicated on drawings

Vapour Barrier: - Sheet to comply with BS3177 vapour test

Revised: October 2002

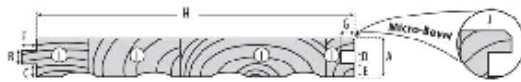
END OF SECTION 095453



White Oak - Specification Sheet

Species:	White Oak
Botanical Name:	Quercus Alba
Raw Material Source:	Mid to Eastern United States
Product Description:	Edge glued plank flooring
Grade:	Staybull Flooring™ Select and Better
Knots:	Closed pin knots allowed.
Checks/Cracks:	Selected for minimal surface checking in up to 5% of pieces allowable.
Grain Pattern:	Open, mixed, primarily flat with occasional swirls and burls and heavy streaks.
Percentage Sapwood:	Selected for minimal sap, up to 10% allowable.
Color:	Contrasting colors and appearance. Some mineral stain. Ranges from a creamy white sapwood to a darker gray brown heartwood.
Weight:	3 lb/Sq. Ft. Approx.
Standard Dimensions:	Thickness: 3/4" (19mm) Width: 5" Face (127mm) Length: 1' – 7' (.304 – 2.13 meters), Average lengths are 3.5' (1.06 meters) or longer.
Edges:	Tongue & Groove with micro bevel.
Ends:	End matched tongue & groove – no micro bevel.
Textures Available:	Smooth
Installation:	Staybull Flooring™ can be installed on and above grade level. It is not recommended that this flooring be installed below grade. Installation procedures may vary, see installation instructions, maybe installed over plywood subfloor or glued to a well aged concrete slab (12 months or older).
Moisture Content:	Shipped at 6%-8.5% average. Moisture content may vary some based on the humidity level of the installation site. Therefore, we recommend flooring be acclimated on the job site in the same environment in which it will remain once installed, for a period of 1 to 3 weeks.
Finishes:	Pre-finished with Ceramic UV Cured Finish.
Stability:	Will expand and contract slightly less than Red Oak.
Waste:	We recommend 5% - 10% cut and waste on traditional sub floor installations.
Janka Rating:	1360
Samples:	Character marks such as knots, checks/cracks, sap, and natural color and grain patterns will vary with each plank. Your floor will vary somewhat from samples and pictures shown.


Staybull Flooring™ products are processed from solid kiln-dried lumber and rips. These flooring materials should be acclimated and installed in accordance with the National Wood Flooring Association recommendations. As each installation is unique, we urge you to contact us and a professional flooring installer for recommendations concerning jobsite evaluation and installation. Please contact your Staybull Flooring™ representative with any questions and view our website for general tips and guidelines on installation.



Letter	Description	Inches	Millimeters
A	Overall Thickness	.75"	19.2mm
B	Tongue Thickness	.25"	6.40mm
C	Tongue to Back of Board	.15"	4.88mm
D	Groove Thickness	.259"	6.60mm
E	Increase End of Board	.187"	4.75mm
F	Length of Tongue	.20"	5.08mm
G	Depth of Groove	.272"	7.00mm
H	Width of flooring face	5"	127mm
I	Width of Lumber Strips Before Milling (Multiple Strips of Lumber)	2.5" - 2.25"	159mm - 64.5mm
J	Micro-Bevel (Before Sanding and Finishing)	.08"	1.5mm


Staybull Flooring™
2520 Blacksburg Rd.
Grover, NC 28073
1-888-525-5966
Fax: (704) 471-9949
Email: info@staybullflooring.com
www.StaybullFlooring.com

SECTION 099123.A1 INTERIOR PAINTING BY BENJAMIN MOORE



ben®
**PREMIUM INTERIOR
 LATEX SEMI-GLOSS W627**

Features	General Description
<ul style="list-style-type: none"> Ideal for trim, cabinets, doors, and wall surfaces that require frequent cleaning Excellent durability Spatter resistant Easy to touch up Dries to a uniform semi-gloss finish Easy to apply by brush, roller or spray Excellent flow and leveling Low VOC 	<p>An acrylic blended latex semi-gloss coating designed for application to a wide variety of interior surfaces. Produces a highly durable, washable finish with excellent hiding.</p>
Recommended For	Limitations
<p>Ideal for interior trim, doors, cabinets, walls, and ceilings. For new or previously painted wallboard, masonry, and primed or previously painted plaster, wood and metal.</p>	<ul style="list-style-type: none"> Do not paint when temperature of air and surface is below 50° F (10° C).

Product Information																																											
<p>Colors: —Standard: (01) White</p> <p>—Tint Bases: Benjamin Moore® Genex® Bases 1X, 2X, 3X, & 4X. Tint Bases only with Genex® Waterborne Colorant.</p> <p>—Special Colors: Contact your Benjamin Moore & Co. representative</p> <p>Certification: Master Painter Institute MPI #54 Federal Specifications Generic Equivalent: TT-P-2119 Available in all regulated areas Class A (0-25) over non-combustible surfaces when tested in accordance with ASTM E-84</p> <div style="text-align: center;">  </div> <p>Based on independent, third-party laboratory testing, the Green Promise® designation certifies that this product meets or exceeds each standard shown in the following chart.</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">LEED®</th> <th style="width: 35%;">CHPS (Collaborative for High Performance Schools)</th> <th style="width: 50%;">VOC</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; background-color: #90EE90;">YES</td> <td style="text-align: center; background-color: #90EE90;">YES</td> <td style="text-align: center;">44.0 g/L</td> </tr> </tbody> </table>	LEED®	CHPS (Collaborative for High Performance Schools)	VOC	YES	YES	44.0 g/L	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #eee;"> <th style="text-align: left;">Technical Data</th> <th style="text-align: left;">Pastel Base</th> </tr> </thead> <tbody> <tr> <td>Vehicle Type</td> <td>Proprietary Acrylic Latex</td> </tr> <tr> <td>Pigment Type</td> <td>Titanium Dioxide</td> </tr> <tr> <td>Volume Solids</td> <td>39%</td> </tr> <tr> <td>Theoretical Coverage At Recommended Film Thickness</td> <td>400 – 450 Sq. Ft Per Gallon</td> </tr> <tr> <td>Film Thickness</td> <td>— Wet 3.8 mils — Dry 1.5 mils</td> </tr> <tr> <td>Dry Time</td> <td>— Dry To Touch 2 Hour — To Recoat 4 Hours</td> </tr> <tr> <td colspan="2" style="text-align: center;"><i>Painted surfaces can be washed after 2 weeks; high humidity may prolong drying time.</i></td> </tr> <tr> <td>Dries By</td> <td>Evaporation, Coalescence</td> </tr> <tr> <td>Viscosity</td> <td>87 ± 2 KU</td> </tr> <tr> <td>Flash Point</td> <td>None</td> </tr> <tr> <td>Gloss/Sheen</td> <td>Semi-Gloss(38-48 @ 80)</td> </tr> <tr> <td>Surface Temperature at application</td> <td>— Min. 50° F — Max 90° F</td> </tr> <tr> <td>Thin With</td> <td>See Chart</td> </tr> <tr> <td>Clean Up Thinner</td> <td>Clean Water</td> </tr> <tr> <td>Weight Per Gallon</td> <td>10.8 lbs</td> </tr> <tr> <td>Storage Temperature</td> <td>— Min 40° F — Max 90° F</td> </tr> <tr> <td colspan="2" style="text-align: center;">Volatile Organic Compounds (VOC) 44 Grams / Liter* .37 LBS / Gallon</td> </tr> </tbody> </table> <p style="font-size: small; text-align: center;">*Reported values are for Pastel Base. Contact Benjamin Moore & Co. for values of other bases or colors.</p>	Technical Data	Pastel Base	Vehicle Type	Proprietary Acrylic Latex	Pigment Type	Titanium Dioxide	Volume Solids	39%	Theoretical Coverage At Recommended Film Thickness	400 – 450 Sq. Ft Per Gallon	Film Thickness	— Wet 3.8 mils — Dry 1.5 mils	Dry Time	— Dry To Touch 2 Hour — To Recoat 4 Hours	<i>Painted surfaces can be washed after 2 weeks; high humidity may prolong drying time.</i>		Dries By	Evaporation, Coalescence	Viscosity	87 ± 2 KU	Flash Point	None	Gloss/Sheen	Semi-Gloss(38-48 @ 80)	Surface Temperature at application	— Min. 50° F — Max 90° F	Thin With	See Chart	Clean Up Thinner	Clean Water	Weight Per Gallon	10.8 lbs	Storage Temperature	— Min 40° F — Max 90° F	Volatile Organic Compounds (VOC) 44 Grams / Liter* .37 LBS / Gallon	
LEED®	CHPS (Collaborative for High Performance Schools)	VOC																																									
YES	YES	44.0 g/L																																									
Technical Data	Pastel Base																																										
Vehicle Type	Proprietary Acrylic Latex																																										
Pigment Type	Titanium Dioxide																																										
Volume Solids	39%																																										
Theoretical Coverage At Recommended Film Thickness	400 – 450 Sq. Ft Per Gallon																																										
Film Thickness	— Wet 3.8 mils — Dry 1.5 mils																																										
Dry Time	— Dry To Touch 2 Hour — To Recoat 4 Hours																																										
<i>Painted surfaces can be washed after 2 weeks; high humidity may prolong drying time.</i>																																											
Dries By	Evaporation, Coalescence																																										
Viscosity	87 ± 2 KU																																										
Flash Point	None																																										
Gloss/Sheen	Semi-Gloss(38-48 @ 80)																																										
Surface Temperature at application	— Min. 50° F — Max 90° F																																										
Thin With	See Chart																																										
Clean Up Thinner	Clean Water																																										
Weight Per Gallon	10.8 lbs																																										
Storage Temperature	— Min 40° F — Max 90° F																																										
Volatile Organic Compounds (VOC) 44 Grams / Liter* .37 LBS / Gallon																																											
<p>Technical Assistance Available through your local authorized independent Benjamin Moore® retailer. For the location of the retailer nearest you, call 1-800-826-2623, see www.benjaminmoore.com, or consult your local Yellow Pages.</p>																																											

ben® Premium Interior Latex Semi-Gloss (W627)

Surface Preparation

Surfaces to be painted must be clean and free from dirt, dust, wax, soap, oil, grease, and water soluble materials. Remove any peeling or scaling paint and sand these areas to feather edges smooth with adjacent surfaces. Glossy areas should be dulled. New plaster and masonry must be cured before painting. Apply primer before and after filling nail holes, cracks, and other surface imperfections.

Unpainted Surfaces & Masonry: New plaster or masonry surfaces must be allowed to cure (30 – 60 days) before priming. All surfaces must be thoroughly brushed with stiff fibre bristles to remove loose particles. Repaint Surfaces: Remove any peeling or scaling paint, and sand these areas to feather edges smooth with adjacent surfaces.

Difficult Substrates: Benjamin Moore & Co. offers a variety of specialty primers for use over difficult substrates such as bleeding woods, grease stains, crayon markings, hard glossy surfaces, galvanized metal, or other substrates where paint adhesion or stain suppression is a particular problem. Your Benjamin Moore® retailer can recommend the right problem-solving primer for your special needs.

WARNING! If you scrape, sand or remove old paint, you may release lead dust. LEAD IS TOXIC. EXPOSURE TO LEAD DUST CAN CAUSE SERIOUS ILLNESS, SUCH AS BRAIN DAMAGE, ESPECIALLY IN CHILDREN. PREGNANT WOMEN SHOULD ALSO AVOID EXPOSURE. Wear a NIOSH approved respirator to control lead exposure. Carefully clean up with a HEPA vacuum and a wet mop. Before you start, find out how to protect yourself and your family by contacting the National Lead Information Hotline at 1-800-424-LEAD or log on to www.epa.gov/lead.

Primer/Finish Systems

For best results and when a significant color change is required, use ben® Premium Interior Latex Primer W624 tinted to the approximate finish coat color. **Special Note:** Certain custom colors require a Deep Color Base Primer tinted to a special prescription formula to achieve the desired color. Consult your retailer.

Wood, and engineered wood products, New:

Primer: ben® Premium Interior Latex Primer (W624).
Finish: 1 or 2 coats of ben® Premium Interior Latex Semi-Gloss (W627)

Bleeding Type Woods (Redwood and Cedar):

Primer: Fresh Start® All-Purpose Alkyd Primer (D24); for light tannin bleed situations, 1 or 2 coats of Fresh Start® All-Purpose 100% Acrylic Primer (D23) may be used.
Finish: 1 or 2 coats of ben® Premium Interior Latex Semi-Gloss (W627)

Drywall:

Primer: ben® Premium Interior Latex Primer (W624)
Finish: 1 or 2 coats of ben® Premium Interior Latex Semi-Gloss (W627)

Plaster:

Primer: Benjamin Moore® Fresh Start® All-Purpose 100% Acrylic Primer (D23)
Finish: 1 or 2 coats of ben® Premium Interior Latex Semi-Gloss (W627)

Rough or Pitted Masonry:

Primer: Super Spec® Latex Block Filler (160)
Finish: 1 or 2 coats of ben® Premium Interior Latex Semi-Gloss (W627)

Priming Smooth Poured or Precast Concrete:

Primer: Moore's Acrylic Masonry Sealer (D66) or ben® Premium Interior Latex Primer (W624)
Finish: 1 or 2 coats of ben® Premium Interior Latex Semi-Gloss (W627)

Unpainted Metal (Ferrous):

Primer: Ironclad® Latex Low Lustre Metal & Wood Enamel (363/C363) or Ironclad® Alkyd Low Lustre Metal & Wood Enamel (C163)
Finish: 1 or 2 coats of ben® Premium Interior Latex Semi-Gloss (W627)

Application

Mixing of Paint: Stir thoroughly before and during use. This product can also be sprayed. Refer to the chart below for application recommendations.

Thinning/Cleanup

Conditioning with Benjamin Moore® 618 Extender may be necessary under certain conditions to adjust open time or spray characteristics. The chart below is for general guidance.		
	Mild conditions	Severe conditions
	Humid (RH> 50%) with no direct sunlight & with little to no wind	Dry (RH<50%), in direct sunlight, or windy conditions
Brush: Nylon / Polyester	No thinning necessary	Add 618 Extender or water:
Roller: Premium Quality		Max of 8 fl. oz. to a gallon paint
Spray: Airless Pressure: 1500 -2500 psi Tip: 0.011-0.015		Never add other paints or solvents.

Cleanup: Wash brushes, rollers, and other painting tools in warm soapy water immediately after use. Spray equipment should be given a final rinse with mineral spirits to prevent rusting.

USE COMPLETELY OR DISPOSE OF PROPERLY. Dry, empty containers may be recycled in a can recycling program. Local disposal requirements vary; consult your sanitation department or state-designated environmental agency on disposal options.

Environmental, Health & Safety Information

Use only with adequate ventilation. Do not breathe spray mist or sanding dust. Ensure fresh air entry during application and drying. Avoid contact with eyes and prolonged or repeated contact with skin. Avoid exposure to dust and spray mist by wearing a NIOSH approved respirator during application, sanding and clean up. Follow respirator manufacturer's directions for respirator use. Close container after each use. Wash thoroughly after handling.

FIRST AID: In case of eye contact, flush immediately with plenty of water for at least 15 minutes; for skin, wash thoroughly with soap and water. If symptoms persist, seek medical attention. If you experience difficulty breathing, leave the area to obtain fresh air. If continued difficulty is experienced, get medical attention immediately.

IN CASE OF SPILL – Absorb with inert material and dispose of as specified under "CleanUp".

**KEEP OUT OF REACH OF CHILDREN
PROTECT FROM FREEZING**

Refer to Material Safety Data Sheet for additional health and safety information.

Benjamin Moore & Co., 101 Paragon Drive, Montvale, NJ 07645 Tel: (201) 573-9600 Fax: (201) 573-9046 www.benjaminmoore.com M72 W627 US 12/09
Benjamin Moore, ben, Fresh Start, Gennex, Green Promise, Ironclad, Moore's, Super Spec, and the triangle "M" symbol are registered trademarks, licensed to Benjamin Moore & Co. © 2008, 2009 Benjamin Moore & Co. All rights reserved.
All other trademarks belong to their respective owners.

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, No. 4 finish (satin), 0.0312-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, ASTM B 16 (ASTM B 16M), or ASTM B 30.
- C. Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063-T6 or 6463-T6.
- D. Sheet Steel: ASTM A 1008/A 1008M, 0.0359-inch (0.9-mm) minimum nominal thickness.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G60 (Z180).
- F. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- G. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- H. Tempered Glass: ASTM C 1048, Kind FT (fully tempered).
- I. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- J. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- K. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

- L. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of [six] <Insert number> keys to Owner's representative.

2.02 TOILET AND BATH ACCESSORIES

A. [Available]Manufacturers:

- 1. <Insert manufacturer's name.>

B. Paper Towel Dispenser <Insert drawing designation>:

- 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
- 2. Mounting: [Recessed] [Surface].
- 3. Minimum Capacity: [400 C-fold or 525 multifold towels] [600 C-fold or 800 multifold towels] [400 single-fold towels] [8-inch- (203-mm-) wide, 800-foot- (244-m-) long roll] <Insert capacity>.
- 4. Material: [Stainless steel, No. 4 finish (satin)] [ABS plastic, gray].
- 5. Lockset: Tumbler type.
- 6. Refill Indicators: Pierced slots at sides or front.

C. Toilet Tissue Dispenser <Insert drawing designation>:

- 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
- 2. Type: [Roll-in-reserve dispenser with hinged front secured with tumbler lockset] [Single-roll dispenser] [Double-roll dispenser].
- 3. Mounting: [Surface mounted with concealed anchorage] [Recessed] [Partition mounted serving two adjacent toilet compartments].
- 4. Material: [Stainless steel] [Chrome-plated zinc alloy (zamac) or steel] [Satin-finish aluminum bracket with plastic spindle] [ABS plastic, gray].
- 5. Operation: [Noncontrol delivery with standard spindle] [Spindleless with tension-spring controlled delivery] [Spindleless with tension-spring controlled delivery and self-locking device extending through core that prevents core removal until roll is empty] [Eccentric-shaped, molded-plastic spindle revolves one-half revolution per dispensing operation for controlled delivery; core cannot be removed until roll is empty].
- 6. Capacity: [Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter-core tissue rolls] [Designed for 5-inch- (127-mm-) diameter-core tissue rolls].

D. Waste Receptacle <Insert drawing designation>:

- 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>

2. Type: [Open top, recessed] [Surface mounted] [Wall mounted for corner installation] [Freestanding] [Undercounter].
 3. Capacity: <Insert capacity.>
 4. Material and Finish: Stainless steel, No. 4 finish (satin).
 5. Liner: [Reusable vinyl liner] <Insert liner description>.
- E. Liquid-Soap Dispenser <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 2. Mounting: [Deck mounted on vanity] [Deck mounted on lavatory] [Horizontal recessed] [Surface].
 3. Capacity: <Insert capacity.>
 4. Materials: <Insert material descriptions.>
 5. Stainless-Steel Soap Valve: Designed for dispensing soap in [liquid] [lather] form.
 6. Lockset: Tumbler type.
 7. Refill Indicator: Window type.
- F. Grab Bar <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 2. Material: Stainless steel, **0.050 inch (1.3 mm)** thick.
 3. Mounting: [Concealed] [Exposed].
 4. Gripping Surfaces: [Smooth, satin finish] [Slip-resistant texture].
 5. Outside Diameter: [**1-1/4 inches (32 mm)** for medium] [**1-1/2 inches (38 mm)** for heavy]-duty applications.
- G. Sanitary Napkin Disposal Unit <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 2. Mounting: [Recessed] [Partition mounted, dual access] [Surface] [Freestanding].
 3. Material: [Stainless steel, No. 4 finish (satin)] [ABS plastic, gray].
 4. Door or Cover: Self-closing.
 5. Receptacle: Removable.
- H. Seat-Cover Dispenser <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 2. Mounting: [Surface] [Recessed] [Partition mounted, dual access].
 3. Capacity: <Insert capacity.>
 4. Material: [Stainless steel, No. 4 finish (satin)] [ABS plastic, gray].
 5. Lockset: Tumbler type.

- I. Mirror Unit <Insert designation>:
 - 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 - 2. Frame: [Stainless-steel angle, 0.050 inch (1.3 mm) thick] [Stainless-steel channel] [Stainless steel, fixed tilt] [Stainless steel, adjustable tilt].

- J. Warm-Air Dryer <Insert drawing designation>:
 - 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 - 2. Type: [Touch-button] [Electronic-sensor] activated.
 - 3. Mounting: Surface.
 - 4. Material: [Steel, with white enamel finish] [Stainless steel, No. 4 finish (satin)] [Molded plastic, gray] [Molded plastic, white].

- K. Shower Curtain Rod <Insert drawing designation>:
 - 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 - 2. Outside Diameter: [1 inch (25.4 mm)] [1-1/4 inches (32 mm)].
 - 3. Mounting: Flanges with [exposed] [concealed] fasteners.
 - 4. Material and Finish: [Brass, polished] [Polished chrome-plated brass] [Stainless steel, No. 4 finish (satin)] [Stainless steel, No. 7 finish (polished)] <Insert material and finish>.

- L. Sliding Glass Shower Doors <Insert drawing designation>:
 - 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 - 2. Material and Finish: [Aluminum, polished, clear anodized] [Aluminum, polished, gold anodized] <Insert material and finish>.
 - 3. Glass: [Clear] [Patterned], fully tempered.

- M. Medicine Cabinet <Insert drawing designation>:
 - 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 - 2. Mounting: [Recessed, for nominal 4-inch (100-mm) wall depth] [Surface mounted].
 - 3. Size: [18 by 24 inches (460 by 610 mm)] <Insert size>.
 - 4. Door: [Framed mirror door concealing storage cabinet equipped with continuous hinge and spring-buffered, rod-type stop and magnetic door catch] <Insert description>.
 - 5. Shelves: [Three, adjustable] <Insert requirements>.

- N. Robe Hook <Insert drawing designation>:
 - 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 - 2. Description: [Double] [Single]-prong unit.

3. Material and Finish: [Solid brass, polished] [Polished brass-plated zinc alloy (zamac)] [Polished chrome-plated brass] [Polished chrome-plated zinc alloy (zamac)] [Stainless steel, No. 4 finish (satin)] [Stainless steel, No. 7 finish (polished)] <Insert material and finish>.
- O. Toothbrush and Tumbler Holder <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 2. Description: <Insert description.>
 3. Material and Finish: [Solid brass, polished] [Polished brass-plated zinc alloy (zamac)] [Polished chrome-plated brass] [Polished chrome-plated zinc alloy (zamac)] [Stainless steel, No. 4 finish (satin)] [Stainless steel, No. 7 finish (polished)] <Insert material and finish>.
- P. Towel Bar <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 2. Description: [~~3/4-inch- (19-mm-)~~ square tube with rectangular end brackets] [~~3/4-inch- (19-mm-)~~ round tube with circular end brackets] <Insert description>.
 3. Mounting: Flanges with [concealed] [exposed] fasteners.
 4. Length: [~~18 inches (457 mm)~~] [~~24 inches (610 mm)~~] [~~30 inches (762 mm)~~] <Insert dimension>.
 5. Material and Finish: [Stainless steel, No. 4 finish (satin)] [Stainless steel, No. 7 finish (polished)] [Polished aluminum] <Insert material and finish>.
- Q. Towel Ring <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 2. Description: Pin projecting approximately ~~2-1/2 inches (63 mm)~~ from wall with [square] [circular] [oval] [trapezoidal] ring.
 3. Pin Material and Finish: [Solid brass, polished] [Polished brass-plated zinc alloy (zamac)] [Polished chrome-plated brass] [Polished chrome-plated zinc alloy (zamac)] [Stainless steel, No. 4 finish (satin)] [Stainless steel, No. 7 finish (polished)] <Insert material and finish>.
 4. Ring Material and Finish: [Matching pin] [Clear plastic].
- R. Towel Rack <Insert drawing designation>:
1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 2. Description: [Surface-mounted, guest-towel unit with approximately ~~1/4-inch- (6-mm-)~~ diameter wire rings welded to upright wire bracket] <Insert description>.
 3. Capacity: [Two] [Three] [Four] <Insert number> sets of bath towels, hand towels, and washcloths.
 4. Nominal Height: [~~11 inches (279 mm)~~] [~~17 inches (432 mm)~~] [~~21 inches (533 mm)~~] <Insert dimension>.
 5. Material and Finish: [Polished brass-plated zinc alloy (zamac)] [Polished chrome-plated zinc alloy (zamac)] <Insert material and finish>.

- S. Underlavatory Guard <Insert drawing designation>:
 - 1. Basis-of-Design Product: <Insert manufacturer; product name or designation.>
 - 2. Description: Insulating pipe coverings for supply and drain piping assemblies, which prevent direct contact with and burns from piping, and allow service access without removing coverings.
 - 3. Material and Finish: Antimicrobial, molded plastic, white.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - 1. Install grab bars to withstand a downward load of at least **250 lbf (1112 N)**, when tested according to method in ASTM F 446.
- B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION 102800

SECTION 104416 - DRY-CHEMICAL FIRE-EXTINGUISHERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHERS AND BRACKETS

- A. Portable Fire Extinguishers: NFPA 10 listed and labeled for the type, rating, and classification of extinguisher.

1. Products:

- a. Kiddie PRO 340 Fire Extinguisher: Multipurpose Dry-Chemical Type: UL-rated 3-A:40-B:C, 5-lb nominal capacity, in enameled-aluminum container.

1) <http://www.kidde.com/utcfs/ws-384/Assets/Pro%20340%20Fire%20Extinguisher.pdf>

- b. Kiddie PRO 110 Fire Extinguisher: Multipurpose Dry-Chemical Type: UL-rate 1-A:10-B:C, 2.6 lb nominal capacity, in enameled-aluminum container.

1) <http://www.kidde.com/utcfs/ws-384/Assets/Pro%20110%20Fire%20Extinguisher.pdf>

- B. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for fire extinguishers indicated, with plated or baked-enamel finish.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install mounting brackets in locations indicated at heights acceptable to authorities having jurisdiction.
- B. Install fire extinguishers in mounting brackets and cabinets where indicated.

END OF SECTION 104416

Division 11 – Equipment

11 31 00 Residential Appliances

SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

- A. Allowances: See Division 01 Section "Price and Payment Procedures" for appliance allowances.
- B. Submittals: Product Data.
- C. Regulatory Requirements: Comply with provisions of the following product certifications:
 - 1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 2. UL and NEMA: Provide electrical components required as part of residential appliances that are listed and labeled by UL and that comply with applicable NEMA standards.
 - 3. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.
 - 4. NAECA: Provide residential appliances that comply with NAECA standards.
- D. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
- E. Energy Ratings: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

PART 2 - PRODUCTS

2.01 RESIDENTIAL APPLIANCES

- A. **11 31 13.A9 - Electric Cooktop:** 30-inch W, 21-inch D, 2 7/8-inch H, built-in cooktop with four burner elements.
 - 1. Product:
 - a. IKEA, Eldig Glass ceramic cooktop
 - 2. Color: White

- B. **11 31 13.B1 - Electric Wall Oven:** 29 ¾-inch W, 28 ¼-inch H, 23 ½-inch D, Built-in single, electric, self-cleaning wall oven with broiler unit.
1. Product: GE # JTP30DPWW
 2. Color: White
- C. **Exhaust Hood:** 30-inch W, 6-inch H, 17.5-inch D, under cabinet, venting exhaust hood with 2 speed fan.
1. Fan Control: Hood-mounted switch, with separate light switch.
 2. Weatherproof wall cap with back-draft damper and rodent-proof screening.
Product:
 - a. Model # UXT4030AAW
 - b. Color: White
- D. **11 31 13.B2 - Refrigerator/Freezer:** 23.63-inch W, 58.38-inch H, 26-inch D, Freestanding, frost-free, two-door refrigerator with top-mounted freezer, baked-enamel-on-steel interior cabinet liners.
1. Food Compartment Volume: **10.3 cu. ft.**
 2. Shelf Area: 2 adjustable wire shelves.
Product:
 - a. Summit FF1112W
 - b. Color: White



FF1112W

58.38" x 23.63" x 26.0" (H x W x D)

ENERGY STAR rated frost-free refrigerator-freezer in slim 24" width; replaces FF1110W

Highlights:

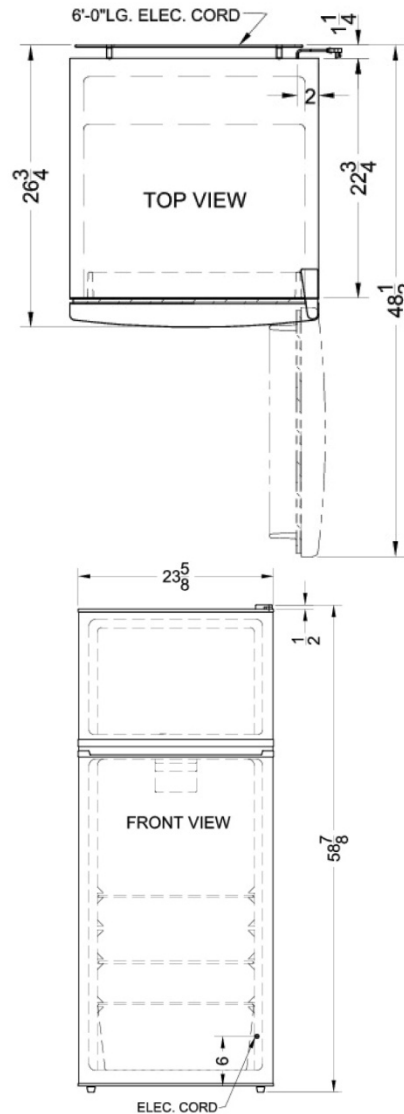
- ENERGY STAR qualified for guaranteed savings on energy waste and utility bills
- True frost-free operation saves you maintenance by preventing icy buildup
- Deluxe interior is fully featured for storage convenience
- Door shelves in both compartments



ENERGY STAR qualified	Rated by the DOE to perform with more efficiency than federal standards require, saving your unit energy and you on higher utility costs
Frost-free operation	No-frost convenience for reduced user maintenance
Adjustable shelves	Rearrange your refrigerator space to accommodate all shapes and sizes or remove shelves for a simple clean-up
Full freezer shelf	Allows you to better separate those TV dinners from your ice cream
Interior light	Automatically illuminates when you open the door
Reversible doors	Keep your options flexible with reversible doors that are easy to switch when your arrangement changes
Fruit and vegetable crisper	Get the longest life and best taste out of produce by storing greens in a convenient slide drawer
Door storage	Keep large bottles and condiments right on the door for easy access
Adjustable thermostat	Manage the interior temperature with ease and accuracy
100% CFC free	Environmentally friendly design without ozone-damaging chemicals

Specifications:

Height	58.38"
Width	23.63"
Depth	26.0"
Capacity	10.3 cu.ft.
Interior Height 1	40.0"
Interior Width 1	19.5"
Interior Depth 1	14.0"
Interior Height 2	12.25"
Interior Width 2	19.0"
Interior Depth 2	14.0"
Shipping Weight	166.0 lbs.
Canadian Electrical Safety	ULC
US Electrical Safety	UL
Energy Usage/Year	309.0 kWh/year
Voltage/Frequency	115 V AC/60 Hz
Amps	1.6
Reversible	Yes
Door Swing	RHD
Crisper Quantity	1
Shelf Quantity	2
Adjustable Shelf	true
Shelf Type	Wire
Crisper Cover Type	Glass
Crisper Finish	Transparent
Full Door Shelf Quantity	4
Defrost Type	Frost-Free
Height to Hinge Cap	58.88"
Depth with door at 90°#176;	48.5"
Thermostat Type	Dial
Condensor Location	Side of Unit
Fan Type	Interior
Light	true
Level Legs Quantity	2
Freon Type	R134a
Freon Oz	5.3
High Side PSI	235.0
Low Side PSI	140.0
Parts/Labor Warranty	1 Year
Compressor Warranty	5 Years



Summit Appliance Division, Felix Storch, Inc.
 770 Garrison Ave • Bronx, NY 10474
 Phone: 718-893-3900 • Fax: 718-842-3093
 Email: info@summitappliance.com

- E. **11 31 13.B3 - Dishwasher:** 18-inch W, 32 ½-inch H, 22 ½-inch D, Built-in, under-counter, automatic dishwasher, sized to replace 18-inch base cabinet, 7 wash cycles with hot-air and heat-off drying cycles, stainless-steel tub and door liner, nylon-coated sliding dish racks.

Product:

- a. GE Spacemaker GSM1800NWW
- b. Color: White

- F. **11 31 23.A4 - Clothes Washer / Dryer Combo:** 23 1/3-inch W, 33 1/3-inch H, 24-inch D, Freestanding, Front-loading, automatic clothes washer and dryer with 13 lbs. maximum load capacity, stainless-steel tub and drum and 9 wash cycles including regular, delicate, and permanent press; 176 kWh reversible motor.

Product:

- a. Ariston AWD121NA
- b. Color: White

Ariston AWD121NA 24" Washer/Dryer Combo with 13 lbs. M...

http://www.ajmadison.com/cgi-bin/ajmadison/AWD121NA.html

Category Index Site Map Reviews Blog Showroom Rebate Center Order Status Help **Cart: 0**

search

Cooking Refrigerators Dishwashers Food Disposal Laundry Air Conditioners Outdoor Sinks & Faucets Vacuums Brands Savings

Home > Lau

Quick

Appearance

Type : Front

Fuel Type :

Color : Whit

Stackable :

Dimensions

Width : 23 43/100"

Depth : 24"

Height : 33 47/100"

Features

Control Type : Digital and Knobs

Drum Material : Stainless Steel

Reversible Door : No

Leveling Legs : Yes

Wash Cycles : 9

Steam Cycle : No

Soak Setting : No

Maximum Spin Speed (RPM) : 1200

Bleach Dispenser : Yes

Fabric Softener Dispenser : Yes

Water Heater : Yes

Self Cleaning Lint Filter : No

Dry Rack : No

Extra Large Lint Filter : No

Venting Type : Ventless

Usage : Residential

Technical Details

Energy Star Rated : Yes

CEE Rating : Not Available

Amps : 15

Voltage : 120 Volts

Are You a Builder?

Contact us for volume discounts and special pricing

Get Quote

Image of a construction worker

Full Size Refrigerators

Top Freezer Refrigerators

Bottom Freezer Refrigerators

French Door Refrigerators

Side by Side Refrigerators

Built In Refrigerators

Panel Ready Refrigerators

All Refrigerators

All Freezers

Compact Refrigeration

Compact Refrigerators

Compact Freezers

Compact Wine Storage

Compact Beverage Centers

Ice Makers

Beer / Kegeators

Specialty Refrigeration

Full Size Wine Storage

Full Size Beverage Centers

Chest Freezers

Upright Freezers



Qty: 1

Add to Cart

with 13 lbs. Maximum Load Capacity, 1200 settings and 12 Hr. Delay Timer. White

Extended Warranty

Price Match Policy

Print

Share this item:

Like Be the first of your friends to like this.

Average Rating: 2.7

Read (10) Write Color Options

Selected White \$1,049.00
 Platinum \$1,099.00

No Interest if paid in full in 6 Months
 Bill Me Later See Terms
 On orders over \$500.
 Subject to credit approval.

As low as \$33.84/month 1
 Learn More >

Warranties Description Specifications Features Info & Guides Rebates Reviews

Specifications

Dimensions & Weight

Product Height: 33 47/100"

Product Width: 23 43/100"

Product Depth: 24"

Door opening: 13"

Product only: 137.3 lbs. / 62.3 kg

Product with packaging: 141.5 lbs. / 64.2 kg

Performances

Energy test washing capacity: 12 lbs. / 5.5 kgs

Energy test drying capacity: 8 lbs. / 3.6 kgs.

Maximum washing load: 13 lbs. / 6.0 kgs

Energy guide: 176 kWh/year

Heating Element: 1300 W

Approval: UL / CUL

Primary Functions

Sanitary Wash: No

Cotton Wash: Heavy, Regular, Light

Permanent Press Wash: Heavy, Regular, Light

Delicates Wash: Delicates, Silk, Wool

Daily Wash: No

Variable temperature: Yes

Variable drying time: Yes

Variable spin speed: Up to 1200 RPM

Additional Options

Super Wash: No

Pre-Wash: Yes

Easy Iron: Yes

Delay Timer: Yes

Extra Rinse: Yes



More saving. More doing.™

Welcome, (Sign In or Register) Pompano Beach, FL is your

Share Email Print

Quantity: 1

Broan 42000 Series 36 in. Externally Vented Range Hood - White

Model # 423601 Internet # 202228408

(1) [Write a Review](#)

\$70.83 /EA-Each

Ships FREE with \$249.00 Order



[Zoom View](#)

+ ADD TO CART

[Add to My List](#)

[Online Only](#)

SHOPPERS WHO VIEWED THIS ITEM ALSO VIEWED



42000 Series 36 in. Externally Vented Range Hood with ...
\$76.68/Each



41000 Series 36 in. Non-Vented Range Hood - White
\$76.91/Each



42000 Series 42 in. Externally Vented Range Hood in ...
\$73.34/Each

Description

Quality construction and ease of installation make the 42000 the popular choice in vertically-ducted economy hoods. It has mitered sides and bottom hem for safety and good looks. It uses rocker-type switches for the fan and light. A damper can be purchased separately.

190 CFM, 6.0 sones, UL Listed, HVI-2100 Certified
BP87 double-leaf damper (available separately)
Rocker-type fan and light switches
Mitered sides and hemmed bottom for safety and good looks
Incandescent light for cooktop illumination (bulb sold separately)
MFG Brand Name : Broan
MFG Model # : 423601
MFG Part # : 423601

Specifications

ADA Compliant : No
ANSI Certified : Yes
Air Flow Method : Axial fan
Allowable Height Above Cooktop (ft.) : 2.0
Amps : 2.5 A
Appliance Suite : 420000 Series
Assembled Depth (in.) : 17.5 in
Assembled Height (in.) : 6 in
Assembled Width (in.) : 36 in
Automatic Delay Shut-off for Fan : No
Automatic Delay Shut-off for Light : No
CSA Listed : No
Color/Finish : White
Color/Finish Family : White
Control Type (Rangehoods) : Rocker
Dishwasher Safe Charcoal Filter : No
Dishwasher Safe Metal Mesh Filter : Yes
Duct Length (in) : 0
Duct Shape : Round
Duct Width (in.) : 0
ETL Listed : No
Fan : Yes
Filter Height (in) : 10.5
Filter Length (in) : 8.75
Filter Saturation Alarm : No
Filter Type : Reusable
Filter Width (in) : 8.75

Housing Material : Steel
Item Weight : 13 lb
Light : Yes
Manufacturer Warranty : Limited 1 year
Maximum Air Flow Capacity (CFM) : 190
Maximum Bulb Wattage : 75 W
Minimum Air Flow Capacity (CFM) : 0.0
NSF Listed : No
Number of Filters : 1
Number of Light Levels : 1
Product Height (in.) : 6 in
Product Length (in.) : 36 in
Product Width (in.) : 36 in
Range Hood Type : Under Cabinet
Reconditioned : No
Remote Control : No
Removable Grease Filter(s) : Yes
Returnable : 90-Day
Temperature Sensor : No
Vent Style : External
Vent Type : Ducted
Voltage (volts) : 120 V

More Info

Warranty

For warranty information on this product, please call our Internet Customer Service Center at 1-800-435-4654.

Shipping

Most orders ship within 3 business days.

Please allow an additional 3-5 business days for Standard Ground Delivery in the U.S. Orders for this item may be expedited for an additional fee.
Other Delivery Options:
Expedited Delivery: Delivery the second business day.
Express Delivery: Delivery the next business day.

CONTACT

Can't find what you're looking for?
 Please call us:

1-800-HOME DEPOT
1-800-466-3337

E-MAIL EXCLUSIVES

Sign up to receive special offers and promotions from the Home Depot

Enter Email Address

FOLLOW THE HOME DEPOT



ABOUT THE HOME DEPOT

Affiliate Program
 Careers
 Corporate Info
 Government Customers
 Investor Relations
 Privacy & Security
 Supplier Center
 Supplier Diversity
 The Home Depot Canada
 The Home Depot Mexico

STRESS FREE SHOPPING

Gift Cards
 Price Match Policy
 Privacy Policy
 Return Policy
 Extended Protection Plans
 Site Map
 Store Pick Up Policy


PARTNER SITES

Home Improver Club
 Home Decorators Collection
 Garden Club
 The Home Depot Racing
 Eco Options

CUSTOMER SERVICE

Contact Us
 Home Depot Opinion
 Order Status
 Product Recalls
 Shipping and Delivery
 Store Information

CREDIT CENTER



No Interest if Paid in Full Within 6 Months*
 \$299 Minimum Purchase Required. Minimum Payments Required.

6 MONTHS EVERYDAY >

† Local store prices may vary from those displayed. Products shown as available are normally stocked but inventory levels cannot be guaranteed.
 © 2000-2010 Homer TLC, Inc. All Rights Reserved. Use of this site is subject to certain Terms of Use which constitute a legal agreement between you and The Home Depot U.S.A. Inc.

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887
END OF SECTION 113100



Division 12 – Furnishings

12 35 30 Residential Casework

SECTION 123530 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.01 SECTION REQUIREMENTS

- A. Submittals: Product Data[, **Shop Drawings**,] and material Samples.
- B. Verify dimensions by field measurements.

PART 2 - PRODUCTS

2.01 CASEWORK

- A. Cabinets:
 - 1. Products:
 - a. IKEA PAX Wardrobe with 2 doors, white, Fardal high-gloss/white. 598.760.65
 - 2. Face Style: Flush overlay
 - 3. Cabinet Style: Face frame.
 - 4. Door and Drawer Fronts: Melamine-faced particleboard.
 - 5. Face Frame Finish: Renewable wood, particleboard, laminated (melamine foil).
 - 6. Exposed Plastic Laminate: Wilsonart, Kensington, maple 10776, vertical grade.
 - 7. Door and Drawer Pulls: IKEA METRIK 401.388.35, Aluminum Brushed finish nickel plated.
 - 8. Hinges: Semiconcealed (wraparound) butt hinges for overlay doors.
 - 9. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides with nylon-tired, ball-bearing rollers.
 - 10. Medium Density Fiberboard: IKEA ABSTRAKT 800.699.86. High gloss white cover panels .low formaldehyde. Meets German E-1 Standard (Formaldehyde emissions from fiberboard must not exceed the E-1 Standard which is equivalent to 0.1 parts-per-million).

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install cabinets with no variations in flushness of adjoining surfaces by using concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework face.
- B. Install cabinets without distortion so doors and drawers fit openings properly and are aligned.
- C. Install level and plumb to a tolerance of **1/8 inch in 8 feet (3.2 mm in 2.4 m)**.
- D. Fasten each cabinet to adjacent unit and to structural members of wall construction. Fasten wall cabinets through back, near top and bottom, at ends and not less than **24 inches (600 mm)** o.c.
 - 1. Use No. 10 wafer-head screws sized for **1-inch (25-mm)** penetration into wood framing, blocking, or hanging strips.
 - 2. Use toggle bolts through metal backing behind gypsum board.
- E. Fasten plastic-laminate countertops by screwing through corner blocks in base units into underside of countertop. Spline and glue joints in countertops and use concealed mechanical clamps.
 - 1. Provide cutouts for sinks and lavatories, including holes for faucets and accessories.
 - 2. Seal edges of cutouts by saturating with varnish.
- F. Fasten solid-surface countertops by screwing through corner blocks in base units into underside of countertop. Align adjacent surfaces. Form seams **1/8 inch (3.2 mm)** wide and adhere with manufacturer's recommended joint adhesive in color to match countertop. Dress joints smooth, remove surface scratches, and clean entire surface.
 - 1. Seal edges of cutouts by saturating with varnish.

END OF SECTION 123530

12 48 53.A1 Rug by IKEA

SECTION 124853.A1 – RUG BY IKEA

IKEA Search

Welcome!

Ask Anna! My account My shopping cart My shopping list Visit our Mobile Site! Join our email list Información en español

All products New Special Offers! Living room Bedroom Kitchen Children's IKEA Textiles All departments

Home / Living room / Rugs / Large & medium rugs

View more images

VEJEN
Rug, flatwoven
\$89.99
601.750.68
[Read more](#)

1 Save to list

Sorry, this product is not for sale on our website, check if it is available in your local store.

Complementary Products

+

[View all complementary products](#)

Buy at your local store
FL, Sunrise Ok

Store selection may vary and prices may differ from those online.

Matching Products **Complementary Products** **Product Information**

BLOMSTER vase \$39.99

VÅTE table lamp \$19.99

VÅTE table lamp \$24.99

More Large & medium rugs

[Go to Large & medium rugs](#)

Delivery Get all your options with our delivery service.

Home furnishing advice Book a free appointment for expert tips and ideas.

IKEA Gift Card Our flattest pack so far! Click for details.

IKEA Catalog & Brochures Request View

Customer Service Contact Us FAQ Return Policy Children's Product Registration All IKEA Services

About IKEA People & the Environment IKEA Foundation IKEA News Room Our Code of Conduct

The IKEA Store Find an IKEA Store IKEA Food & Restaurant IKEA Business IKEA Gift Card View your IKEA Credit Card Account

Careers at IKEA Search careers Your career at IKEA Coworker stories Work areas

<http://www.ikea.com/us/en/store/sunrise>

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887
END OF SECTION 124853.A1



SECTION 125219.A1 UPHOLSTERED SEARING BY IKEA

IKEA | Fabric sofas | Fabric armchairs | TIRUP | Swivel chair

<http://www.ikea.com/us/en/catalog/products/70120075>

WELCOME!

Search

My account
My shopping cart
My shopping list

Visit our Mobile Site!
Join our email list
Información en español

Ask Anna!

Children's IKEA Textiles All departments

All products New Special Offers Living room Bedroom Kitchen

TIRUP
Swivel chair
\$349.00

Extra wide seat allows you to sit comfortably; you can put your legs under you and rest your hands on the seat.
[Read more](#)

1
Buy online Save to list

Buy at your local store
Choose Ok

Store selection may vary and prices may differ from those online.

Product information



TIRUP
Swivel chair
\$349.00

Package measurement and weight

Packages: 1
Article Number: 70120075
Weight: 55lb
Quantity: 1

Article Number: 70120075
Weight: 24.8 kg
Quantity: 1

Key features

- Extra wide seat allows you to sit comfortably; you can put your legs under you and rest your hands on the seat.

- Molded high-resilient polyurethane foam gives rounded shapes and great, durable seating comfort.

Designer:

Carl Ojerstam

Good to know

Complies with California TB117 flammability requirements.

Care instructions

Do not wash.
Clean with upholstery shampoo.
Do not bleach.
Do not tumble dry.
Do not iron.
Do not dryclean.

Product description

Cover: 100 % cotton
Frame: High resilient polyurethane foam (cold foam), Steel
Fixing bracket with cone/ Tubular column/
Swivel base: Steel, Chrome plated
Sleeve/ Zipper: Polyamide
Thread: 100 % polyester

More Fabric armchairs



[Go to Fabric armchairs](#)

IKEA | Fabric sofas | Fabric armchairs | TIRUP | Swivel chair

<http://www.ikea.com/us/en/catalog/products/70120075>

<p>IKEA Catalog & Brochures Request View</p> 	<p>Customer Service Need help? Ask Anna! FAQ Return Policy Children's Product Registration All IKEA Services</p>	<p>About IKEA People & the Environment IKEA Social Initiative IKEA Press Room</p>	<p>The IKEA Store Find an IKEA Store IKEA Food & Restaurant IKEA Business IKEA Gift Card</p>	<p>Working at IKEA Jobs Available What we offer</p>
---	---	--	---	--

© Inter IKEA Systems B.V. 1999 - 2010 | [Privacy Policy](#)

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887
END OF SECTION 125219.A1



SECTION 125813.A1 SOFA BY IKEA

IKEA | Fabric sofas | Two-seat sofas | KIVIK | Loveseat

http://www.ikea.com/us/en/catalog/products/S09877798



Enlarge image

KIVIK
Loveseat
\$579.00

Cover
Tan light gray
Price reflects the options selected above

Shopping list
Make it easier for yourself. Add products to your shopping list. Print it, and bring to the store.
Add to shopping list

Buy online
Quantity: 1
add to shopping cart

Buy at your local store
Prices on products not featured in the IKEA 2011 catalog may vary at your local store.
Choose
Check stock availability

Want more?
More KIVIK series products

More of the same
Go to Two-seat sofas

Product information

Key features

- Generous seating series with a soft, deep seat and comfortable support for your back.
- Seat cushions with a top layer of memory foam. Holds to the contours of your body and regains its shape when you get up.
- The sofa can be expanded with one or more chaises. The removable armrests make it easy.
- Wide and low armrests with extra padding work both as extra seating and as comfortable support for your neck when you lie on your sofa.
- Easy to keep clean with removable, dry clean only cover.

Designers

Ola Wilborg

Product dimensions

Width: 74 3/4 "
Depth: 37 3/8 "
Height: 32 5/8 "
Seat width: 55 1/8 "
Seat depth: 23 5/8 "
Seat height: 17 3/4 "

Width: 190 cm
Depth: 95 cm
Height: 83 cm
Seat width: 140 cm
Seat depth: 60 cm
Seat height: 45 cm

This product requires assembly

Care instructions

- Removable cover. Do not wash. To be washed separately. Do not bleach. Do not tumble dry. Iron, low temperature. Dryclean, normal cycle.

Product description & measurements

Loveseat frame: Back and seat frame: Fiberboard, Moisture resistant particleboard, Plywood, Non-woven polypropylene, Solid pine, Polyurethane foam 1.2 lb/cu.ft.
Armrest frame: Fiberboard, Moisture resistant particleboard, Plywood, Solid pine, Polyurethane foam 1.2 lb/cu.ft., Polyurethane foam 1.5 lb/cu.ft., Polyester wadding
Seat cushion: High-resilience polyurethane foam (cold foam) 2.2 lb/cu.ft., Polyurethane memory foam 3.1 lb/cu.ft., Polyester wadding
Back cushion: Polyester fiber balls
Lining: Non-woven polypropylene
Loveseat cover: Total composition: 26 % modacrylic, 23 % acrylic, 18 % viscose/nylon, 13 % cotton, 12 % wool, 6 % polyester, 2 % nylon
Lining: Non-woven polypropylene

Package measurements & weight
(3 packages in total)

Delivery
Get all your options with our delivery service.

Assembly service
In need of some assembly assistance? Help is at hand.

IKEA Credit Card
There's no reason to put off that purchase with the IKEA Credit Card!

12 58 19.A1 Dining Table and Chairs

SECTION 125819.A1 DINING TABLE AND CHAIRS

IKEA Search

Welcome!

Ask Anna! My account My shopping cart My shopping list Visit our Mobile Site! Join our email list Información en español

All products New Special Offers! Living room Bedroom Kitchen Children's IKEA Textiles All departments

Home / Dining / Up to 6 seats
View more images

BJURSTA
Dining table
\$179.00

The price reflects selected options
601.823.04

Extendable dining table with 1 extra leaf seats 4-6; makes it possible to adjust the table size according to need. [Read more](#)

Color: brown

1 Save to list

Sorry, this product is not for sale on our website, check if it is available in your local store.

Buy at your local store
FL, Sunrise Ok

Store selection may vary and prices may differ from those online.

Color:

More Models:

Matching Products:

BJURSTA
Dining table
\$179.00

Good to know
For increased stability, re-tighten the screws about two weeks after assembly. Combines with other furniture in the BJRSTA series.

Care instructions
Wipe clean using a damp cloth and a mild cleaner. Wipe dry with a clean cloth.

Product description
Table top/ Extension leaf/ Leg: Particleboard, Ash veneer, Stain, Clear acrylic lacquer
Underframe: Ash veneer, Stain, Clear acrylic lacquer
Box: Solid wood
Side rail: Solid wood, Ash veneer, Stain, Clear acrylic lacquer

More BJRSTA series:

Go to BJRSTA series

More Up to 6 seats:

Go to Up to 6 seats

Find the Style
Show matching products

Package measurement and weight
Packages:: 2
Article Number: 601.823.04
Width:
Height:
Length: 110lb
Weight: 50.1 kg
Quantity: 1

Article Number: 601.823.04
Width: cm
Height: cm
Length: cm
Weight: 50.1 kg
Quantity: 1

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



Key features


- Extendable dining table with 1 extra leaf seats 4-6; makes it possible to adjust the table size according to need.
- The extra leaf can be stored within easy reach under the table top when not in use.
- Concealed locking function prevents gaps between top and leaf and keeps the extra leaf in place.
- Table surface with clear lacquer finish; simply wipes clean.

Designer:
Tord Björklund


Product dimensions

Max. length: 65 3/8 "
Diameter: 45 1/4 "
Height: 29 1/8 "

Max. length: 166 cm
Diameter: 115 cm
Height: 74 cm

 **Delivery**
Get all your options with our delivery service.

 **Home furnishing advice**
Book a free appointment for expert tips and ideas.

 **IKEA Gift Card**
Our flattest pack so far! Click for details.

IKEA Catalog & Brochures
Request View 

Customer Service
Contact Us
FAQ
Return Policy
Children's Product Registration
All IKEA Services

About IKEA
People & the Environment
IKEA Foundation
IKEA News Room
Our Code of Conduct

The IKEA Store
Find an IKEA Store
IKEA Food & Restaurant
IKEA Business
IKEA Gift Card
View your IKEA Credit Card Account

Careers at IKEA
Search careers
Your career at IKEA
Coworker stories
Work areas

IKEA Search
Welcome!

My account | My shopping cart | My shopping list | Visit our Mobile Site | Join our email list | Información en español

Ask Anna!

All products | New | Special Offers | Living room | Bedroom | Kitchen | Children's IKEA | Textiles | All departments

Home / Dining / Dining chairs / Dining chairs



BERNHARD

Chair

\$139.00

The price reflects selected options
801.530.70

Restful springiness in the seat; prevents static sitting and provides enhanced seating comfort. [Read more](#)

Color

chrome plated/Kavat white

1 Save to list

Sorry, this product is not for sale on our website, check if it is available in your local store.

Complementary Products



[View all complementary products](#)

Buy at your local store

FL, Sunrise Ok

Store selection may vary and prices may differ from those online.

Color



Complementary Products

Product information



BERNHARD
Chair
\$139.00

Package measurement and weight

Packages: 1
Article Number: 801.530.70
Width:
Height:
Length:
Weight: 16lb
Quantity: 1

Article Number: 801.530.70
Width: cm
Height: cm
Length: cm
Weight: 7.3 kg
Quantity: 1

Key features

- Restful springiness in the seat; prevents

Good to know

For increased stability, re-tighten the screws about two weeks after assembly.

Care instructions

Leather
For best possible result, wipe clean and treat the surface regularly with ABSORB leathercare set.

Metal
Wipe clean using a damp cloth and a mild cleaner.
Wipe dry with a clean cloth.

Product description

Seat shell: Beech veneer
Uppholstery material: High resilient polyurethane foam (cold foam).
Leg frame/ Rod: Steel, Nickel plated
Plastic parts: Reinforced polyamide
Foot: Polyamide
Leather: Dyed through top-grain leather with a treated and embossed surface

More Dining chairs



[Go to Dining chairs](#)

static sitting and provides enhanced seating comfort.

- Padded seat and back for enhanced seating comfort.

- Soft, hardwearing and easy care leather, which ages gracefully.

Designer:
Ola Wihlborg

Product dimensions

Width: 17 3/4 "

Depth: 19 5/8 "

Height: 30 3/8 "

Seat width: 17 3/4 "

Seat depth: 15 3/4 "

Seat height: 18 7/8 "

Width: 45 cm

Depth: 50 cm

Height: 77 cm


Seat width: 45 cm

Seat depth: 40 cm

Seat height: 48 cm

 **Delivery**
Get all your options with our delivery service.

 **Assembly service**
In need of some assembly assistance? Help is at hand.

 **IKEA Gift Card**
Our flattest pack so far! Click for details.

IKEA Catalog & Brochures
Request View 

Customer Service
Contact Us
FAQ
Return Policy
Children's Product Registration
All IKEA Services

About IKEA
People & the Environment
IKEA Foundation
IKEA News Room
Our Code of Conduct

The IKEA Store
Find an IKEA Store
IKEA Food & Restaurant
IKEA Business
IKEA Gift Card
View your IKEA Credit Card Account

Careers at IKEA
Search careers
Your career at IKEA
Coworker stories
Work areas

© Inter IKEA Systems B.V. 1999 - 2011 | Privacy Policy

<http://www.ikea.com/us/en/catalog/products/80153070>

END OF SECTION 125819.A1

SECTION 125823.A1 COFFEE TABLE BY IKEA


IKEA | Coffee & side tables | Coffee tables | STRIND | Coffee table

<http://www.ikea.com/us/en/catalog/products/30157103>

IKEA® Search

Welcome! [Ask Anna!](#) [My account](#) [My shopping cart](#) [My shopping list](#) [Visit our Mobile Site!](#) [Join our email list](#) [Información en español](#)

[All products](#) [New](#) [Special Offers!](#) [Living room](#) [Bedroom](#) [Kitchen](#) [Children's IKEA](#) [Textiles](#) [All departments](#)



STRIND
Coffee table
\$99.99

Color:

Size:

Price reflects the options selected above

[Enlarge image](#)

Shopping list
Make it easier for yourself. Add products to your shopping list. Print it, and bring to the store.
[Add to shopping list](#)

Buy online
Sorry, this product is not for sale on our website, check if it is available in your local store.

Buy at your local store
Prices on products not featured in the IKEA 2011 catalog may vary at your local store.

[Check stock availability](#)

More of the same
[Go to Coffee tables](#)

Product information

Key features

- Separate shelf for storing magazines, etc. Keeps your things organized and the table top clear.
- The casters make it easy to move the table if needed.

Designers:
Erlén Johanson

Product dimensions

Diameter: 29 1/2"
Height: 15 3/4"
Max. load: 33 lb

Diameter: 75 cm
Height: 40 cm
Max. load: 15 kg

[This product requires assembly](#)

Good to know

Handle with care! A strike, knock or scratch can cause the glass to crack suddenly. However, only into small pieces, never into sharp fragments. Casters included.

Product description & measurements

Underframe: Steel, Nickel plated, Clear polyurethane lacquer
Bracket: Zinc, Clear polyurethane lacquer
Shelf/ Table top: Tempered/safety glass, Glass enamel

Package measurements & weight
(1 packages in total)

Delivery
Get all your options with our delivery service.

Assembly service
In need of some assembly assistance? Help is at hand.

IKEA Credit Card
There's no reason to put off that purchase with the IKEA Credit Card!

IKEA Catalog & Brochures
[Request](#)
[View](#)

Customer Service
Need help? Ask Anna!
[FAQ](#)
[Return Policy](#)
[Children's Product Registration](#)
[All IKEA Services](#)

The IKEA Story
About IKEA
The IKEA Store
Working at IKEA
People & the Environment
IKEA Social Initiative
IKEA Press Room

At Your Local IKEA
Find an IKEA Store
IKEA Food & Restaurant
IKEA Business
IKEA Gift Card

Working at IKEA
Jobs Available
IKEA Values

© Inter IKEA Systems B.V. 1999 - 2010 | [Privacy Policy](#)

<http://www.ikea.com/us/en/catalog/products/30157103>

END OF SECTION 125823.A1

SECTION 221116 - DOMESTIC WATER PIPING

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

- A. Comply with NSF 14 for plastic, potable domestic water piping and components.
- B. Comply with NSF 61 for potable domestic water piping and components.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Hard Copper Tubing: ASTM B 88, Types L and M (ASTM B 88M, Types B and C, water tube, drawn temper with wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 1. Copper Unions: Cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
 - 2. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.
- B. Soft Copper Tubing: ASTM B 88, Types K and L (ASTM B 88M, Types A and B), water tube, annealed temper with copper pressure fittings, cast-copper-alloy or wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 1. Joining Materials: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder.
- C. CPVC Piping: ASTM F 441/F 441M, Schedule 40 pipe with ASTM F 438, CPVC Schedule 40 socket-type fittings.
- D. PEX Tube and Fittings: ASTM F 877, SDR 9 PEX tubing and ASTM F 1807, metal insert-type fittings with copper or stainless-steel crimp rings.

1. Manifold: ASTM F 877 plastic or corrosion-resistant-metal assembly, with a plastic or corrosion-resistant-metal valve for each outlet.
- E. PVC Pipe: ASTM D 1785, Schedule 40.
1. PVC Fittings: ASTM D 2466, Schedule 40, socket type.
- F. Special-Duty Valves:
1. Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for general-duty metal valves.
 2. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.
 3. CPVC and PVC Union Ball Valves: MSS SP-122, with full-port ball, socket or threaded detachable end connectors, and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C)
 4. CPVC and PVC Non-Union Ball Valves: MSS SP-122, with full- or reduced-port ball, socket or threaded ends, and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C)
 5. CPVC and PVC Butterfly Valves: With lever handle and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C) .
 6. CPVC and PVC Check Valves: Swing or ball-check design and pressure rating not less than 150 psig (1035 kPa) at 73 deg F (23 deg C)
- G. Transition Fittings: Manufactured piping coupling or specified piping system fitting. Same size as pipes to be joined and pressure rating at least equal to pipes to be joined.
- H. Flexible Connectors: Stainless-steel, corrugated-metal tubing with wire-braid covering. Working-pressure rating a minimum of 200 psig (1380 kPa).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping installation requirements.
- B. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for wall penetration systems.
- C. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
- D. Install domestic water piping with 0.25 percent slope downward toward drain for horizontal piping and plumb for vertical piping.
- E. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
- F. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.
 - 1. Soldered Joints: Comply with procedures in ASTM B 828 unless otherwise indicated.
- G. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for pipe hanger and support devices.
- H. Support vertical piping at each floor.
- I. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.

3.2 INSPECTING AND CLEANING

- A. Inspect and test piping systems as follows:
 - 1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - 2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.

- B. Clean and disinfect potable and non-potable domestic water piping by filling system with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.

3.3 PIPING SCHEDULE

- A. Aboveground Distribution Piping: Type L (Type B), hard copper tubing, Type M (Type C), hard copper tubing, CPVC piping, PEX piping, or Schedule 40 PVC piping.

3.4 VALVE SCHEDULE

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly or gate valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 - 2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 (DN 50) and smaller. Use cast-iron butterfly valves with flanged ends for piping NPS 2-1/2 (DN 65) and larger.
 - 3. Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
 - 4. Drain Duty: Hose-end drain valves.

- B. Install gate valves close to main on each branch and riser serving two or more plumbing fixtures or equipment connections and where indicated.

- C. Install gate or ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.

- D. CPVC and PVC ball, butterfly, and check valves may be used in matching piping materials.
- E. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain water distribution piping system.
- F. Install swing check valve on discharge side of each pump and elsewhere as indicated.
- G. Install ball valves in each hot-water circulating loop and discharge side of each pump.

END OF SECTION 221116

SECTION 221119 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. Pipe-Applied, Atmospheric Vacuum Breakers: ASSE 1001, with floating disc and atmospheric vent.
- B. Hose Connection Vacuum Breakers: ASSE 1011, nickel-plated bronze, with non-removable and manual drain features and garden-hose threaded connection.
- C. Reduced-Pressure-Principle Backflow Preventers: ASSE 1013.
- D. Water Regulators: ASSE 1003.
- E. Balancing Valves: MSS SP-110 for two-piece, copper-alloy ball valves, with memory stop.
- F. Thermostatic Mixing Valves: Manually adjustable, bronze body. Include check stop and union on hot- and cold-water-supply inlets.
- G. Clothes Washer Outlet Boxes: Enameled steel box and face plate with 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.
- H. Hose Bibbs: Bronze body in [chrome-plated finish, with removable composition disc, threaded or soldered inlet, garden-hose threaded outlet, and wheel handle.

- I. Ball-Valve-Type, Hose-End Drain Valves: MSS SP-110, with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.
- J. Stop-and-Waste Drain Valves: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
- K. Water Hammer Arrester: Bellows or piston type with pressurized cushioning chamber.
- L. Strainers: Y-pattern, bronze body, 125-psig (860-kPa) minimum steam working pressure.
- M. Water Filters: Cartridge type, including housing, fittings, filter cartridges, and cartridge end caps.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backflow preventers at each water-supply connection to mechanical equipment and where required by authorities having jurisdiction.
- B. Install hose bibs with integral or field-installed vacuum breaker.

END OF SECTION 221119

22 11 23.A1 Domestic Water Pumps by Pan World

Expected Pump Performance Curve & Specifications (Reference)

Pump model : NH-50PX-X,NH-50PX-X-N,NH-50PX-X-F

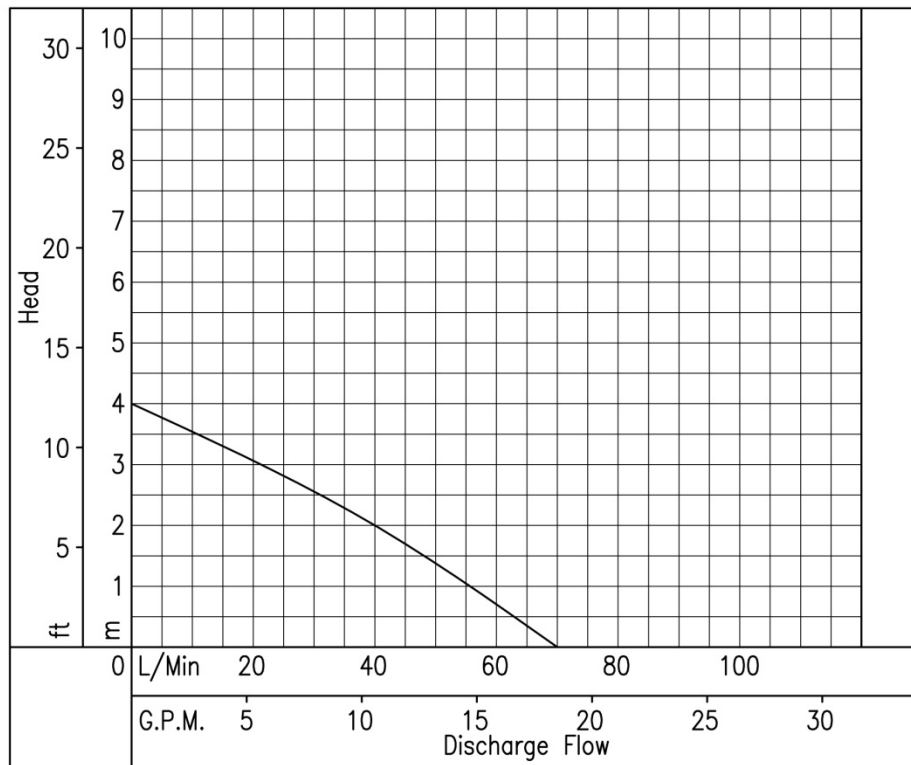
Pump specifications

REF : A3400466

- 1). Specified point : 2.0m at 40 L/Min Frequency : 60 Hz
- 2). Max Head – Discharge flow : 4.0m – 70 L/Min IMPELLER DIA : 56 mm
- 3). Hose : H , Thread : T
- 4). Permissible working Temp. : PX series 0 ~ 60°C , Glass filled polypropylene
 PX-N series 0 ~ 80°C , Natural PVDF
 PX-F series 0 ~ 90°C , Carbon filled ETFE
- 5). Permissible system pressure : 0.75 Bar
- 6). Permissible environment conditions : 0 ~ 40°C , Upto 85%
- 7). Nominal speed : 3,000 r.p.m.

Motor specifications

- 1). Nominal output * input : 45 * 110 Watts
- 2). Applicable voltage : 100~120V/60Hz 200~240V/60Hz
- 3). Insulation grade : E grade
- 4). Single phase capacitor motor



Pan World Co.,Ltd. Japan

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



http://www.aquaponicsusa.com/Blog/Entries/2010/8/2_Aquaponics_USA_Pumps.html

<http://www.panworldamericas.com/PW-Nseries.html>

END OF SECTION 221123.A1

SECTION 221316 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Minimum Pressure Requirement for Soil, Waste, and Vent: 10-foot head of water (30 kPa).
- B. Comply with NSF 14, "Plastic Piping Components and Related Materials," for plastic piping components.

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

- A. Copper Drainage Tube and Fittings: ASTM B 306, Type DWV drawn temper with wrought -copper, Type DWV drainage fittings.
- B. PVC Plastic, DWV Pipe and Fittings: ASTM D 2665, Schedule 40, plain ends with PVC socket-type, DWV pipe fittings.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping installation requirements.
- B. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- C. Install wall penetration system at each pipe penetration through foundation wall. Make installation watertight. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for wall penetration systems.

1. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- D. 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 2 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.
- E. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- F. 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.
- G. Install PVC soil and waste drainage and vent piping according to ASTM D 2665.
- H. Install underground PVC soil and waste drainage piping according to ASTM D 2321.
- I. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- J. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for basic piping joint construction.
- K. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure unless otherwise indicated.

- L. Comply with requirements in Division 22 Section "Common Work Results for Plumbing" for pipe hanger and support devices.

3.2 PIPE SCHEDULE

- A. Aboveground Applications: PVC plastic, DWV pipe and fittings with solvent-cemented joints, Copper drainage tube and fittings with soldered joints.

END OF SECTION 221316

22 13 19 Sanitary Waste Piping Specialties

SECTION 221319 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

- A. PVC Backwater Valves: Horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.
- B. Cleanouts, P-103:
 - 1. Application: Floor cleanout
 - 2. Body or Ferrule: Plastic.
 - 3. Clamping Device: Required.
 - 4. Outlet Connection: Threaded.
 - 5. Closure: Plastic plug.
 - 6. Adjustable Housing Material: Plastic with threads.
 - 7. Frame and Cover Material and Finish: Rough bronze.
 - 8. Frame and Cover Shape: Round.
 - 9. Top-Loading Classification: Heavy Duty.
- C. Floor Drains, P-103:
 - 1. Standard: ASME A112.3.1.
 - 2. Pattern: Floor drain.
 - 3. Body Material: Stainless steel.
 - 4. Seepage Flange: Not required.
 - 5. Clamping Device: Not Required.

6. Outlet: Side.

D. Air-Gap Fittings: ASME A112.1.2, chrome-plated brass cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.
- B. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- C. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor unless otherwise indicated.
 - 1. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 2. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- D. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- E. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- F. Install grease removal devices on floor. Install trap, vent, and flow-control fitting according to authorities having jurisdiction. Install control panel adjacent to unit, unless otherwise indicated.
- G. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain grease removal devices.

END OF SECTION 221319

SECTION 221423 STORM DRAINAGE PIPING SPECIALTIES

PART 4 - GENERAL

4.01 SECTION REQUIREMENTS

- A. Submittals: Product Data.

PART 5 - PRODUCTS

5.01 MANUFACTURED UNITS

- A. Roof Drains, <Insert drawing designation>:

1. [Available]Products:

- a. <Insert manufacturer's name; model number>.

2. Standard: ASME A112.6.4.

3. Type: [General purpose] [Cornice and gutter] [Parapet] [Promenade] [Deck] roof drain.

4. Body Material: [Cast iron] [Copper] [Metal] <Insert other>.

5. Dimensions of Body: <Insert dimensions and describe body and sump if required>.

6. Flange: [Anchor] [Anchor with weep holes] [Not required].

7. Outlet: [Bottom] [Side] [Angle] <Insert other>.

8. Dome Material: [Aluminum] [Bronze] [Cast iron] [Copper] [Stainless steel] [PE].

9. Grate Material: [Bronze] [Cast iron] [Nickel-bronze alloy] <Insert material>.

10. Top-Loading Classification: [Extra Heavy] [Heavy] [Light] [Medium] Duty.

11. Features and Accessories: [Flow-control weirs] [integral backwater valve] [combination flashing ring and gravel stop] [extension collars] [underdeck clamp] [sump receiver] [gravel guard] [vandal-proof dome] [vandal-proof grate] [and] [expansion joint].

- B. Plastic Roof Drains, <Insert drawing designation>:

1. [Available]Products:

- a. <Insert manufacturer's name; model number>.

2. Standard: ASME A112.6.4, for plastic roof drains.
3. Body Material: [ABS] [or] [PVC] <Insert other>.
4. Sump Diameter: <Insert nominal dimension>.
5. Outlet: [Bottom] <Insert other>.
6. Dome Material: [Aluminum] [Cast iron] [PE] [Stainless steel] <Insert material>.
7. Features and Accessories: [Combination flashing ring and gravel stop] [extension collars] [underdeck clamp] [sump receiver plate] [and] [expansion joint] <Insert options>.

C. Cleanouts, <Insert drawing designation>:

1. Standard: ASME A112.36.2M.
2. Application: [Floor cleanout] [Wall cleanout] [For installation in exposed piping] <Insert other or delete this subparagraph>.
3. Body or Ferrule Material: [Cast iron] [Plastic] [Stainless steel] <Insert other>.
4. Clamping Device: [Required] [Not required].
5. Outlet Connection: [Threaded] [Inside calk] [Spigot].
6. Closure: [Brass plug with straight threads and gasket] [Brass plug with tapered threads] [Plastic plug] <Insert other>.
7. Adjustable Housing Material: [Cast iron] [Plastic] with [threads] [set-screws or other device] <Insert other>.
8. Frame and Cover Material and Finish: [Painted cast iron] [Nickel-bronze, copper alloy] [Polished bronze] [Rough bronze] [Stainless steel] <Insert other>.
9. Frame and Cover Shape: [Round] [Square] <Insert other or delete this subparagraph>.
10. Top-Loading Classification: [Light] [Medium] [Heavy] [Extra Heavy] [Special] Duty.

D. Horizontal, Cast-Iron Backwater Valves: ASME A112.14.1, gray-iron body with bronze seat.

1. Extension: ASTM A 74, Service class; full-size, cast-iron, soil-pipe extension to field-installed cleanout at floor; replaces backwater valve cover.

E. PVC Backwater Valves: Horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.

F. Area Drains, <Insert drawing designation>:

1. [Available] Products:
 - a. <Insert manufacturer's name; model number>.
2. Body Material: [Gray iron] [Stainless steel] <Insert other>.
3. Seepage Flange: [Required] [Not required] [Anchor flange].
4. Clamping Device: [Required] [Not required].

5. Outlet: [Bottom] [Side] <Insert other>.
6. Exposed Surfaces and Interior Lining: [Acid-resistant enamel] [Not required] <Insert other>.
7. Sediment Bucket: [Not required] <Insert description if required>.
8. Top or Strainer Material: [Gray iron] [Stainless steel] [Bronze] [Nickel bronze] <Insert other>.
9. Top of Body and Strainer Finish: [Nickel bronze] [Polished bronze] [Rough bronze] [Stainless steel] <Insert other>.
10. Top Shape: [Round] [Square] <Insert other>.
11. Dimensions of Top or Strainer: <Insert dimensions and describe body, sump, and grate if required>.
12. Top-Loading Classification: [Light] [Medium] [Heavy] [Extra Heavy] [Special] Duty.
13. Inlet Fitting: [Gray iron, with threaded inlet and threaded or spigot outlet, and trap seal primer valve connection] [Not required].
14. Trap Material: [Cast iron] [Bronze] [Copper] [Not required] <Insert other>.
15. Trap Pattern: [Standard P-trap] [Deep-seal P-trap] [Not required] <Insert other>.
16. Trap Features: [Cleanout] [Trap seal primer valve drain connection] [Cleanout and trap seal primer valve drain connection] [Not required] <Insert other>.

G. Trench Drains <Insert drawing designation if any>:

1. Basis-of-Design Product: [Product indicated on Drawings] <Insert manufacturer's name; product name or designation> or a comparable product by one of the following:
 - a. <Insert manufacturer's name>.
2. Standard: ASME A112.6.3 for trench drains.
3. Material: Cast iron.
4. Flange: [Anchor] [Seepage] [Not required].
5. Clamping Device: [Not required] [Required].
6. Outlet: [Bottom] [End] [Side] <Insert location>.
7. Grate Material: [Ductile iron] [or] [gray iron] [stainless steel] <Insert material>.
8. Grate Finish: [Painted] [Not required] <Insert finish>.
9. Dimensions of Frame and Grate: <Insert dimensions and describe body, sump, and grate if required>.
10. Top-Loading Classification: [Extra Heavy Duty] [Heavy Duty] [Light Duty] [Medium Duty].
11. Trap Material: [Cast iron] [Stainless steel] [Not required] <Insert material>.
12. Trap Pattern: [Standard P-trap] [Not required] <Insert pattern>.

H. Concrete Sediment Interceptor:

1. Description: [27-inch- (686-mm-)] <Insert dimension> square, precast concrete body, with outlets in number and sizes indicated. Include 24-inch- (610-mm-) square, gray-iron slotted grate.
2. Frame: [Gray-iron or galvanized steel for grate] [Not required].

- I. Roof Flashing Assemblies <Insert drawing designation if any>:
 - 1. Description: Manufactured assembly made of [4.0-lb/sq. ft. (20-kg/sq. m), 0.0625-inch- (1.6-mm-)] [6.0-lb/sq. ft. (30-kg/sq. m), 0.0938-inch- (2.4-mm-)] thick, lead flashing collar and skirt extending at least [6 inches (150 mm)] [8 inches (200 mm)] [10 inches (250 mm)] from pipe, with galvanized-steel boot reinforcement and counterflashing fitting.

- J. Downspout Boots:
 - 1. Description: ASTM A 74, Service class, hub-and-spigot, cast-iron soil pipe.
 - 2. Size: Same as or larger than connected downspout.

PART 6 - EXECUTION

6.01 INSTALLATION

- A. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.

- B. Install floor drains at low pints of surface areas and where indicated. Set tops of drains flush with finished floor.
 - 1. Trap drains connected to sanitary building drain.
 - 2. Install drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes.

- C. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
 - 1. Install roof-drain flashing collar or flange so no leakage occurs between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.

END OF SECTION 221423

22 14 26.13 Roof Drain

SECTION 221426.13 - ROOF DRAINS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Specifications for Scupper Drain with Angle Grate

1.02 ACTION SUBMITTALS

- A. Product Data
- B. The roof drain shall comply with ASME A112.21.2M or ASME A112.3.1 and fittings shall comply with ICC 1102.7
- C. Installation

1.03 QUALITY ASSURANCE

- A. Product will comply with manufacturer's recommended usage

PART 2 - PRODUCTS

2.01 PRODUCT NAME

- A. Watts Drainage RD-270

2.02 MANUFACTURER

- A. Watts
Specification Drainage Products
100 Watts Road
Spindale, NC 28160-2298
Phone: 828-288-2179

PART 3 - EXECUTION


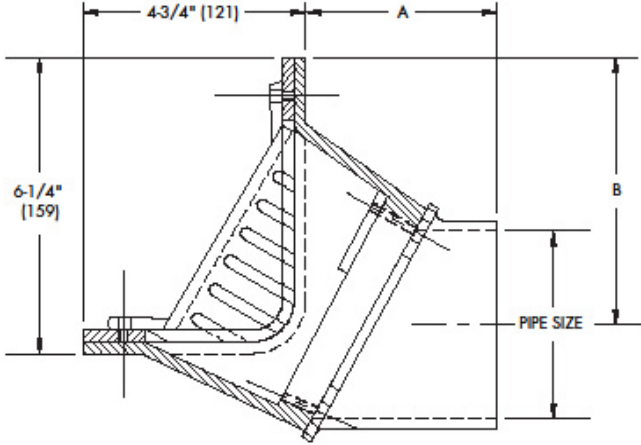
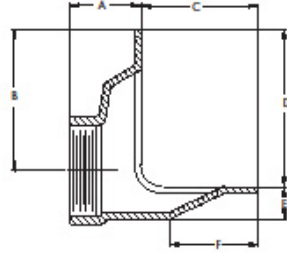

3.01 INSTALLERS

- A. Florida International University Solar Decathlon Team

3.02 INSTALLATION

- A. Roof drains will be installed in a manufacture approved manner
- B. Roof drains that pass through the interior of the building will be sealed to the building with an approved flashing material that follows the manufacturer’s typical flashing procedures.

END OF SECTION 221426.13

	RD-270 Tag: _____	Scupper Drain with Angle Grate																																												
SPECIFICATION: Watts Drainage RD-270 epoxy coated cast iron scupper drain with flashing clamp, secured angle grate, and no hub (standard) outlet.																																														
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Pipe Sizing (Select One)</th> </tr> <tr> <th>Suffix</th> <th>Description</th> </tr> <tr> <td>2</td> <td>2" (51) Pipe Size</td> </tr> <tr> <td>3</td> <td>3" (76) Pipe Size</td> </tr> <tr> <td>4</td> <td>4" (102) Pipe Size</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2">Options (Select One or More)</th> </tr> <tr> <th>Suffix</th> <th>Description</th> </tr> <tr> <td>-A</td> <td>45 Degree Outlet</td> </tr> <tr> <td>-T</td> <td>Threaded Outlet</td> </tr> <tr> <td>-1</td> <td>Nickel Bronze Grate & Frame</td> </tr> <tr> <td>-6</td> <td>Vandal Proof Grate</td> </tr> <tr> <td>-13</td> <td>Galvanized</td> </tr> </table> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>Free Area</th> </tr> <tr> <td>Sq. In.</td> </tr> <tr> <td style="text-align: center;">15</td> </tr> </table>		Pipe Sizing (Select One)		Suffix	Description	2	2" (51) Pipe Size	3	3" (76) Pipe Size	4	4" (102) Pipe Size	Options (Select One or More)		Suffix	Description	-A	45 Degree Outlet	-T	Threaded Outlet	-1	Nickel Bronze Grate & Frame	-6	Vandal Proof Grate	-13	Galvanized	Free Area	Sq. In.	15																	
Pipe Sizing (Select One)																																														
Suffix	Description																																													
2	2" (51) Pipe Size																																													
3	3" (76) Pipe Size																																													
4	4" (102) Pipe Size																																													
Options (Select One or More)																																														
Suffix	Description																																													
-A	45 Degree Outlet																																													
-T	Threaded Outlet																																													
-1	Nickel Bronze Grate & Frame																																													
-6	Vandal Proof Grate																																													
-13	Galvanized																																													
Free Area																																														
Sq. In.																																														
15																																														
 <p>*RD-270T 90 degree outlet shown</p>																																														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Pipe Size</th> <th colspan="2">NO HUB (N.H.)</th> <th colspan="6">THREADED</th> </tr> <tr> <th>A</th> <th>B</th> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>E</th> <th>F</th> </tr> </thead> <tbody> <tr> <td>2" (51)</td> <td>5-1/8" (130)</td> <td>6-1/2" (165)</td> <td>2-3/4" (70)</td> <td>6" (152)</td> <td>4-1/2" (114)</td> <td>6" (152)</td> <td>1-1/4" (32)</td> <td>3-3/8" (86)</td> </tr> <tr> <td>3" (76)</td> <td>4-1/2" (114)</td> <td>5-3/4" (146)</td> <td>2-3/4" (70)</td> <td>5-3/8" (137)</td> <td>4-1/2" (114)</td> <td>6" (152)</td> <td>1-1/4" (32)</td> <td>3-3/8" (86)</td> </tr> <tr> <td>4" (102)</td> <td>4" (102)</td> <td>5-1/8" (130)</td> <td>2-3/4" (70)</td> <td>4-7/8" (124)</td> <td>4-1/2" (114)</td> <td>6" (152)</td> <td>1-1/4" (32)</td> <td>3-3/8" (86)</td> </tr> </tbody> </table>			Pipe Size	NO HUB (N.H.)		THREADED						A	B	A	B	C	D	E	F	2" (51)	5-1/8" (130)	6-1/2" (165)	2-3/4" (70)	6" (152)	4-1/2" (114)	6" (152)	1-1/4" (32)	3-3/8" (86)	3" (76)	4-1/2" (114)	5-3/4" (146)	2-3/4" (70)	5-3/8" (137)	4-1/2" (114)	6" (152)	1-1/4" (32)	3-3/8" (86)	4" (102)	4" (102)	5-1/8" (130)	2-3/4" (70)	4-7/8" (124)	4-1/2" (114)	6" (152)	1-1/4" (32)	3-3/8" (86)
Pipe Size	NO HUB (N.H.)			THREADED																																										
	A	B	A	B	C	D	E	F																																						
2" (51)	5-1/8" (130)	6-1/2" (165)	2-3/4" (70)	6" (152)	4-1/2" (114)	6" (152)	1-1/4" (32)	3-3/8" (86)																																						
3" (76)	4-1/2" (114)	5-3/4" (146)	2-3/4" (70)	5-3/8" (137)	4-1/2" (114)	6" (152)	1-1/4" (32)	3-3/8" (86)																																						
4" (102)	4" (102)	5-1/8" (130)	2-3/4" (70)	4-7/8" (124)	4-1/2" (114)	6" (152)	1-1/4" (32)	3-3/8" (86)																																						
Job Name _____ Contractor _____ Job Location _____ Contractor's P.D. No. _____ Engineer _____ Representative _____																																														
<small>WATTS Drainage reserves the right to modify or change product design or specification without prior notice and without incurring any obligation to make similar changes and modifications to products previously or subsequently sold. See your WATTS Drainage representative for any alterations. Dimensions are subject to manufacturing tolerances.</small>																																														
																																														
<small>Specification Package Products 14816 108 Watts Road, Springs, NC, 28160-2299 TEL: 828-299-8778 TOLL-FREE: 1-888-329-6261 www.watts.com</small>																																														
ES-WD-RD-270 USA 0324	RD-270																																													

<http://www.watts.com/pages/search.asp?keyword=rd+270>

END OF SECTION 221426.13

SECTION 22 33 10 – Solar Thermal System

4. Pre-Installation –

For AUTHORIZED Installers ONLY SolarUS must emphasize that it is vital that all SolarUS equipment be installed properly to ensure proper function as well as maximize safety. All SolarUS equipment must be installed by an authorized SolarUS installer. SolarUS cannot guarantee the performance of do-it-yourself installations, and SolarUS withholds the right to void any warranty for any and all unauthorized installations. Before carrying out the installation, all installers must have read and understood this manual thoroughly and carefully. This section outlines important information prior to installation.

4.1. Safety First!

4.1.1. Local Codes

All installations must comply with any relevant local codes or regulations with regards to construction, building, and plumbing.

4.1.2. Safe on the Job

A. Always wear leather protective gloves when handling solar collector components, particularly metal and glass. Some components may contain sharp edges or become extremely hot (evacuated tubes & heat pipes).

B. Be careful when handling the evacuated tubes. They are glass and will break if knocked heavily or dropped.

SAFETY GLASSES SHOULD BE WORN AT ALL TIMES WHEN HANDLING EVACUATED TUBES

C. Be careful of high temperatures post-tube installation. Remember, the heat pipes can reach temperatures in excess of 392°F / 200°C which could result in serious burns if handled barehanded.

D. Take care when handling any exposed (uninsulated) piping near the collector inlet or outlet as this areas can reach temperatures of 160°C / 320°F.

E. Make sure to wear a helmet and use safety belt when working on the roof.

F. All bolts must be firmly fixed, and make sure all bars and beams are firmly connected.

G. Do not ingest the heat paste and keep the heat paste out of reach of children.

4.2. Authorized SolarUS Installer

Installations of all SolarUS equipment must be carried out by a qualified tradesperson who holds the corresponding industry licenses or certificates required as well as have received formal SolarUS approval or approval from one of its affiliates to carry out the installation process.

4.3. Installer Safety

All installers must adhere to operation health and safety standards and are responsible for their own safety while completing installations. For any questions, regarding safety, please contact a SolarUS representative or SolarUS affiliate.

4.4. Water Quality

Water used in the system must meet the following requirements, particularly for stainless steel tanks which are more susceptible to damage from poor quality water.

Total dissolved solids Chloride Magnesium < 600 mg/L or p.p.m < 250 mg/L or p.p.m < 10 mg/L or p.p.m

Total hardness pH Sodium < 200 mg/L or p.p.m Min 6.5 to Max 8.5 < 150 mg/L or p.p.m

In areas with “hard” water (>200mg/L or p.p.m), SolarUS recommends installing a water softener device to ensure the long term efficient operation of the system.

4.4.1. Water Quality in a Closed Loop

In closed loops which require a water/propylene glycol solution, water must meet the above requirements, and the propylene glycol content of the liquid must not exceed 50% (unless specified by propylene glycol manufacturer). Remember, only GRAS (Generally-Regarded-As-Safe) fluids are allowed.

4.4.2. Legionella

All SolarUS systems must be designed to heat water to a minimum of 140°F (60°C) every 24 hours via solar or traditional means to prevent Legionella’s disease. Therefore, the electric element or gas boosting system must not be disabled at any time. Instructing a SolarUS solar thermal system owner to do so may be in violation of local regulations.

4.5. Corrosion Advisory

Both copper and stainless steel are susceptible to corrosion when, amongst other factors, high concentrations of chloride are present. SolarUS solar thermal systems may be used for pool or jacuzzi heating, however, free chlorine levels must not exceed 5ppm to avoid risk of copper corrosion. SolarUS will not warranty its systems against corrosion.

4.6. Freezing Conditions

SolarUS systems are not suitable for areas which reach temperatures below freezing unless designed appropriately. For areas with sustained winter temperatures below 26°F (–3°C), a closed loop system filled with propylene glycol or similar heat transfer fluid must be used to ensure freeze protection inside the manifold. SolarUS evacuated tubes and copper heat pipes are not susceptible to damage in cold weather.

4.7. SolarUS Collector Specifications

4.7.1. Overall Collector Dimensions & Weight

Collector Size 20 tubes

Overall Length 1 1935 mm / 76.2 in.

Overall Height 2 145mm / 5.7 in. (Standard Back frame & Manifold Case)

Overall Width 3 790mm / 31.1 in. 1540mm / 60.6 in. 2290mm / 90.2 in.

Effective Absorber Area 4 0.812m² / 8.74 ft.² 1.624m² / 17.49 ft.² 2.436m² / 26.22 ft.²

Net Weight 32kg / 70.5 lbs. 65kg / 143.3 lbs. 98kg / 216 lbs.

Volume of Manifold Header 600ml / 0.159 gal. 1170ml / 0.31 gal. 1740ml / 0.46 gal.

4.7.2. Copper Heat Exchanger (Header)

Material TP2 Copper, Cu≥99.9%

Overall Length of Header Pipe $L = (N-1)*75mm + 82.5mm*2 / L = (N-1)$

$*2.95 in. + 3.25 in*2$

Header Pipe Specification OD: Φ35mm, WT: 1.0mm / OD: Φ1.38 in.,

WT: 0.039 in.

Inlet & outlet OD : Φ22mm / Φ0.87 in.

Temperature Sensor Port OD: Φ0.8mm*(0.5~0.65) / OD: Φ0.032 in.*

(0.2~0.023)

Maximum Operating Pressure Rating 0.7 MPa / 102 psi

Maximum Flow Rate 8L/tube/min. | 2.11 gal./tube/min.

Recommended Flow Rate 0.03L/tube/min. | .008 gal./tube/min.

1. Overall Length shows the length of the entire solar collector.
2. Overall Height shows the total height of the back frame plus manifold case.
3. Overall Width shows the width of the manifold case, not including the left and right side outlets.
4. Effective Absorber Area: $N*(47mm*1800mm)*96%$, N is the number of tubes, 47mm is the O.D. of inner tube.

4.7.3. Manifold Casing

Manifold Material 6063 Aluminum Alloy - best for all types of extrusion Material Thickness 1.7mm / 0.067 in. Tube Spacing 75mm / 2.95 in.

4.7.4. Back frame

Material 6063 Aluminum Alloy - best for all types of extrusion

Material Thickness 2.0mm / 0.079 in.

Bolts Washers and Nuts SUS 304 or SUS 201 Stainless Steel

4.7.5. Insulation

Material

Glass Wool K-factor: 0.05 W/(m.K)

Polyurethane

Density: 28~34kg/m³;

K-factor: 0.03 W/(m.K)

Aluminum Foil Thickness: 0.04mm / 0.0015 in.

Insulation

Factor Overall K-factor: 0.035 W/(m.K)

4.7.6. Heat pipes & Aluminum fins

Length 1785mm / 70.23 in.

Material TP2 Copper

Copper Pipe Dimension $\phi 8\text{mm} \times 0.7\text{mm}$ / $\phi 0.315 \text{ in.} \times 0.028 \text{ in.}$

Condenser Dimensions $\phi 14\text{mm} \times 78\text{mm}$ $\delta 0.8\text{mm}$ / $\phi 0.55 \text{ in.} \times 3.07 \text{ in.}$ $\delta 0.031 \text{ in.}$

Heat Transfer Material Super Conductivity Technology - Inorganic Media

Startup Temperature 25°C / 77°F

Heat Transfer Fins 3003 Aluminum Alloy - best for forming thin parts

Frozen Protection -25°C / -13°F

4.7.7. Evacuated Tubes

Tube Length 1800mm / 70.86 in.

Outer Tube Dimensions $\Phi 58\text{mm}$ / 2.28 in.

Inner Tube Dimensions $\Phi 47\text{mm}$ / 1.85 in.

Weight 2.2 kg / 4.85 lbs.

Vacuum Solar Tube Material Borosilicate Glass 3.3

Vacuum Solar Tube Coating SS-AlN_x/Cu

Thermal Expansion 3.3

Absorption (α) ≥92%

Emission ≤8% (80±5)

Vacuum <3×10⁻³ Pa

Stagnation Temperature >230 / >446°F

Heat Loss <0.80W/(m²)

Maximum Strength 0.7Mpa / 102 psi

Effective Absorber Area per Tube 0.0812 m² / 0.874 ft.²

4.7.8. Silicon Rubber Seal Ring

Material Silicon Rubber

Density 1.18mg/m³

Duro-meter Hardness(Shore A) 52

Elongation 429%

Maximum Working Temperature 260 / 500°F

Tensile Strength 6 Mpa / 870 psi

Tear Strength 24 KN/M

4.8. Wind Loading.....

a) When installing the collector, please consider the issue of wind resistance, and the resultant stress on attachment points. Please adhere to relevant building codes/regulations regarding installation of such objects.

b) The standard frame, and all frames kits are designed to withstand wind speeds of up to 208km/h. See Appendices A through E for frame assembly details.

c) Refer to Appendix G for roof attachment instructions for flush mounting in high wind regions. Other mounting formats in high wind regions should obtain design approval by an authorised engineer. It is the responsibility of the installation officer to ensure that the frame mounting is of suitable strength and meets building regulations.

d) In high wind regions (up to 208km/h), when installed on a flat roof, with full front and rear exposure, the vertical force on the rear mid round foot attachment point can reach 122kg. The horizontal force pushing the collector across the roof can reach 180kg on the front mid round foot. Both of these values are based on an install angle of 60o, with decreased values resulting at lower angles. The direction of load on the feet can change based on the angle, so while at 30o with a rear wind there is a upward pull force on the mid front foot of 22kg, that actually becomes a downward force of 7kg at 45o, as the collector tries to tip forwards. Table 2.10 below provides peak vertical pull forces and horizontal (pushing across the roof) forces for an AP-30 collector. These forces consider both rear and frontal winds. The highest force of 180kg on the front mid foot when installed at 60o is actually from a frontal and not rear wind.

Table 2.10

e) Based on the figures provided in the table 2.10, the weight of individual concrete blocks, or the strength of fixation points can be determined. A safety factory of at least 1.2 should be used, or as specified by local authorities, whichever is higher. If using concreted blocks under the feet, connecting the blocks, particularly front and rear, is advisable as it can help spread the load. This is particularly valid for the middle legs which are exposed to the peak loads.

Round Foot

Peak Vertical Pull Load @ 30o / 45o / 60o angle

Peak Forward-Backward Load @ 30o / 45o / 60o angle

Front Mid

22kg / 8kg / 40kg

59kg / 100kg / 180kg

Front Left/Right

15.3kg / 13kg / 43kg

32kg / 74kg / 100kg

Rear Mid

38kg / 85kg / 122kg

18kg / 31kg / 66kg

Rear Left/Right

32kg / 78kg / 114kg

17kg / 24kg / 58kg

4.9. Snowy Areas

For region prone to frequent snow, SolarUS solar collectors should ideally be installed at an angle greater than 50° help the snow slide off the tubes. It is also advisable to raise the front of the collector frame 6-8 inches (15-20cm) off the roof surface to permit snow to sit beneath the collector and blow away. SolarUS evacuated tubes are strong enough to withstand >110 lbs. (50kg) loading, but reinforcement may still be required for roof attachment points. Please refer to local regulations regarding snow loading precautions.

4.10. Hail Prone Areas

SolarUS recommends that in areas prone to large hail (>25mm / 1" diameter) the solar collector should be installed at an angle of 45° or greater to provide optimum protection. SolarUS evacuated tubes are able to withstand impact from hail up to 1" / 25mm in diameter, nonetheless, the ability of the evacuated tubes to withstand impact from hail is greatly influenced by the angle of impact, and so installing the collectors at low angles may reduce their impact resistance.

4.11. Roof Load

All SolarUS collectors are rated for roof installation in areas complying with USA building codes. If you are not in the USA, please consult your local building codes to ensure your roof can withstand the weight of the collector.

4.12. Installation Preparation

-Always double check component integrity prior to going to installation site, particularly evacuated tubes. -Always take spare evacuated tubes, fittings, sensor cables, and tools just in case.

-Take a copy of this manual with you to the installation site for your reference during installation.

5. Installation - For AUTHORIZED Installers ONLY

5.1. Delivery to Site

5.1.1. Don't Forget Anything

Double check to make sure all necessary components and tools are loaded prior to departure to the installation site.

One SL-30 collector should contain the following:

NO. Item Description Quantity

1 Manifold Case 1

2 Side Beam 2

3 Bottom Track 1

4 Tube Holders 30

5 M8 Bolts and Nuts N/A

6 Heat Paste 1

7 Evacuated Solar Tubes with heat pipes 30

8 Back Supportive Bar N/A

Remember to bring thick gloves for handling all equipment. Safety first!

5.1.2. Delivery of Evacuated Tubes to Site

A. All boxes of evacuated tubes should be shipped vertically with the arrow facing UP. If it is not possible to lay the boxes down, place them flat on a firm surface.

B. Evacuated tube boxes should not exceed three(3) layers.

C. Ensure the boxes are strapped well and that the box edges are properly padded with cardboard to prevent the straps from tearing into the boxes.

5.1.3. Delivery of Manifolds & Frames to Site

A. Boxes of manifolds are not as fragile as evacuated tubes. Horizontal loading is OK.

B. Do not exceed three(3) layers if possible.

C. Ensure the boxes are strapped well and that the box edges are properly padded with cardboard to prevent the straps from tearing into the boxes.

5.2. Manifold & Standard Frame Assembly & Installation

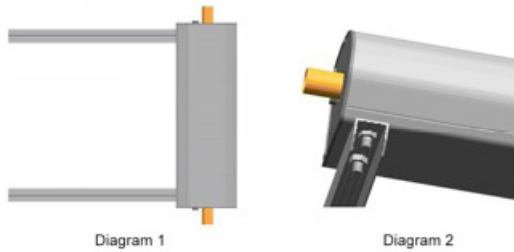
5.2.1. Unpacking Manifold & Frames

A. Open the manifold & frame box to find the manifold and standard frame packed together. If you are using an adjustable frame attachment, this frame should come in a separate box.

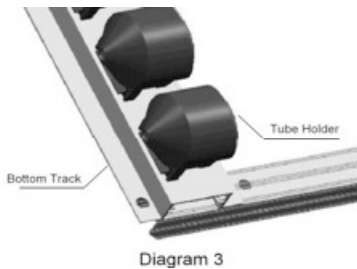
B. Depending on the roof surface, rubber pads, roof attachment straps or round feet may be used to attach the standard frame to the roof. These components are supplied separately.

5.2.2. Manifold & Standard Frame Assembly

A. Place the manifold, two side-beams and the back supportive bars flatly on the ground in their respective places before for assembling (Diagram 1).



B. Fix the two side-beams firmly together with the manifold, and connect the back supportive bars with the side beams (Diagram 2).



C. Fix the bottom track firmly with the two side-beams, and then attach the plastic tube caps (black) to the bottom track (Diagram 3). Make sure to screw in the cover of the tube cap (photo below).



5.2.3. Flush Roof Installation & Attachment

Before installing the evacuated tubes, the assembled frame and manifold must be properly secured on the roof at the correct angle so the only remaining step is to insert the evacuated tubes which will be covered in section 5.3.

5.2.3.1 Collector Direction

A. Due to SolarUS's evacuated tube and heat pipe technology, the collector should ideally face south (north for Southern Hemisphere). The collector can be angled slightly west or east with minimal effect on performance. If installed due east or west, the solar collector performance will be affected, with the majority of the output in the morning (facing east) or afternoon (facing west).

B. The collector manifold is normally installed flush, but may be installed at an angle of +/-60° from horizontal if installing on the due east or west side of the roof.

C. Do NOT install the collector upside-down. It will not function.

5.2.3.2 Collector Angle

Normally the collector is installed at the same angle that corresponds to the latitude of the location. +/- 10° is acceptable, and will not greatly reduce solar output. For winter months, some installations are “over-angled” to take advantage of winter sun. Regardless, the solar collector should be installed at an angle of between 15°-80° to ensure proper heat pipe function. Vertical installation is acceptable, but the heat output may be reduced somewhat due to less optimal heat pipe operation. Flat installation is possible, but may significantly reduce output.

5.2.3.3 Attachment of Standard Frame to Roof

A. Position the manifold and frame tracks so the frame tracks lay flat and even on the roof (match the tiles/shingles) and also line up with, or as close as possible to, the roof’s rafters.

B. For low wind load areas (winds < 60mph [100km/h]), one 20.24 in.x 2.95 in. (2 6x75mm) stainless steel batten screw may be used per attachment point (3 per frame front track). For high wind load areas (winds > 60mph [100km/h]), two 20.24 in.x 2.95 in. (2 6x75mm) stainless steel batten screws must be used per attachment point. On occasion, additional hole(s) may be needed to properly secure the rubber pad. Important: Always obtain engineering approval for projects sensitive to wind loading, and make sure installation is in line with local building regulations. TIP: Metal Roofing - Try to only use stainless steel screws to avoid galvanic reaction on any metal roofing. If the roofing screw is galvanized steel, direct contact between the screw and the frame must be avoided by use of a nylon or rubber washer. Many roofing screws come with a washer already in place.

C. Make sure to use outdoor grade silicone sealant to ensure waterproof seals are formed between any pads, screws, or washers that may separate the frame from direct contact with the roof.

5.2.3.4 Flat Roof Installation (High Angle Frame)

A high angle adjustable frame is appropriate for installations on flat surfaces. A. Concrete blocks are often used under each foot. If no concrete blocks are available, make sure the roof surface is pavement or concrete to ensure its structural integrity.

B. Each block must be capable of supporting the collector during periods of high wind load.

C. To attach the adjustable angle frame to the standard frame.

5.2.3.5 Wall Mounting

Always consider the weight of the collector and the structural integrity of the wall. Make sure your wall mount is approved and/or in accordance with local building codes. A wall mount is common where solar thermal is being used for space heating. It is also an excellent design for larger systems since the angle will increase winter output and shade the collector partially during summer months. A. Using the high angle adjustable frame, make sure the adjustable frame legs are reversed, in other words, attached to the bottom of the standard frame rather than the top.

B. The adjustable frame’s rear legs should be positioned perpendicular to the wall’s surface to maximize frame strength and stability.

C. Attach the frame depending on the wall material. Some examples include:

Brick or concrete walls: Round feet with stainless steel expansion bolts. Wood or Synthetic Boarding: Stainless steel screws. A large washer or metal plate positioned before the nut can be applied to increase strength.

D. During a wall mount one must keep in mind the possibility of shading, even if this is considered part of the system design. Caution: If installing on a wall above a walkway or area where people may pass by, please consider the danger associated with broken glass that could fall if the tubes were to be damaged.

5.3. Plumbing & Connecting the System

The system should be plumbed and connected BEFORE inserting the evacuated tubes for safety reasons. If the tubes are inserted beforehand, many connections on the collector could reach high temperatures, increasing the risk for burn injury.

5.3.1. Temperature Sensor Insertion

A. The temperature sensor port on the solar collector is located beside the inlet and outlet ports.



B. Take the solar controller sensor cable tip and coat it with a fine layer of heat paste. Make sure the sensor and cable are both rated for up to 356°F/180°C. C. Insert the the sensor cable fully into the sensor port. Make sure the sensor cable fits snugly.

D. Make sure there is proper insulation to prevent any water ingress. Silicone sealants tend to work fine.

Important: Make sure to run the sensor cable alongside the insulation of the pipe run, not the pipe itself, to avoid any chance of melting the cable.

5.3.2 Connecting & Plumbing the System

5.3.2.1 Fittings

A. Compression and flared fittings and/or brazing are all suitable methods to connect the inlet and outlet ports to the main piping run to and from the collector.

B. Take care to use insulation and seals around the inlet and outlet ports that can withstand high temperatures since these sections will become very hot.

5.3.2.2 Insulation

- A. To prevent heat loss, insulation of at least 0.59 in. (15mm) thickness is needed on the pipe runs. Make sure the insulation near the collector inlet/outlet is high temperature rated and that all insulation is UV-rated due to constant outdoor exposure.
- B. Silicone sealants are recommended to form waterproof seals to prevent any water from entering the manifold or sensor port area.
- C. All internal piping should be insulated as well. This includes at least the 3 ft. / 1m closest to the hot water outlet of the tank since this copper pipe can be a significant area prone to heat loss.

5.3.2.3 Pumps

All active systems require a pump (open loop) or pump station with heat exchanger (closed loop). Pumps should fulfill the following criteria:

- Provides enough pressure to circulate water through the collector header at a determined flow rate, thus ensuring optimal heat transfer and minimizing turbulence in the storage tank. Recommended flow rate is calculated: # of tubes x 0.026 gal./min. (0.1L/ min.)
- Ideally 3 speeds (40, 60, 90W) to control flow.
- Install the pump in the horizontal position to avoid damaging the pumps internal bearings.

5.3.2.4 Filling the System

Once all the piping and insulation are in place, the system should be fully connected.

- A. Fill the hot water tank with cold water (street).
- B. Purge the collector loop of any potential air pockets before inserting the evacuated tubes. For open loop systems this can be done using an auto-air vent or by loosening the union on the collector outlet for air release. For closed loop systems, please refer to the instructions for your pump station or tank heat exchanger.

5.4. Evacuated Tube & Heat Pipe Installation

BE SURE TO WEAR SAFETY GLASSES WHEN HANDLING GLASS TUBES. TO AVOID SERIOUS BURNS, WEAR THICK LEATHER GLOVES WHEN HANDLING EXPOSED EVACUATED TUBES & HEAT PIPES.

5.4.1. Unpacking Evacuated Tubes & Heat Pipes

- A. Open the tube box(es) with evacuated tubes and heat pipes inserted.

TIP: Tear open both ends of the boxes to check the tube bottoms and expose the heat pipe condenser heads for heat transfer paste application without exposing the tubes' selective coating to sunlight.

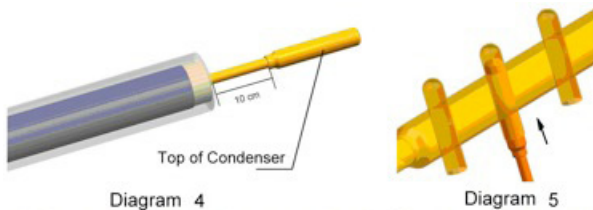
B. Make sure the evacuated tubes are all intact and the bottom of each tube is still silver/chrome. If a tube has a white or clear bottom, it is damaged and should be replaced. Remember, the heat pipe can be salvaged, so just remove it from the broken tube and insert it into the new one.

DO NOT EXPOSE the tubes to sunlight UNTIL READY TO INSTALL. The outer glass surface will not become hot, but the HEAT PIPES AND INSIDE OF THE EVACUATED TUBE WILL BECOME EXTREMELY HOT.

5.4.2. Evacuated Tube & Heat Pipe Insertion

A. Remove and insert each evacuated tube & heat pipe one by one.

B. Pull up the heat pipe a little bit out of the evacuated tube, and make sure there is at least 4 in.(10cm) of distance from the tube opening (Diagram 4).



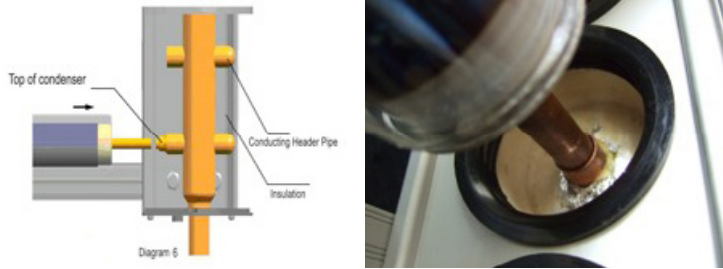
C. Prior to insertion, apply the heat paste to the heat pipe condenser head using the below method: Use a short length of foam insulation with about half a tube of the heat transfer paste squirted inside. Insert the heat pipe into the foam insulation to form a thin layer of heat paste on the condenser head. Remove the heat pipe. The heat pipe should be coated in a thin layer of heat paste.

D. CAREFULLY put the silver/chrome tube bottom into its tube cap holder as seen below.



E. Prior to inserting the evacuated tube heat pipe into the manifold port as seen in Diagram 5, it is recommended to lubricate the inside of the silicon rubber seal ring with a small amount of diluted, soapy water using a small pump spray bottle.

F. Insert the heat pipe condenser all the way into the manifold port making sure the evacuated tube stopper fits snugly as seen in the photos below and in Diagram 6. Sometimes this requires slightly twisting the tube back and forth.



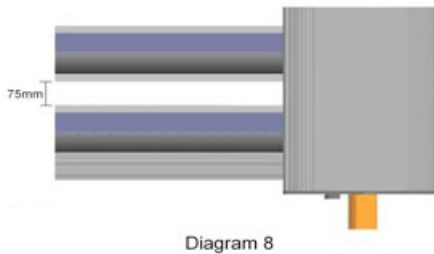
The heat pipe and evacuated tube are fully inserted once the selective coating of the evacuated tube has disappeared up into the manifold.



G. Screw on the tube cap cover. Take care to not twist too tightly to avoid breaking the evacuated tube tip. After screwing on the tube cap it should look like the photos below.



H. Once all tubes have been fully inserted, check to make sure is about a 3 in. (75mm) distance between each tube as seen in Diagram 8.



6. Basic Maintenance

The SolarUS system is designed for virtually no maintenance needed since it has no mechanical or moving parts. However, the following are some tips and kind reminders for you to ensure the longevity of your system. If for ANY reason you are unsure about the maintenance of your SolarUS system, please contact an authorized SolarUS installer or a SolarUS representative.

6.1. Tube Breakage

SolarUS evacuated tubes are highly durable and rated to withstand hailstones of up to 1" (25mm). Nonetheless, we understand that severe weather and accidents do occur. The collector tubes are made of glass, so please be careful after such an occurrence. Make sure there is no glass in the surrounding area outside the home or building. Broken glass is SHARP SO BE CAREFUL! Call a SolarUS installer to replace the damaged tubes.



It is easy to tell if the tube is broken. The bottom of the tube has a silver/chrome tip which indicates the vacuum is intact. If this tip is milky white or clear, your tube needs to be replaced.

6.2. Cleaning

SolarUS evacuated tubes are designed for regular rain to keep them clean. In areas of low rain and/or high dust levels, we recommend a high-pressure water hose to spray down the tubes. If cleaning is required and the suggested methods above are not suitable, please contact your SolarUS installer to conduct a thorough cleaning.

7. Customer Service

Your Satisfaction Guaranteed At SolarUS we take customer service seriously. We hold all our employees, partners, and installers to the highest standards of service quality and integrity.

All SolarUS installers should:

- Be punctual for appointments
- Be polite and have nice presentation
- Patiently answer any questions you may have about the system

- Explain the basic operation of the system to you
- Clean up after the installation
- Leave with you a completed warranty form

If you have any comments about the service provided by the installation officer please contact us:

SolarUS, Inc.

965 West Main Street

Branford, CT USA 06405

Tel: +1 203 208 3533

www.solarusmfg.com

9. Warranty

Warranty Conditions

1. The solar water heating system must be installed in accordance with the manufacturer's installation instructions, the local authorities and all relevant statutory requirements - AS3500.4 & 5, AS5601, AS3000, AS2712 etc.
2. Installation may only be completed plumbers, gas fitters and electricians that are licensed in the state the installation is completed. 3. This warranty applies only to those components provided as part of the Apricus solar water heating product and not any electrical or plumbing parts provided by the installer. e.g. Pressure limiting valve, duo-valve, etc.
4. The coverage period is valid from the date of installation.! Should any part of the complete solar water heating system be replace during the warranty period, the balance of the original warranty will continue to remain effective.
5. Should the system be installed in a region where regular flushing of the hot water tank is required to clean out sediment, a drain cock for flushing must be fitted at the time of installation! Please contact your plumber or local water authority if unsure if this is required.
6. The electrical system components are installed in a domestic application and connected to a 240V power supply by a qualified electrician in accordance with AS3000.
7. Component manufacturers are a liberty to alter the design or construction for the products notwithstanding that the product may have been sold by description or sample, even though alterations may have been introduced for the date of Contract and the date of delivery provided that the products are of the same or similar quality and are fit of the purposes for which they are purchased.! Such alterations shall not constitute a defect in design or construction under this Warranty.
8. Dated proof of purchase is required prior to commencement of warranty work.

9. The Warranty shall be limited to the replacement or repair, at the option of Apricus Australia Pty Ltd of any defective products and of such parts as have been damaged in consequence of the defect. Apricus Australia is excluded to the extend allowable by Law from responsibility for consequential loss including:

- Injury to persons - Damage to property

- Economic loss - Pain and suffering; and - Any legal or other damages resulting from any manufacturing fault or defect.

10. Apricus Australia shall be under no obligation to return parts replaced at its option pursuant to this Warranty.

Warranty Exclusions

The following exclusions may cause the warranty to become void, and may incur a service charge and cost of parts that may be required.

1. Accidental damage, acts of God, failure due to misuse incorrect installation, attempts to repair the system other than by an Apricus accredited serviceman/technician.

2. Where the solar collector leaks or fails to operate normally due to freezing in regions above the snow

line and/or with minimum temperatures below -5oC (in accordance with AS/NZS 2712:2007 freeze level1), or when power supply to the controller and pump is cut.

3. Damage to the collector due to excessive winds. 4. Damage to the evacuated tubes due to impact by any object.

5. The solar collector is left dry (no liquid circulation) and exposed to daily sunlight (i.e. not covered) for a period exceeding 14 consecutive days.

6. Failure of a vitreous enamel steel tank where the anode has been completely dissolved.

7. Where the solar water heating system component has failed directly or indirectly as a result of excessive water pressure, negative pressure (partial vacuum), excessive temperature, corrosive atmosphere, faulty plumbing and/or electrical wiring, or major variations in electrical energy supply

8. Subject to any statutory provisions to the contrary, claims for damage to walls, foundations, gardens, etc. or any other consequential loss or inconvenience either directly or indirectly due to leakage from the solar water heating system or any other matter related to the system or its operation.

9. This warranty does not cover the effects of sludge/sediment as a result of connection to a water supply from suitably filtered or treated sources ie. Spring, dam, bore, river or town supply from a bore.

10. Where the water stored in the cylinder exceeds at any time the following levels:

200 mg/litre or p.p.m 600 mg/litre or p.p.m 850 µS/cm 250 mg/litre or p.p.m

10 mg/litre or p.p.m 150 mg/litre or p.p.m Min 6.5 to Max 8.5

11. Any serial tags/stickers on any of the components are removed or defaced. 12. The product is relocated from its original point of installation

13. Subject to statutory provisions to the contrary, Apricus Australia shall not be liable for consequential damage or any incidental expenses resulting from any breach of this warranty.

14. The benefits conferred by this warranty are in addition to all other rights and remedies in respect of the product, which the purchaser has under the Trade Practices Act (Commonwealth) 1975, and similar State or Territory laws.

15.

Warranty Coverage

Components that fail within the “parts and labour” warranted period due to faulty manufacturing or workmanship will be replaced at no charge to the customer within metropolitan areas.! During the “parts only” warranty period only replacement product will be provided, with additional costs to be charged to the customer.! Where the system is installed outside the boundaries of a Capital Cities Metropolitan area (i.e. those areas STD), the cost of transport, insurance and travelling between the nearest Apricus accredited Service Agent’s premises will be charged to the owner.

The period for which free replacement applies, varies for different components, as outlined in the table below.

Component

Coverage

Apricus Solar Collector: Copper heat transfer header One year parts and labour (All states) Fifteen years parts only (All states)

Apricus Solar Collector: Evacuated Tubes and Heat Pipes One year parts and labour (All states) Ten years parts only (All states)

Apricus Solar Collector: Mounting Frame One year parts and labour (All states) Fifteen years parts only (All states)

10. Troubleshooting

Problem

Cause

Solution

1. Pump always ON even during minimal solar radiation conditions

AAir lock in manifold

Ensure system is air bled properly. A ball valve and drain should be installed on the return line allowing the drain to be opened, ball valve shut off, thus flushing the collector. Take care as some steam may be released.

Insufficient flow rate

Check flow rate by temporarily installing flow meter. If not sufficient try:

- Ensure there is 15-20cm of straight pipe both sides of the pump to ensure optimal operation.
- Eliminated any unnecessary elbows or bends in copper line to reduce pressure drop.
- Change the pump to a higher speed setting. - Confirm correct pump orientation (see figure 3.8.8)

Pump Cavitation

Bleed the pump of air by opening the top bleed screw. Also ensure there is at least 15cm of straight pipe on both sides of the pump.

2. Pump not cycling during good weather and collector is hot.

Collector sensor (ROOF) not inserted properly.

Coat with thermal paste, insert into the port beside outlet and check operation.

Faulty sensors

Check sensor operation by putting ROOF sensor in hot water, INLET sensor in cold water, the pump should come on. Replace one or both sensors and re-check operation.

3. Pump running at night.

Freeze protection operating

This is normal, but if the pump is running more than once an hour, additional insulation on the collector line should be used.

4. Not enough hot water

Electric or gas booster is not configured correctly.

Ensure gas booster is operational.

For electric systems, fit an automatic timer for the element power supply set to run from 3pm to 6pm, providing a boost each day.! End user can over-ride to turn the element ON for a few hours if they need additional hot water.

5. Hot water dumping from tank PTRV

High temperature setting in controller not functioning to turn off pump.

Check to ensure TOP-OUT function is set to 70oC. Check TANK sensor contact.

6. Excessively hot water delivered to house taps

No tempering valve installed

Install tempering valve, providing 50oC water supply to house.

7. Banging noise in pipes when hot water tap is opened.

Steam formation in collector when hot water tap is opened after a period of collector stagnation. Often occurs when inlet cold pressure is low (<400kPa)

Check cold supply water pressure. Install pressure pump to raise cold supply pressure above 400kPa.

8. Banging noise in pipe even when hot water is NOT being used.

Check valve (duo-valve) may not be installed on cold mains line, combined with low supply water pressure (<400kPa)

Install check valve (duo-valve) on cold line before tank (see Appendix H-L diagrams). Install pressure pump to raise cold supply pressure above 400kPa

Check valve on cold line not sealing.

Replace with new check valve. Cold expansion valve or PTRV should be dumping water each day.

Copyright ! 2009 – Apricus Solar Co., Ltd A7-05.4.1.1-PB--1.7 Page 34 of 51

Apricus Solar Collector Installation and Operation Manual

Problem

Cause

Solution

9. Poor solar contribution

Insufficient flow rate

See Troubleshooting point 1.

Is working fine, but customer has turned booster off.

Explain to customer that in the winter or poor weather the tank will not heat up to full temperature, refer to section 1 of this manual. Boosting is still needed all year round and will operate as needed.

Damaged tubes

Check to ensure tubes are all intact. Replace any damaged tubes.

Incorrect installation of heat pipes

Heat pipes are not inserted into the ports correctly, or do not have coating of heat transfer paste.

Low installation angle, reducing winter output (If angle is less than latitude).

Increase installation angle to at least latitude angle, and preferably 10-15o greater than latitude.

Insufficient insulation resulting in excessive heat loss

Ensure all exposed copper pipe is insulated and protected against UV degradation.

Thermosiphoning at night

Install downward U shaped copper pipe on collector return pipe just before tank inlet to form a heat trap.

Increased hot water demand

If the customer is using a lot more hot water than in the past then the % solar contribution will be reduced even though solar output may be the same.

11. Disclaimer

Apricus Solar Co., Ltd withholds the right to change dimensions and the characteristics of the product without any forewarning, and rejects any kind of responsibility for misprints.

This booklet is only a guide and as such Apricus Solar Co., Ltd will not be held responsible for any damage to person or property that results during the installation or subsequent use of this solar collector and related system components.

PRODUCT RANGE

EFFECTIVE MAY 2009



AEROLINE® SPLIT

COPPER | Page 1 - 2



AEROLINE® SPLIT

INOX | Page 3 - 4



AEROLINE® COMBI

INOX | Page 5



AERORAPID®

INOX | Page 6



AERORAPID® PRO

INOX | Page 7



AEROPRO®

TUBES | Page 8



ISICLICK®

CORRUGATED TUBE
CONNECTION | Page 9



ACCESSORIES

COPPER | Page 10



AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrer Feld 30 | www.tubesystems.com

Subject to change

PRODUCT RANGE

EFFECTIVE MAY 2009



AEROLINE® SPLIT R4



AEROLINE® SPLIT R4 Rapid piping system

For thermal solar systems (closed loop), with copper tubes, splittable for easier connection to collector, solar station, storage.

EASILY SPLITTABLE!
E.G. AT THE COLLECTOR



Integrated tube system, consisting of: Insulating material made of EPDM, 2 x copper tubes according to ASTM B88 Type L/ACR (soft), black PE protective film, UV-resistant, sensor cable AWG 19 (3 x 0.75 mm²) UL 300V.

Thermal protection: The thermal loss is equal to that of two individually-bld pipes complete with 3/4" thick thermal insulation. The characteristic value of thermal conductivity at + 104 °F, K-Value = 0.27 BTU·in./h·ft²·°F, at + 75 °F, K-Value = 0.25 BTU·in./h·ft²·°F, at + 32 °F, K-Value = 0.23 BTU·in./h·ft²·°F. Cu 1/2", Cu 5/8" and Cu 3/4" – with 1/2" insulation thickness each.

Insulating material made of EPDM, light, flexible, closed-cell, synthetic rubber; PVC and CFC-free. Flammability and smoke density: Self extinguishing according to ASTM D 635 and Class V0 according to UL-94. No embrittlement of copper and stainless steel tubes according to DIN 1988 Part 7; dimensions according to DIN 52 275-2. Long term thermal stability up to + 257 °F; short term up to + 347 °F (stagnation temperature of collectors). Characteristic value of thermal conductivity at + 104 °F (+ 40 °C), K-Value = 0.27 BTU·in./h·ft²·°F ($\lambda_{104°C}$ = 0.039 W/mK), at + 75 °F (+24 °C), K-Value = 0.25 BTU·in./h·ft²·°F ($\lambda_{75°C}$ = 0.037 W/mK), at + 32 °F (0 °C), K-Value = 0.23 BTU·in./h·ft²·°F ($\lambda_{32°C}$ = 0.034 W/mK). Very good ozone resistance, UV-resistant.

The tubes are marked in order to avoid any confusion between flow/return.

ORDER NO.	TUBE DIMENSION O.D. X WALL	LENGTH	R-VALUE
10012.435	Cu tube 1/2" x 0.035	Length 35 ft	> 4
10012.450	Cu tube 1/2" x 0.035	Length 50 ft	> 4
10012.480	Cu tube 1/2" x 0.035	Length 80 ft	> 4
10050.435	Cu tube 5/8" x 0.040	Length 35 ft	> 4
10050.450	Cu tube 5/8" x 0.040	Length 50 ft	> 4
10050.480	Cu tube 5/8" x 0.040	Length 80 ft	> 4
10034.435	Cu tube 3/4" x 0.042	Length 35 ft	> 4
10034.450	Cu tube 3/4" x 0.042	Length 50 ft	> 4
10034.480	Cu tube 3/4" x 0.042	Length 80 ft	> 4

Due to production procedures a maximum deviation of 1-2% in the tube lengths is possible.

AEROLINE mounting materials

Packing unit with 4 oval clips, M8x80 stair bolts and S10 plugs each

- 2.907.004 Size 0 - for SPLIT R4 with Cu Tube 1/2"
- 2.904.004 Size 1 - for SPLIT R4 with Cu Tube 5/8" or 3/4"



AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrer Feld 30 | www.tubesystems.com

Subject to change

PRODUCT RANGE

EFFECTIVE MAY 2009



AEROLINE® SPLIT R6

AEROLINE®
TUBE SYSTEMS
BAUMANN GMBH

AEROLINE® SPLIT R6 Rapid piping system

For thermal solar systems (closed loop), with copper tubes, splittable for easier connection to collector, solar station, storage.

EASILY SPLITTABLE!
E.G. AT THE
COLLECTOR



Integrated tube system, consisting of: Insulating material made of EPDM, 2 x copper tubes according to ASTM B88 Type L/ACR (soft), black PE protective film, UV-resistant, sensor cable AWG 19 (3 x 0.75 mm²) UL 300V.

Thermal protection: The thermal loss is equal to that of two individually-laid pipes complete with 1" thick thermal insulation. The characteristic value of thermal conductivity at + 104 °F, K-Value = 0.27 BTU·in./h·ft²·°F, at + 75 °F, K-Value = 0.25 BTU·in./h·ft²·°F, at + 32 °F, K-Value = 0.23 BTU·in./h·ft²·°F. Cu 1/2", Cu 5/8" and Cu 3/4" – with 3/4" insulation thickness each.

Insulating material made of EPDM, light, flexible, closed-cell, synthetic rubber; PVC and CFC-free. Flammability and smoke density: Self extinguishing according to ASTM D 635 and Class V0 according to UL-94. No embrittlement of copper and stainless steel tubes according to DIN 1988 Part 7; dimensions according to DIN 52 275-2. Long term thermal stability up to + 257 °F; short term up to + 347 °F (stagnation temperature of collectors). Characteristic value of thermal conductivity at + 104 °F (+ 40 °C), K-Value = 0.27 BTU·in./h·ft²·°F ($\lambda_{25°C}$ = 0.039 W/mK), at + 75 °F (+ 24 °C), K-Value = 0.25 BTU·in./h·ft²·°F ($\lambda_{25°C}$ = 0.037 W/mK), at + 32 °F (0 °C), K-Value = 0.23 BTU·in./h·ft²·°F ($\lambda_{25°C}$ = 0.034 W/mK). Very good ozone resistance, UV-resistant.

The tubes are marked in order to avoid any confusion between flow/return.

ORDER NO.	TUBE DIMENSION O.D. X WALL	LENGTH	R-VALUE
10012.235	Cu tube 1/2" x 0.035	Length 35 ft	> 6
10012.250	Cu tube 1/2" x 0.035	Length 50 ft	> 6
10012.280	Cu tube 1/2" x 0.035	Length 80 ft	> 6
10050.235	Cu tube 5/8" x 0.040	Length 35 ft	> 6
10050.250	Cu tube 5/8" x 0.040	Length 50 ft	> 6
10050.280	Cu tube 5/8" x 0.040	Length 80 ft	> 6
10034.235	Cu tube 3/4" x 0.042	Length 35 ft	> 6
10034.250	Cu tube 3/4" x 0.042	Length 50 ft	> 6
10034.280	Cu tube 3/4" x 0.042	Length 80 ft	> 6

FITTINGS
from page 10 on

Due to production procedure a maximum deviation of 1-2% in the tube length is possible.

AEROLINE mounting materials

Packing unit with 4 oval clips, M8x20 stair bolts and S10 plugs each

2.907.004	Size 0 - for SPLIT R6 with Cu Tube 1/2"
2.904.004	Size 1 - for SPLIT R6 with Cu Tube 5/8"
2.906.004	Size 2 - for SPLIT R6 with Cu Tube 3/4"



AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrer Feld 30 | www.tubesystems.com

Subject to change

PRODUCT RANGE

EFFECTIVE MAY 2009



AEROLINE® INOX SPLIT R6



AEROLINE® INOX SPLIT R6 Rapid piping system

For thermal solar systems (closed loop); with stainless steel corrugated tubes, splitable for easier connection to collector, solar station, storage.

EASILY SPLITABLE!
E.G. AT THE
COLLECTOR



Integrated tube system, consisting of: Insulating material made of EPDM, 2 x stainless steel corrugated tubes, black PE protective film, UV-resistant, sensor cable AWG 19 (3 x 0.75 mm²) UL 300V.

Thermal protection: The thermal loss is equal to that of two individually-laid pipes complete with 1" thick thermal insulation. The characteristic value of thermal conductivity at + 104 °F, K-Value = 0.27 BTU·in./h·ft²·°F, at + 75 °F, K-Value = 0.25 BTU·in./h·ft²·°F, at + 32 °F, K-Value = 0.23 BTU·in./h·ft²·°F.
Corrugated tube 5/8" and 3/4" - with 3/4" insulation thickness each.

Stainless steel corrugated tubes: Material no.: AISI 316L with a temperature range of - 454 °F to + 1112 °F. Recommended pressure at +392 °F 5/8"/159 psi; 3/4"/159 psi. Bursting pressure 5/8" / 3/4" higher 478 psi.

Insulating material made of EPDM, light, flexible, closed-cell, synthetic rubber; PVC and CFC-free. Flammability and smoke density: Self extinguishing according to ASTM D 635 and Class V0 according to UL-94. No embrittlement of copper and stainless steel tubes according to DIN 1988 Part 7; dimensions according to DIN 52 275-2. Long term thermal stability up to + 257 °F; short term up to + 347 °F (stagnation temperature of collectors). Characteristic value of thermal conductivity at + 104 °F (+ 40 °C), K-Value = 0.27 BTU·in./h·ft²·°F ($\lambda_{300C} = 0.039 W/mK$), at + 75 °F (+24 °C), K-Value = 0.25 BTU·in./h·ft²·°F ($\lambda_{300C} = 0.037 W/mK$), at + 32 °F (0 °C), K-Value = 0.23 BTU·in./h·ft²·°F ($\lambda_{300C} = 0.034 W/mK$). Very good ozone resistance, UV-resistant.

The tubes are marked in order to avoid any confusion between flow/return.

ORDER NO.	TUBE DIMENSION OD X WALL, LENGTH	R-VALUE
10.250.235	Corrugated tube 5/8" (LD. 0.64 in.) Length 35 ft	> 6
10.250.250	Corrugated tube 5/8" (LD. 0.64 in.) Length 50 ft	> 6
10.250.200	Corrugated tube 5/8" (LD. 0.64 in.) Length 60 ft	> 6
10.234.235	Corrugated tube 3/4" (LD. 0.80 in.) Length 35 ft	> 6
10.234.250	Corrugated tube 3/4" (LD. 0.80 in.) Length 50 ft	> 6
10.234.200	Corrugated tube 3/4" (LD. 0.80 in.) Length 60 ft	> 6

FITTINGS
from page 7 on

Due to production procedures a maximum deviation of 1-2% in the tube length is possible.

AEROLINE mounting materials

Packing unit with 4 oval clips, M8x80 stair bolts and S10 plugs each

- 9.906.004 Size 2 - for INOX SPLIT R6 with corrugated tube 5/8"
- 9.905.004 Size 3 - for INOX SPLIT R6 with corrugated tube 3/4"



AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrer-Feld 30 | www.tubesystems.com

Subject to change

PRODUCT RANGE

EFFECTIVE MAY 2008



AEROLINE® COMBI SPLIT R4/PRO



AEROLINE® COMBI SPLIT R4/PRO

The integrated double-tube system for thermal solar systems (closed loop) with individual, optimally protected collector connections.

THE FLEXIBLE SOLUTION
 WITH EXTRA
 PROTECTION FOR OUTSIDE USE!



Integrated tube system, consisting of:

Insulating material made of EPDM, 2 x stainless steel corrugated tubes, black PE protective film, collector connection surrounded with polyester wire mesh, UV-resistant and weather-proof, sensor cable AWG 19 (3 x 0.75 mm²) UL 300V.

Thermal protection: Thermal loss of the main tube corresponds to that of two individually-laid pipes complete with 3/4" thick thermal insulation. The characteristic value of thermal conductivity at + 104 °F, K-Value = 0.27 BTU·in./h·ft²·°F, at + 75 °F, K-Value = 0.25 BTU·in./h·ft²·°F, at + 32 °F, K-Value = 0.23 BTU·in./h·ft²·°F.

Stainless steel corrugated tubes: Material no.: AISI 316L with a temperature range of - 454 °F to + 1112 °F. Recommended pressure at + 392 °F 5/8"/159 psi; 3/4"/159 psi. Bursting pressure 5/8" / 3/4" higher 478 psi.

Collector connections: M12 x 6.5 ft individual connections, insulated, covered with polyester wire mesh.

Insulating material made of EPDM, light, flexible, closed-cell, synthetic rubber; PVC and CFC-free. Flammability and smoke density: Self extinguishing according to ASTM D 635 and Class V0 according to UL-94. No embrittlement of copper and stainless steel tubes according to DIN 1988 Part 7; dimensions according to DIN 52 275-2. Long term thermal stability up to + 257 °F; short term up to + 347 °F (stagnation temperature of collectors). Characteristic value of thermal conductivity at + 104 °F (+ 40 °C), K-Value = 0.27 BTU·in./h·ft²·°F ($\lambda_{40°C} = 0.039 \text{ W/mK}$), at + 75 °F (+ 24 °C), K-Value = 0.25 BTU·in./h·ft²·°F ($\lambda_{24°C} = 0.037 \text{ W/mK}$), at + 32 °F (0 °C), K-Value = 0.23 BTU·in./h·ft²·°F ($\lambda_{0°C} = 0.034 \text{ W/mK}$). Very good ozone resistance, UV-resistant.

The tubes are marked in order to avoid any confusion between flow/return.

ORDER NO.	COMBI 5/8" MESH-JACKETING 6.5 FT	R-VALUE
10.558935	Corrugated tube 5/8" (LD. 0.64 in.) main tube 28.5 ft total length 35 ft	> 4
10.558950	Corrugated tube 5/8" (LD. 0.64 in.) main tube 43.5 ft total length 50 ft	> 4
10.558980	Corrugated tube 5/8" (LD. 0.64 in.) main tube 73.5 ft total length 80 ft	> 4

ORDER NO.	COMBI 3/4" MESH-JACKETING 6.5 FT	R-VALUE
10.534935	Corrugated tube 3/4" (LD. 0.80 in.) main tube 28.5 ft total length 35 ft	> 4
10.534950	Corrugated tube 3/4" (LD. 0.80 in.) main tube 43.5 ft total length 50 ft	> 4
10.534980	Corrugated tube 3/4" (LD. 0.80 in.) main tube 73.5 ft total length 80 ft	> 4



Due to production procedure a maximum deviation of 1-2% in the tube lengths is possible.

AEROLINE mounting materials

Packing unit with 4 oval clips, M8x80 stair bolts and S10 plugs each

- 9.904.004 Size 1 - for COMBI 5/8"
- 9.906.004 Size 2 - for COMBI 3/4"



AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrer Feld 30 | www.tubesystems.com

Subject to change

PRODUCT RANGE

EFFECTIVE MAY 2009



AERORAPID® Thermally insulated stainless steel corrugated tubes

Connection system for thermal solar systems (closed loop)

PRE-INSULATED FOR
 THERMAL
 SOLAR APPLICATIONS!



Integrated tube system, consisting of:
 Insulating material made of EPDM. Stainless steel corrugated tube.

Stainless steel corrugated tube:
 Material no.: AISI 316L with a temperature range of - 454 °F to + 1112 °F. Recommended pressure at +392 °F
 5/8" / 159 psi; 3/4" / 159 psi. Bursting pressure 5/8" / 3/4" higher 478 psi.

Insulating material made of EPDM, light, flexible, closed-cell synthetic rubber; PVC and CFC-free. Flammability
 and smoke density: Self extinguishing according to ASTM D 635 and Class V0 according to UL-94. No embrittlement
 of copper and stainless steel tubes according to DIN 1988 Part 7; dimensions according to DIN 52 275-2. Long term
 thermal stability up to + 257 °F; short term up to + 347 °F (stagnation temperature of collectors). Characteristic value
 of thermal conductivity at + 104 °F (+ 40 °C), K-Value = 0.27 BTU·in./h·ft²·°F ($\lambda_{40°C}$ = 0.039 W/mK), at + 75 °F (+24 °C),
 K-Value = 0.25 BTU·in./h·ft²·°F ($\lambda_{24°C}$ = 0.037 W/mK), at + 32 °F (0 °C), K-Value = 0.23 BTU·in./h·ft²·°F
 ($\lambda_{0°C}$ = 0.034 W/mK). Very good ozone resistance, UV-resistant.

ORDER NO.	TUBE DIMENSIONS, LENGTH	THICKNESS	R-VALUE
10.050.050	Corrugated tube 5/8" (I.D. 0.64 in.) Length 90 ft	Insulation 1/2"	> 2,6
10.050.060	Corrugated tube 5/8" (I.D. 0.64 in.) Length 60 ft	Insulation 1/2"	> 2,6
10.034.050	Corrugated tube 3/4" (I.D. 0.80 in.) Length 90 ft	Insulation 1/2"	2,5
10.034.060	Corrugated tube 3/4" (I.D. 0.80 in.) Length 60 ft	Insulation 1/2"	2,5

ORDER NO.	TUBE DIMENSIONS, LENGTH	THICKNESS	R-VALUE
10.150.050	Corrugated tube 5/8" (I.D. 0.64 in.) Length 90 ft	Insulation 1"	> 6
10.034.050	Corrugated tube 3/4" (I.D. 0.80 in.) Length 90 ft	Insulation 1"	> 6

FITTINGS
 from page 9 on

Due to production procedures a maximum deviation of 1-2% in the tube lengths is possible.

AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrer Feld 30 | www.tubesystems.com

Subject to change

PRODUCT RANGE

EFFECTIVE MAY 2008



AERORAPID® PRO



AERORAPID® Thermally insulated stainless steel corrugated tubes

Connection system for thermal solar systems (closed loop)

WITH PRO-PROTECTION -
 IDEAL FOR
 OUTDOOR USE



Integrated tube system, consisting of:
 Insulating material made of EPDM, covered with polyester wire mesh. Stainless steel corrugated tube.

Stainless steel corrugated tube:

Material no.: AISI 316L with a temperature range of - 454 °F to + 1112 °F. Recommended pressure at +392 °F 5/8" / 159 psi; 3/4" / 159 psi. Bursting pressure 5/8" / 3/4" higher 478 psi.

Insulating material made of EPDM, light, flexible, closed-cell, synthetic rubber; PVC and CFC-free. Flammability and smoke density: Self extinguishing according to ASTM D 635 and Class V0 according to UL-94. No embrittlement of copper and stainless steel tubes according to DIN 1988 Part 7; dimensions according to DIN 52 275-2. Long term thermal stability up to + 257 °F; short term up to + 347 °F (stagnation temperature of collectors). Characteristic value of thermal conductivity at + 104 °F (+ 40 °C), K-Value = 0.27 BTU·in./h·ft²·°F ($\lambda_{STC} = 0.039 \text{ W/mK}$), at + 75 °F (+24°C), K-Value = 0.25 BTU·in./h·ft²·°F ($\lambda_{STC} = 0.037 \text{ W/mK}$), at + 32 °F (0 °C), K-Value = 0.23 BTU·in./h·ft²·°F ($\lambda_{STC} = 0.034 \text{ W/mK}$). Very good ozone resistance, UV-resistant.

ORDER NO.	TUBE DIMENSIONS, LENGTH	THICKNESS	R-VALUE
10.050.150	Corrugated tube 5/8" (LD: 0.64 in.) Length 90 ft	Insulation 1/2"	> 2,6
10.034.150	Corrugated tube 3/4" (LD: 0.80 in.) Length 90 ft	Insulation 1/2"	2,5

ORDER NO.	TUBE DIMENSIONS, LENGTH	THICKNESS	R-VALUE
10.150.150	Corrugated tube 5/8" (LD: 0.64 in.) Length 90 ft	Insulation 1"	> 6
10.134.150	Corrugated tube 3/4" (LD: 0.80 in.) Length 90 ft	Insulation 1"	> 6

Due to production procedures a maximum deviation of 1-2% in the tube length is possible.

FITTINGS
 from page 9 on

PRODUCT RANGE

EFFECTIVE MAY 2009



AEROPRO® insulation

The insulation for thermal solar systems with the visually pleasant protective mesh for use in particularly rough conditions.

THE IDEAL INSULATION
 FOR
 OUTDOOR USE!



Tubes, consisting of
 Insulating material covered with polyester wire mesh, UV-resistant and weather-proof.

Insulating material made of EPDM, light, flexible, closed-cell, synthetic rubber; PVC and CFC-free. Flammability and smoke density: Self extinguishing according to ASTM D 635 and Class V0 according to UL-94. No embrittlement of copper and stainless steel tubes according to DIN 1988 Part 7; dimensions according to DIN 52 275-2. Long term thermal stability up to + 257 °F; short term up to + 347 °F (stagnation temperature of collectors). Characteristic value of thermal conductivity at + 104 °F (+ 40 °C), K-Value = 0.27 BTU·in./h·ft²·°F ($\lambda_{40°C}$ = 0.039 W/mK), at + 75 °F (+24°C), K-Value = 0.25 BTU·in./h·ft²·°F ($\lambda_{24°C}$ = 0.037 W/mK), at + 32 °F (0 °C), K-Value = 0.23 BTU·in./h·ft²·°F ($\lambda_{0°C}$ = 0.034 W/mK). Very good ozone resistance, UV-resistant.

ORDER NO.	LENGTH 6.5 FT	Copper - Stainless steel	Insulation thickness	R-Value	Box
3.213.010	I.D. 3/4"	Cu tube 3/4"	1/2"	> 2.6	260 ft
3.219.010	I.D. 3/4"	Cu tube 3/4"	3/4"	> 4	156 ft
3.225.010	I.D. 3/4"	Cu tube 3/4"	1"	> 6	104 ft
3.213.022	I.D. 7/8"	Cu tube 7/8" - Corr. tube 5/8"	1/2"	> 2.6	208 ft
3.219.022	I.D. 7/8"	Cu tube 7/8" - Corr. tube 5/8"	3/4"	> 4	136 ft
3.225.022	I.D. 7/8"	Cu tube 7/8" - Corr. tube 5/8"	1"	> 6	78 ft
3.213.020	I.D. 1 1/8"	Cu tube 1 1/8" - Co rr tube 3/4"	1/2"	2.5	182 ft
3.219.020	I.D. 1 1/8"	Cu tube 1 1/8" - Co rr tube 3/4"	3/4"	> 4	117 ft
3.225.020	I.D. 1 1/8"	Cu tube 1 1/8" - Co rr tube 3/4"	1"	> 6	78 ft

ORDER NO.	ENDLESS	Copper - Stainless steel	Insulation thickness	R-Value	Box
3.213.010e	I.D. 3/4"	Cu tube 3/4"	1/2"	> 2.6	98 ft
3.219.010e	I.D. 3/4"	Cu tube 3/4"	3/4"	> 4	42 ft
3.225.010e	I.D. 3/4"	Cu tube 3/4"	1"	> 6	32 ft
3.213.022e	I.D. 7/8"	Cu tube 7/8" - Corr. tube 5/8"	1/2"	> 2.6	72 ft
3.219.022e	I.D. 7/8"	Cu tube 7/8" - Corr. tube 5/8"	3/4"	> 4	36 ft
3.225.022e	I.D. 7/8"	Cu tube 7/8" - Corr. tube 5/8"	1"	> 6	29 ft
3.213.020e	I.D. 1 1/8"	Cu tube 1 1/8" - Co rr tube 3/4"	1/2"	2.5	52 ft
3.219.020e	I.D. 1 1/8"	Cu tube 1 1/8" - Co rr tube 3/4"	3/4"	> 4	32 ft
3.225.020e	I.D. 1 1/8"	Cu tube 1 1/8" - Co rr tube 3/4"	1"	> 6	29 ft

20 % surcharge for fractional quantities.

AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrer Feld 30 | www.tubesystems.com

Subject to change

PRODUCT RANGE

EFFECTIVE MAY 2009



IsiClick® Connecting system for stainless steel corrugated tubes

For the connections of thermal solar systems (closed loop)



IsiClick corrugated tube connection:

Metal-to-metal sealing system, to apply without special tools, defined stop prevents overwinding.

Being prepared for all situations with a larger choice of IsiClick connections:

- IsiClick with pipe end to plug into press and compression fittings, e.g. suitable for many solar stations

Connection system of solar installations in combination with

AEROLINE INOX SPLIT . AEROLINE COMBI . AERORAPID . AERORAPID PRO

ORDER NO. | ISICLICK ON MALE THREAD

4.108.116	Connection 5/8" x male thread 3/4" NPT			
4.108.020	Connection 3/4" x male thread 3/4" NPT			

ORDER NO. | ISICLICK ON ISICLICK-CORRUGATED TUBE COUPLING

4.009.016	Straight coupling 5/8" x 5/8"		
4.009.020	Straight coupling 3/4" x 3/4"		

ORDER NO. | ISICLICK ON PIPE END

4.110.116	Adaptor 5/8" x pipe end 3/4" (O.D.)		
4.122.116	Adaptor 5/8" x pipe end 7/8" (O.D.)		
4.110.120	Adaptor 3/4" x pipe end 3/4" (O.D.)		
4.122.120	Adaptor 3/4" x pipe end 7/8" (O.D.)		

ORDER NO. | ISICLICK TEE

4.017.316	IsiClick Tee 5/8" x 5/8" x 5/8"	
4.017.320	IsiClick Tee 3/4" x 3/4" x 3/4"	
4.162.016	IsiClick Tee 5/8" x 3/4" x 5/8"	

AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrerfeld 30 | www.tubesystems.com

Subject to change

PRODUCT RANGE

EFFECTIVE MAY 2009




COPPER ACCESSORIES



Brass fittings for solder-free connections:

Compression ring connections for thermal solar systems (closed loop)
 Connections on compression fittings



ORDER NO.	COMPRESSION RING STRAIGHT COUPLING	E
10.912.012	Compression ring straight coupling 1/2" (O.D.) x 1/2" (O.D.)	
10.915.015	Compression ring straight coupling 5/8" (O.D.) x 5/8" (O.D.)	
10.918.018	Compression ring straight coupling 3/4" (O.D.) x 3/4" (O.D.)	

ORDER NO.	COMPRESSION RING ON MALE THREAD	E
10.905.012	Adaptor compression ring 1/2" (O.D.) x male thread 3/4" NPT	
10.905.015	Adaptor compression ring 5/8" (O.D.) x male thread 3/4" NPT	
10.905.018	Adaptor compression ring 3/4" (O.D.) x male thread 3/4" NPT	

AEROLINE TUBE SYSTEMS | D-89081 Ulm | Im Lehrerfeld 30 | www.tubesystems.com

Subject to change



MICROSOL II plus
DIFFERENTIAL TEMPERATURE
CONTROLLER FOR SOLAR HEATING
WITH TWO SOLAR BACKING

Ver03



ULC01010V03-001-11703

1. DESCRIPTION

Differential temperature controller for automation of solar heating systems, MICRO SOL II plus becomes simple the management of the temperature of the water in the thermal reservoirs and swimming pools, use the solar energy better.

It acts in the command of the water circulation pump through the differential of temperature between the solar collectors and the thermal reservoir or swimming pool. It is a dedicated instrument that has all its parameters of configuration protected by access code.

It makes use of two solar backing outputs, that can be electric, gas, diesel or also to program the filtering of the swimming pool. solar backing 1 is tied with an schedule that allows the configuration of up to four daily events for each day of the week and solar backing 2 can optionally be configured for functioning in set with this schedule.

It has functions that prevent the water freezing and over heating in the tankings and a clock with internal battery to guarantee its synchronism, even in the energy lack, per many years. The instrument has serial communication or connection with the SITRAD[®] via internet.

Product complies with CE (European Union) and UL Inc. (United States and Canada). *

*The UL approval is only valid for Microsol II plus models with 115/230Vac power supply.

2. APPLICATION

- Solar heating pumped systems

3. TECHNICAL SPECIFICATIONS

- Power supply: Microsol II plus: 115 or 230Vac ± 10% (50/60Hz)
- Microsol II plus: 12 or 24Vac/dc
- Control temperature: Sensor 1: -50 to 200°C / -58 to 392°F
- Sensors 2 and 3: -50 to 105°C / -58 to 221°F
- Resolution: 0.1°C between -10 and 100°C and 1°C in the rest of the range
- 1°F in all range
- Dimensions: 71 x 28 x 71 mm
- Operating temperature: 0 to 50°C / 32 to 122°F
- Operating humidity: 10 to 90% RH (without condensation)
- Sensors: S1 - Sensor of the collectors
- S2 - Sensor of the Reservoir/Pool
- S3 - Sensor for control of solar backings
- Control outputs: PUMP - Water pump solenoid - 3(A)/250Vac, 18HP
- AUX1 - solar backing 1 - 3(A)/250Vac, 18HP
- AUX2 - solar backing 2 - 3(A)/250Vac, 18HP

CLASSIFICATION ACCORDING TO IEC 60730-2-9 STANDARD:

- Temperature limit of the installation surface: 50°C
- Type of construction: Built-in electronic controller
- Automatic action: Type 1
- Control of pollution: Level 2
- Impulse voltage: 1.5kV
- Temperature for the test of sphere pressure: 75°C and 125°C
- Installation: Class II

4. ADVANCED SETTINGS

4.1 - To access the options menu

Press **SEL** and **ESC** simultaneously for two seconds until it appears **SEL**, then releasing it. When appears **ESC** press **ESC** (tap) and enter the code (123) through keys **SEL** and **ESC**. To confirm, press the key **ESC**. Through the keys **SEL** and **ESC** access the other functions and proceed in the same manner to adjust them. To leave the menu and return to normal operations, press **ESC** (long hit) until **ESC** appears.

4.2 - Options

- ESC** Access code entry
- FUN** Advanced configuration functions
- ESC** Events planner operating mode
- PRG** Scheduling in the events planner
- CLD** Adjustment of the clock and the day of the week

4.2.1 - Settings parameters

Fun	Description	CELSIUS				FAHRENHEIT			
		Min	Max	Unit	Standard	Min	Max	Unit	Standard
F001	Indication of the preferential temperature	0	3	-	1	0	3	-	1
F002	Differential for turning on the water circulation pump	1.0	40.0	C	3.0	2	72	F	14
F003	Differential for turning off the water circulation pump	1.0	40.0	C	4.0	2	72	F	7
F004	Minimum temperature at S1 to switch on the pump	-50.0	200	C	-50.0	-58	392	F	-58
F005	Pump switch on delay	0	999	sec.	0	0	99	sec.	0
F006	Negative differential (S1-S2) to switch on the pump to dissipate heat	-40.0	0.0	C	0.0	-72	0	F	0
F007	Minimum temperature at S2 to allow circulating heat dissipation	0.0	105	C	105	32	221	F	221
F008	Antifreeze S1 to switch on the pump	2.9	10.0	C	3.0	37	50	F	37
F009	Antifreeze hysteresis	0.1	20.0	C	1.0	1	36	F	1
F010	Minimum antifreeze time	0	999	sec.	0	0	999	sec.	0
F011	Overheating temperature S1 to switch off the pump	0.0	200	C	90.0	32	392	F	194
F012	Overheating hysteresis to switch on the pump	0.1	20.0	C	1	1	36	F	1
F013	Overheating temperature S2 to switch off the pump	0.0	105	C	105	32	221	F	221
F014	Overheating hysteresis to switch on the pump (S2)	0.1	20.0	C	1.0	1	36	F	1
F015	Solar backing 1 operating mode	0	1	-	0	0	1	-	0
F016	Solar backing 1 temperature setpoint	-50.0	105	C	35.0	-58	221	F	95
F017	Solar backing 1 activation hysteresis	0.1	20.0	C	1.0	1	36	F	1
F018	Minimum value for solar backing 1 temperature setpoint	-50.0	105	C	-50.0	-58	221	F	-58
F019	Maximum value for solar backing 1 temperature setpoint	-50.0	105	C	105	-58	221	F	221
F020	Solar backing 1 manual activation time	0	999	min.	0	0	999	min.	0
F021	Solar backing 2 operating mode	0	5	-	0	0	5	-	0
F022	Solar backing 2 temperature setpoint	-50.0	105	C	30.0	-58	221	F	86
F023	Solar backing 2 activation hysteresis	0.1	20	C	1.0	1	36	F	1
F024	Minimum value for solar backing 2 temperature setpoint	-50.0	105	C	-50.0	-58	221	F	-58
F025	Maximum value for solar backing 2 temperature setpoint	-50.0	105	C	105	-58	221	F	221
F026	Solar backing 2 manual activation time	0	999	min.	0	0	999	min.	0
F027	Cyclic timer on time	1	999	min.	1	1	999	min.	1
F028	Cyclic timer off time	1	999	min.	1	1	999	min.	1
F029	Event schedule linking mode	0	3	-	0	0	3	-	0
F030	Minimum S1 temperature alarm	-50.0	200	C	-50.0	-58	392	F	-58
F031	Maximum S1 temperature alarm	-50.0	200	C	200	-58	392	F	392
F032	S1 temperature indication offset	-5.0	5.0	C	0.0	-9	9	F	0
F033	S2 temperature indication offset	-5.0	5.0	C	0.0	-9	9	F	0
F034	S3 temperature indication offset	-5.0	5.1	C	0.0	-9	10	F	0
F035	RS-485 network address	1	247	-	1	1	247	-	1

4.2.1.1 - Parameters description

F001 Indication of the preferential temperature
It allows the preferential temperature indication to be configured. You may choose between:

- ESC** temperature in the sensor 1
- ESC** temperature in the sensor 2
- ESC** temperature in the sensor 3
- ESC** differential temperature (S1-S2)

F002 Differential for turning on the water circulation pump
It allows the adjustment of the differential temperature (S1-S2) to activate the water circulation pump. As the solar collectors receive energy, the temperature in sensor S1 increases. When this temperature is at a value established as being above the temperature of sensor S2, the pump is turned on and circulates under the heated water, storing it in the reservoir, for example.

F003 Differential for turning off the water circulation pump
It allows the adjustment of the differential temperature (S1-S2) to turn off the water circulation pump. With the pump on, the hot water circulates below and cools upwards. After which time, the temperature difference between S1 and S2 tends to decrease. When this difference falls to an established level, the pump is turned off and the water circulation stops.

F004 Minimum temperature at S1 to switch on the pump
Minimum temperature at sensor 1 to allow switching on the water circulation pump. To deactivate it, just decrement the value until the message OFF is displayed.

F005 Pump switch on delay
It allows setting the minimum time the pump must be switched off before being switched on again. It prevents switching the pump on and off at short intervals, thus increasing pump's service life. It also defines the delay to switch on the pump after switching on the controller.

F006 Negative differential (S1-S2) to switch on the pump to dissipate heat
Negative differential (S1-S2) to switch on the water circulation pump. It allows dissipating heat to reduce any excess temperature in the water tank. To deactivate it, just increment the value until the message OFF is displayed.

F007 Minimum temperature at S2 to allow activating heat dissipation
Minimum temperature at sensor 2 to allow activating the heat dissipation functions.

It allows setting the temperature for which the collectors start to ice. When the temperature at the collectors (sensor 1) is too low (e.g. winter nighttime), the pump is switched on at regular intervals to prevent the water from freezing and damaging the pipes. To deactivate this function, just decrement the value until the message **0000** is displayed.

F09 Antifreeze hysteresis

Hysteresis for the antifreeze function to switch off the water circulation pump.

F10 Minimum antifreeze time

Minimum time for which the antifreeze function stays on even if the temperature at sensor 1 returns to the normal value.

F11 Overheating temperature S1 to switch off the pump

It allows setting the overheating temperature of the collectors to switch off the water circulation pump. When the temperature at the collectors (sensor 1) is higher than an adjustable value, the pump is switched off to prevent the overheated water from circulating through the pipes and damaging them (if PVC pipes are used).

F12 Overheating hysteresis to switch on the pump

Overheating temperature hysteresis adjustment for sensor 1 to allow switching on the pump again.

F13 Overheating temperature S2 to switch off the pump (swimming pool temperature)

It allows setting the overheating temperature of the swimming pool to switch off the water circulation pump to avoid uncomfortable thermal conditions.

F14 Overheating hysteresis to switch on the pump (S2)

Overheating temperature hysteresis adjustment for sensor 2 to allow switching on the pump again.

F15 Solar backing 1 operating mode

It allows setting up the operating mode of the solar backing 1 output. The modes are:

- 0 Solar backing 1 working independently from solar backing 2
- 1 Solar backing 1 deactivated when solar backing 2 is activated

When this parameter has the value "1" and the solar backing 2 is activated the controller will display the message AA2. This option is used with solar heating systems containing gas (AUX1 output) and electrical (AUX2 output) heating backups. In this condition when the controller activates the solar backing 2 (electrical heating) it will alert the user that solar backing 1 (gas heating) is not working properly.

F16 Solar backing 1 temperature setpoint

Allows setting the activation temperature for solar backing 1.

F17 Solar backing 1 activation hysteresis

Hysteresis setting for solar backing 1 activation temperature setpoint.

F18 Minimum value for solar backing 1 temperature setpoint

Lower threshold aimed at preventing an exceedingly low temperature setpoint from being adjusted inadvertently for solar backing 1.

F19 Maximum value for solar backing 1 temperature setpoint

Upper threshold aimed at preventing an exceedingly high temperature setpoint from being adjusted inadvertently for solar backing 1.

F20 Solar backing 1 manual activation time

Time for which solar backing 1 stays on when activated manually. After this time solar backing 1 returns to automatic operation.

F21 Solar backing 2 operating mode

It allows setting up the operating mode of the solar backing 2 output. The modes are:

- 0 Cooling thermostat
- 1 Heating thermostat
- 2 Cooling thermostat linked to the event schedule
- 3 Heating thermostat linked to the event schedule
- 4 Cyclic timer with initial state "off"
- 5 Cyclic timer with initial state "off" and linked to the event schedule
- 6 Cooling thermostat for heat dissipation to reduce any excess temperature in the water tank

F22 Solar backing 2 temperature setpoint

Allows setting the activation temperature for solar backing 2.

F23 Solar backing 2 activation hysteresis

Hysteresis setting for solar backing 2 activation temperature setpoint.

F24 Minimum value for solar backing 2 temperature setpoint

Lower threshold aimed at preventing a low temperature setpoint from being adjusted inadvertently for solar backing 2.

F25 Maximum value for solar backing 2 temperature setpoint

Upper threshold aimed at preventing an exceedingly high temperature setpoint from being adjusted inadvertently for solar backing 2.

F26 Solar backing 2 manual activation time

Time for which solar backing 2 stays on when activated manually. After this time solar backing 2 returns to automatic operation.

F27 Cyclic timer on time

It allows adjusting the time for which the cyclic timer keeps its output on.

F28 Cyclic timer off time

It allows adjusting the time for which the cyclic timer keeps its output off.

It allows linking the solar backing outputs to one or more of the four daily events. The possible modes are:

- 0 Aux 1 linked to events 1, 2, 3 and 4
Aux 2 linked to events 1, 2, 3, and 4
- 1 Aux 1 linked to event 1
Aux 2 linked to events 2, 3, and 4
- 2 Aux 1 linked to events 1 and 2
Aux 2 linked to events 3 and 4
- 3 Aux 1 linked to events 1, 2, and 3
Aux 2 linked to event 4

F30 Minimum S1 temperature alarm

Temperature for sensor 1 low temperature alarm indication

F31 Maximum temperature alarm on S1

Indication temperature of high temperature on sensor 1

F32 S1 temperature indication offset

It allows setting sensor 1 (collectors) temperature indication offset.

F33 S2 temperature indication offset

It allows setting sensor 2 (tanks/swimming pool) temperature indication offset.

F34 S3 temperature indication offset

It allows setting sensor 3 (solar backing systems) temperature indication offset.

To disable the temperature sensor for the solar backing systems (sensor 3), access this function in the advanced function menu. Then press the key **▲** successively until the message **0000** is displayed. Press **↵** to confirm.

After sensor 3 is disabled, solar backing 1 and 2 will be contracted [sic] by sensor 2 (tank/swimming pool).

If the activation of the water pump is linked to sensor 3 and this sensor is disabled, the controller will automatically unlink them.

F35 RS-485 network address

Equipment's network address for communicating with SITRADO software.

Note: one network must not have different equipment with the same address.

4.2.3 - Events schedule operating mode

In this option, you can choose how the events planner will operate.

1b1 Weekly programming - In this mode, the instrument can configure up to 4 events for every day of the week.

2b6 Programming for business days - In this mode, the instrument keeps the events the same for business days (Monday through Friday), and allows the programming of different events for Saturday and Sunday.

1b7 Daily programming - In this mode, the instrument keeps the events the same for all of the days of the week.

4.2.4 - Programming of the events schedule

In this option, you can enter the values for the time periods for each event. The entry of the data depends on the operating mode configured. You can configure up to four events for each day. For each event, the start and end time are configured through the options **0n1** **0E1** up to **0n4** **0E4**, where:

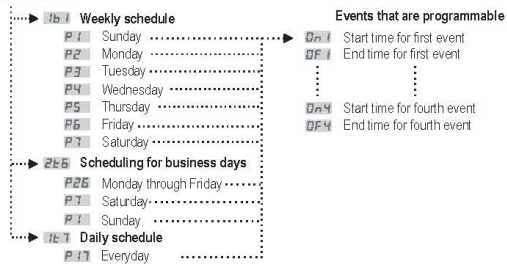
0n1 Start time for the first event

0E1 End time for the first event

0n4 Start time for the 4th event

0E4 End time for the 4th event

If you do not need to use the four events, you can configure it to be deactivated, and all you have to do is increase the off time (**0E1** for example) until the **0FF** indication appears. It is also possible to configure an event to overlap that it begins in one day and it finishes in the other, and for that you should increase the off time until the option **0n0** appears and adjust an event for the next day to start at 00h and 00min. According to the operating mode configured, the following scheduling possibilities may be presented.



4.2.5 - Adjustment of the current time and day of the week

Press the key **▲** until the message **0000** appears in the visor.

Hit key **set**. The settings will appear in the following order:

HOURS → MINUTES → DAY OF THE WEEK

Ex.: 12h43min - Friday

12h Hours

43 Minutes

5 Day of the week

5. FACILITATED ACCESS MENU

5.1 - To enter the menu

Press **set** for two seconds until it appears **5FL**, then release it.

Through the keys **▲** and **▼** access the functions and proceed with the adjust of them. To leave the menu adjust the menu option **0000** (back) until **0000** appears.

F13 **Shotcut to adjust the parameter F13**

This shortcut is used when the Microsol II plus is installed to control swimming pools heating systems. In this case the parameter F13 adjusts the maximum confort temperature of the pool water.

F16 **Shotcut to adjust the parameter F16**

Allows the facilitated adjust of the solar backing 1 temperature setpoint.

F22 **Shotcut to adjust the parameter F22**

Allows the facilitated adjust of the solar backing 2 temperature setpoint.

PPR **Water pump start**

It allows to set the operation mode of the water circulation pump, as follows:

- OFF** Water pump always OFF
- ON** Water pump always ON
- AUT** Circulation pump operating in automatic mode and not linked to sensor 3. With this mode the pump is activated only by the temperature differential (S1-S2).
- LD** Circulation pump operating in automatic mode and linked to sensor 3. With this mode the pump is activated by the temperature differential and when the temperature at sensor 1 is higher than that at sensor 3.

MAN **Manual activation of solar backing 1**

With this option the output of solar backing 1 is manually activated. The output is deactivated after the time adjusted in function **F20** expires. Upon entering this function again, the manual activation is overridden and the solar backing 1 returns to automatic operation.
 To disable the manual activation just configure the function **F20** to "000".

MAN **Manual activation of solar backing 2**

With this option the output of solar backing 2 is manually activated. The output is deactivated after the time adjusted in function **F26** expires. Upon entering this function again, the manual activation is overridden and the solar backing 2 returns to automatic operation.
 To disable the manual activation just configure the function **F26** to "000".

6. QUICKVIEW

6.1 - View other temperatures

To switch between the temperature views for sensor 1, sensor 2, sensor 3 or temperature difference between sensors 1 and 2 (differential temperature), press **↵** till the desired temperature is displayed.

- E=1** Sensor 1 temperature
- E=2** Sensor 2 temperature
- E=3** Sensor 3 temperature
- d.F** Differential temperature (S1-S2)

The selected temperature will be displayed for 15 seconds and then the default indication returns (as per **F01** parameter setting).

6.2 - Visualize the current time

Quickly pressing the key **↵**, you can visualize the time set in the controller, the current time will be shown, followed by the minutes and then the day of the week.

Ex: 12h43min - Friday
12h Hours
43 Minutes
5 Day of the week

6.3 - View maximum and minimum temperatures

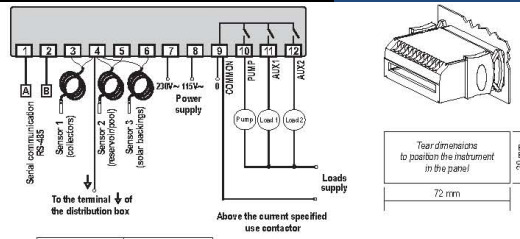
Pressing the **▲** key enables viewing the maximum and minimum temperature for each sensor, as well as the maximum and minimum temperature differentials. Upon pressing the key **▲** (short touch) the message **E=1** will be displayed to indicate sensor 1 temperature and then its maximum and minimum temperatures will be displayed, then the temperatures for sensor 2 (**E=2**), sensor 3 (**E=3**), and differential (**d.F**) will be displayed in sequence.
 If the key **▲** is pressed during the visualization, the values will be reset and the message **FSE** will be displayed.

7. SIGNALING

- E=1** Sensor 1 (collectors) disconnected or out of range
- F=2** Sensor 2 (reservoir /pool) disconnected or out of range
- E=3** Sensor 3 (solar backings) disconnected or out of range
- ICE** Temperature for sensor 1 is freezing
- HE1** Temperature for sensor 1 is overheated
- HE2** Temperature for sensor 2 is overheated
- PPP** Configuration parameters not programmed or out of range
- ON** Circulation pump in off manual mode
- OFF** Circulation pump in on manual mode
- HH1** Sensor 1 high temperature alarm
- LL1** Sensor 1 low temperature alarm
- RR2** Solar backing 2 activation alarm

8. UNIT SELECTION (°C / °F)

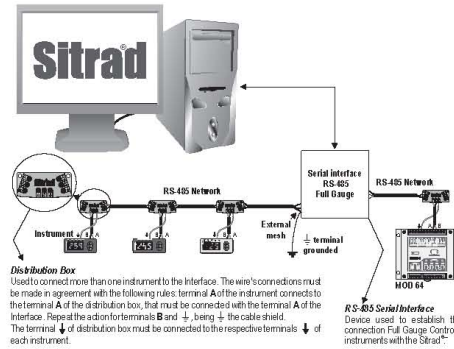
To define the unit that the system will use to operate, enter into the functions menu **F04** using the access code "231" and confirm it by hitting key **↵**. The indication **UN=** will appear, press **↵** or **▲** to choose between **°C** or **°F** and confirm with key **↵**. After selecting the unit the **FRC** message will appear, and the instrument will return to the function **F04**. Whenever the unit is altered, the parameters relating to the temperature must be reconfigured, since they assume "standard" values.



	MICROSOL II plus	MICROSOL II plus
9 - 8	115V ~	12V ~
9 - 7	230V ~	24V ~

Note: The sensor cable length can be increased by the user until 200 meters using PP 2 x 24 AWG cable.

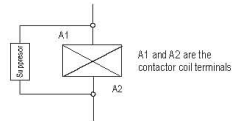
Integrating Controllers, RS-485 Serial interface and Computer



IMPORTANT

According to the chapters of norm IEC 60364:
 1: Install **protector against overvoltage** on the power supply.
 2: Sensor cables and signal cables of the computer may be joined, but not in the same electric conduit through which the electric input and the activation of the loads run.
 3: Install transient suppressors (RC filters) parallel to the loads as to increase the product life of the relays.
 For more information, please contact our Technical Support by e-mail: support@fulgauge.com or by phone +55 51 3475.3308.

Schematic for the connection of suppressors to contactors



Schematic for the connection of suppressors to direct activation loads



PROTECTIVE VINYL:

This adhesive vinyl (included inside the packing) protects the instruments against water drippings, as in commercial refrigerators, for example. Do the application after finishing the electrical connections.

Remove the protective paper and apply the vinyl on the entire superior part of the device, folding the flaps as indicated by the arrows.

Art. S011 SOLAR PUMP STATION WITH DELIVERY AND RETURN CONNECTIONS



Technical Information sheet 0001/07/Rev01 ENG

FUNCTION

The S011 circulation unit is applied to the primary circuit of solar systems and oversees management of the solar panel - storage tank fluid thermodynamic cycle for subsequent supply to utilities via hydraulic distribution circuits. They consist essentially of a circulator with appropriate performance (rate of flow/head) and regulation and control devices governing the operating circuit.

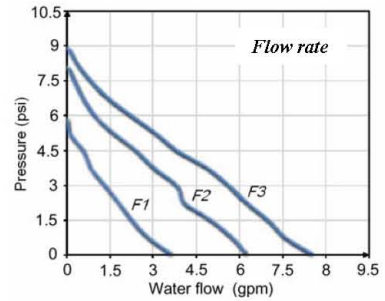
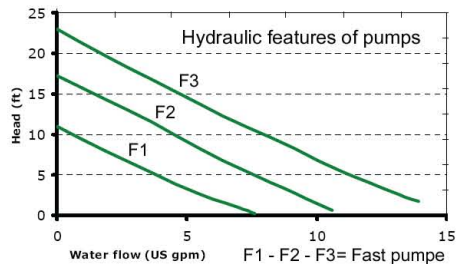
Art.S011

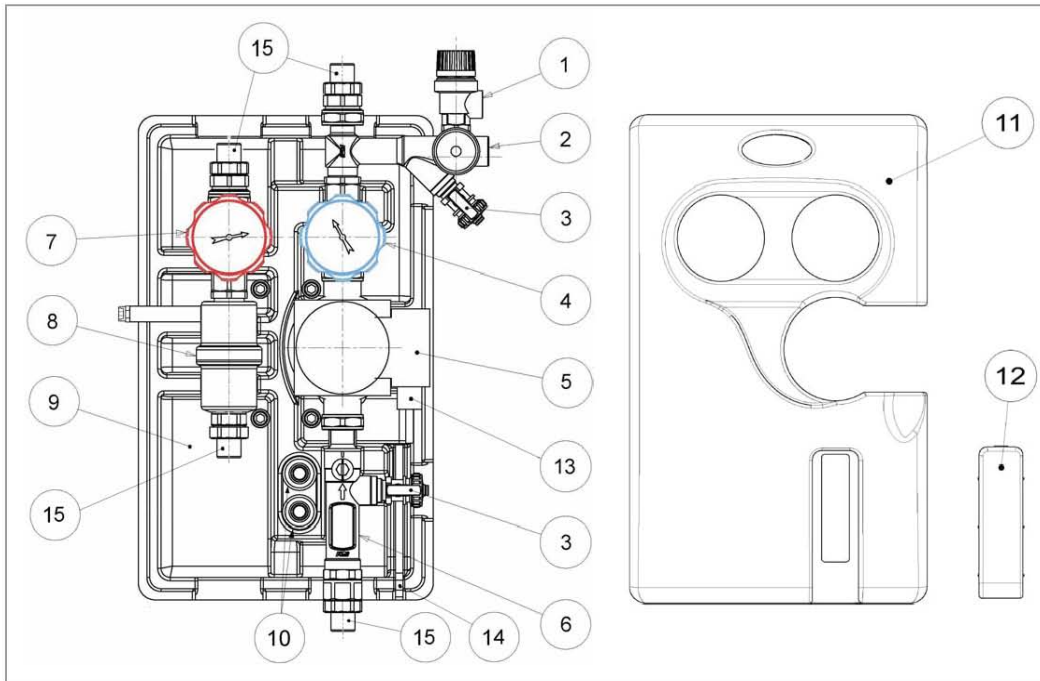


TECHNICAL FEATURES

Fluid used	Water, glycol solutions (glycol 25% - 50% max)
Calibration of safety valve	60 psi
Connection	3/4" NPT
Permitted temperature range	+14 °F / +320°F
Max. ambient temperature	+104°F
Max. operative pressure	150 psi
Min. pressure on intake opening with temperatures of:	+122 °F : 0,8 psi +203 °F : 4.4 psi +230 °F : 14.5 psi
Body	brass EN 12165 CW617N
Thermometer	steel/alluminium
Seals	PTFE
Sealing elements	EPDM-Perox
Flat seals	Betaflex
Insulation shell	PPE, Conductivity λ(ΔT): 0.041 (W/mK)
Pressure gauge scale	0 - 90 psi
Thermometer scale	32 - 320 °F
Connections	3/4" NPT
Hose fitting, for connection with expansion tank	3/4" NPT
Calibration of safety valve	60 psi
Min. pressure for opening on/off and check valve	Δp: 0.29 psi
Filling/emptying connections with hose connection	5/8"

Model Wilo Solar pump STAR S 21 U 15 130 PR 3
 Center-to-center distance: 5.12 inches between connections
 Electrical power supply: 115V - 60Hz
 Operating temperature: 14°- 230°F approx.
 Max. temperature: 284°F for max 2 hours
 Max. operating pressure: 145 psi
 Protection level: NEMA 2





TAB.1

CO M P O N E N T S

1. Safety valve for solar energy systems
2. Expansion tank connection with pressure gauge
3. Taps for filling, emptying and washing the system
4. On/off valve with built-in thermometer and return connection with Anti-gravity non return valve
5. Vilo Solar pump T type Star S 21 U 15 130 PR 3
6. Flow controller with on/off valve, return connection (scale range between 0.25 - 3.5 gpm).
7. On/off valve with built-in thermometer and delivery connection
8. Air bleeding device
9. Preformed insulating base
10. Hose connection
11. Preformed insulating cover
12. Inspection compartment insert
13. Molex connector
14. Cable duct groove
15. Fitting for 3/4 inch NPT

SOLARUS, INC. 965 WEST MAIN STREET BRANFORD, CT USA 06405

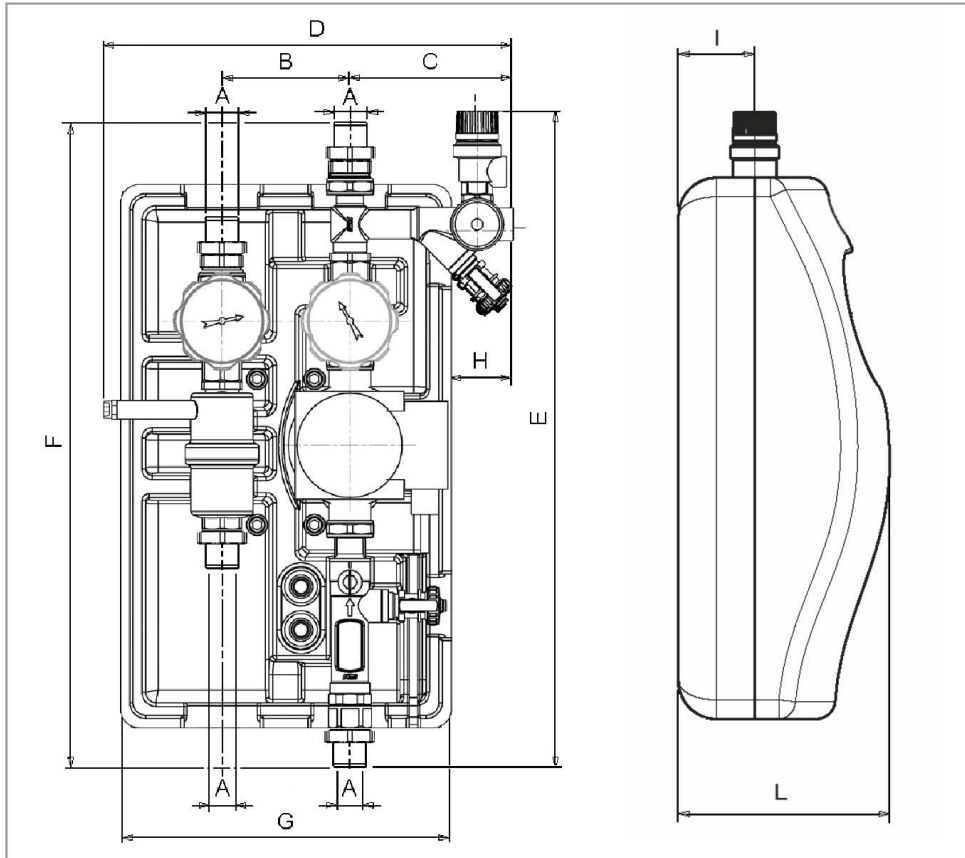
www.solarusmfg.com

inquiry@solarusmfg.com

page 2



DIMENSIONS



TAB N.2

Code	A	B	C	D	E	F	G	H	I	L	Weight (lbs)
S011	¾" F NPT	3.9	5.2	13	19.7	19	10.2	1.97	2.4	6.6	15.4

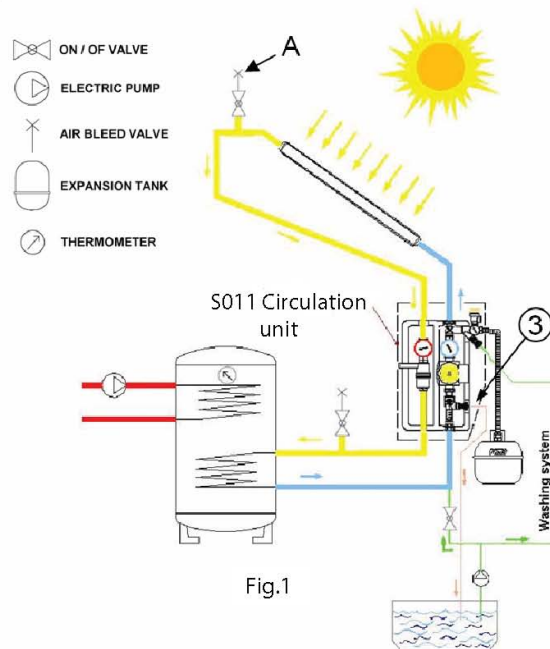


TECHNICAL SPECIFICATIONS

Pump Station S011 receives a signal from the external controller (differential temperature controller), which has at least two temperature sensors (one is positioned on the panel outlet pipe and the other is an immersion sensor in the storage tank), constantly reading the temperature difference and keeping it within the established range, which normally varies between 25°F and 36°F. If Δt between the panel and the storage tank is found to be over the established set point, the controller starts up the pump on the pump station to provide the lacking thermal load. If, on the other hand, the Δt is lower than the one set, the internal pump will be disabled. For further clarification about the electronic controller functioning consult Controller Manual.

FILLING THE SYSTEM

1. Open the on/off valve connected with the air bleed valve A (Fig.1), located at the highest point of the system.
2. Open the on/off and check valves, turning the ball valves with the handle with the thermometer on it (4, 7 in Tab.1).
3. Fill the system with a pump, using the tap at the lowest part of the system (3 in Tab.1), until air stops coming out of the air bleed A (Fig.1).
4. Close the on/off valve on the air bleed valve (7 in Tab.1).
5. Close the tap (3 in Tab.1).



WASHING THE SYSTEM

1. Close the flow control ball valve (6 in Tab.1).
2. Let fluid flow through the solar panels and the heat exchange circuit using an external washing pump linked via a rubber hose to the safety unit filling/emptying tap (1, 2, 3 in Tab.1), until fluid flows out of the flow controller filling/emptying tap (3 in Tab.1).
3. Briefly open the ball valve in the flow controller (6 in Tab.1) to expel all the air from the system.
4. Leave the external pump running in the system for a few minutes to make sure that it is thoroughly washed, following the instructions provided with the external washing pump.



START-UP

1. Close the filling/emptying tap on the flow controller (6 in Tab.1) and increase the system's pressure up to the maximum permitted value. Close the tap when this value is reached.
2. Open the valve on the on/off assembly (4, 7 in Tab.1) and operate the pump (5 in Tab.1).
3. Leave it to circulate for a certain amount of time, and then check the hydraulic seals in the system.
4. Open the air bleed valves A (Fig.1) again, removing air from the system again by turning on the circulation pump briefly.
5. Restore the desired air pressure.
6. The rate of flow of the system may be modified using the flow controller (6 in Tab.1), working the ball valve above the graduated scale (refer to flow meter description). In order to do this the pump must be set to maximum power. Follow the solar panel manufacturer's instructions to adjust or limit the rate of flow.
7. After a few hours of operation, remove air from the solar energy system again at the highest point in the system A (Fig.1) in the air separator (8 in Tab.1). When you have finished bleeding air, check the pressure in the system and restore the desired operating pressure if necessary.

EMPTYING THE SYSTEM

The system must be emptied if it has been filled with water only and will be exposed to a risk of freezing.

1. Open the on/off and check valves by turning the thermometer holder to 45° (4, 7 in Tab.1).
2. Open the air bleed devices at the highest point A (Fig.1).
3. Open the emptying tap at the lowest point in the system (3 in Tab.1).

INSTALLATION AND WALL MOUNTING

The Pump station S011 is anchored using two supporting brackets C (Fig.3) situated at the back of the shell (9 in Tab.1) screwed in with 2 screws (M8x35mm) with washers (Fig.2) stored in a bag inside the box which must then be screwed into the corresponding anchors after inserting them in the wall (Fig.3).

Proceed as follows to install:

1. Lay the pipes for the entire system, leaving the amount of space shown in Table N.2
2. Determine the position of the screw anchors and insert them in the wall
3. Anchor the solar unit to the wall using the screws provided and connect it with the pipes
4. Wire it up electrically
5. Check that all unions are tight

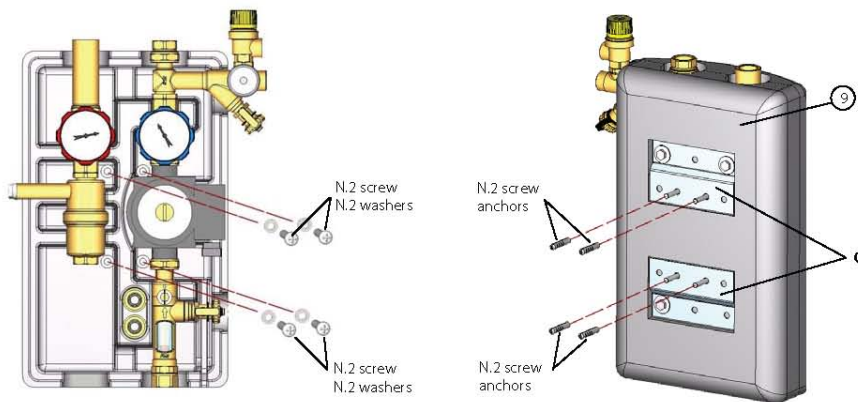


Fig.3

SOLARUS, INC. 965 WEST MAIN STREET BRANFORD, CT USA 06405

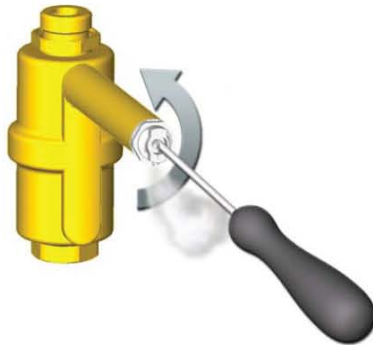
www.solarusmfg.com

inquiry@solarusmfg.com

page 5



AIR BLEED DISTRIBUTOR (air separation device)



The pump station has an air bleed distributor (8 in Tab.1) positioned on the delivery line. Gases are separated from the head conveying fluid and accumulate in the upper part of the deaerator. During start-up, accumulated gas must be evacuated periodically during the day using the manual air bleed valve, with a screwdriver appropriate to the size of the bleed valve. After this, depending on the amount of air in the system, the operation may be repeated either once a week or once a month. Lastly, use the deaerator to bleed the system once every 6 months to keep the solar installation running efficiently.



Danger of burning !

When bleeding the system, if fluid pressure and temperature are high enough, slackening the screw could produce a jet of superheated liquid or steam.

Proceed as follows to avoid accidents:

- Carefully push and turn the rod inwards using an appropriate screwdriver.
- Protect components and electrical connections from water.
- Start up the pump again.

SAFETY

Safety warnings



Read assembly and operating instructions carefully before starting up the system in order to prevent accidents and damage to the system caused by improper use. Remember that your rights under the warranty will be forfeited if you make any changes to the system or tamper with it during assembly and construction without authorization. In addition, you must follow the requirements of the regulations listed below:

DIN 4751
Water heating systems

DIN 4757
Solar heating systems

DIN 18380
Heating systems and hot water heating systems

DIN 18382
Electrical systems and pipes in buildings

DIN 12975
Thermal solar systems and components



OPERATING CONDITIONS

The limits on operating values specified must not be exceeded under any circumstances. Safe operation is guaranteed if you comply with the general conditions and limits on operating valves described in this information sheet.

SAFETY STANDARDS FOR ASSEMBLY AND INSPECTION

Assembly and inspection operations must always be performed by qualified, authorized personnel familiar with the instructions contained herein. Make sure the system is shut down before performing any work on it.

ELECTRICAL CONNECTIONS

Electrical connections must be made by qualified personnel. Connecting cables must be positioned in the cavity provided for the purpose in the insulating shell (14 in Tab.1) so as to avoid contact with the body of the pump motor and with pipes. Check that the power supply voltage is as specified on the plate before turning on the pump. All connections must be made as required by law.

MAINTENANCE

Maintenance work must always be performed by qualified, authorized personnel familiar with the instructions contained herein. Make sure the system is shut down before performing any work on it. When replacing the pump, turn the on/off valve, return connection (4 in Tab.1) and flow control valve (6 in Tab.1) to the off position.



Warning! Depending on operating conditions in the pump and the system, the surface temperature could be very high touching the pump directly creates risk of burning!

DECLARATION OF CONFORMITY (CE)

Wilo Solar ST20/6 pumps conform to the following harmonisation directives:

EEC Machinery Directive

89/392/CEE, 91/368/CEE, 93/44/CEE, 93/68/CEE.

Electromagnetic compatibility

89/336/CEE, 92/31/CEE, 93/68/CEE

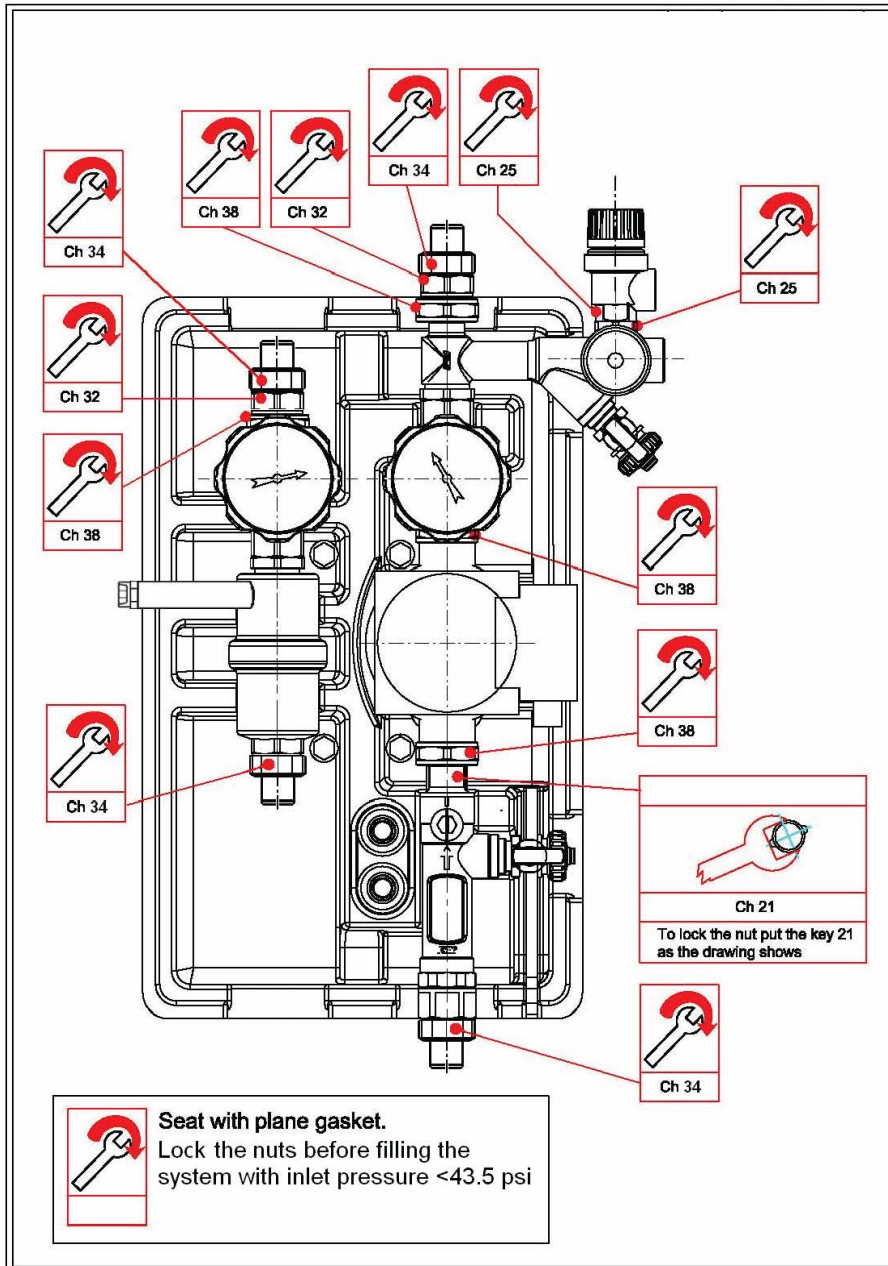
General harmonised standards

EN 809, EN50081-1, en 50 081-2, EN 50 082-1, EN 50 082-2.

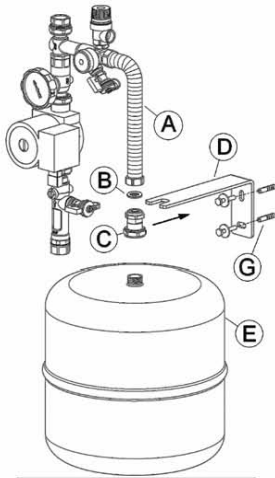
SOLARUS, INC. 965 WEST MAIN STREET BRANFORD, CT USA 06405

www.solarusmfg.com

inquiry@solarusmfg.com



Art.S141 BRACKET AND CONNECTOR KIT FOR THE EXPANSION VESSEL G3/4"



Components

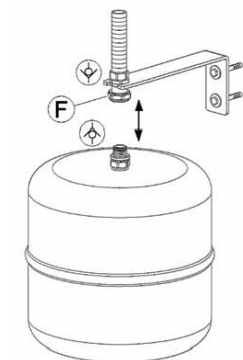
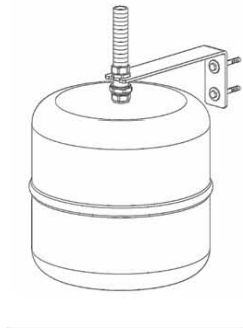
- A) 3/4" Flexible pipe connected to the security unit of the solar pumping station
- B) Fibre washer (included)
- C) Connector with double check valve to disconnect the expansion vessel in a reliable and fast way without any leakage
- D) Mounting bracket provided with plugs and screws to mount it to the wall
- E) Expansion vessel with 3/4" threaded connection (not included)
- G) Mounting anchors to the wall

Installation

Mount the bracket to the wall with the mounting anchors (G). Screw the expansion vessel (E) to the connector (C) and put it on the mounting bracket using the special groove, then lock with the nut. Install the fibre washer (B) and screw the flexible pipe of the security unit (A) to the connector.

Replacement of the expansion vessel

By unscrewing the nut (F) it is possible to disconnect one end of the connector that remains screwed to the expansion vessel. The other end of the connector stays fixed on the bracket connected to the security unit. Both ends have a check valve that becomes operative at the time of the disconnection: this prevents any leakage both from the expansion vessel and from the flexible pipe. To restore the normal function of the system just connect the two ends of the connector (C) and fix them by screwing the nut (F). The two check valves will be then disconnected and the expansion vessel will be connected again to the installation.





SOLARUS, INC.

WARRANTY FORM PUMP STATIONS MODEL # **S011** FILL OUT AND MAIL OR EMAIL TO THE LISTING BELOW

Date : _____

Customer Name : _____

Address : _____

E-Mail : _____

Phone #: _____

Installer Name : _____

Company Name : _____

Company Address : _____

E-Mail : _____

Phone #: _____

SOLARUS, INC. 965 WEST MAIN STREET BRANFORD, CT USA 06405

www.solarusmfg.com

inquiry@solarusmfg.com

page 11

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887
END OF SECTION 22 33 10



SECTION 223313 - TANKLESS HOT WATER - INSTANTANEOUS ELECTRIC DOMESTIC WATER HEATERS

PART 1 – GENERAL

1.1 SUMMARY

- A. Section includes the following:
 1. Whole house electric tankless water heater

1.2 SUBMITTALS

- A. Link to manufacturer's published data sheet, including:
 1. Product details
 2. Dimensions and measurements
 3. Installation instructions

1.3 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at site:
 1. Inspect product upon delivery. Report any damaged or missing components directly to the manufacturer.
- B. Packing, Shipping, Handling and Unloading
 1. Store product in manufacturer's packaging until ready for installation.
- C. Storage and Protection
 1. Store packed product in a safe location as designated by the construction coordinator.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

Bosch Water heating
340 Mad River park
Waitsfield, VT 05673

2.2 PRODUCTS

- A. Bosch RP12PT : Electric tankless water heater
 - 1. Efficiency: 99%
 - 2. Dimensions: 12.25" x 6.5" x 3"
 - 4. Water fittings: 1/2" male NPT
 - 5. Electrical Requirements:
 - a. Volts: 240
 - b. Kilowatts: 12 kW
 - c. Amps: 50
 - d. Wire Size: 6 gauge (2 conductors & ground)
 - e. Phase: Single

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Refer to manufacturer's published installation instructions for detailed installation description. Installation instructions shall be located in the CUSD Operations and Maintenance Manual.

END OF SECTION 223313

SECTION 233423 - POWER VENTILATORS

PART 1 – GENERAL

1.01 SUMMARY

1.02 ACTION SUBMITTALS

- A. Product Data
- B. Bear the AMCA seal and Energy Star seal
- C. Comply with applicable NEMA standards
- D. Comply with UL 705

PART 2 - PRODUCTS

2.01 PRODUCT NAME

- A. Panasonic WhisperGreen-Lite 80 CFM FV-08VKL3

<http://www2.panasonic.com/webapp/wcs/stores/servlet/ModelDetail?storeId=11201&catalogId=13051&itemId=487651&catGroupId=119506&surfModel=FV-08VKL3&displayTab=F>

2.02 MANUFACTURER

- A. Panasonic Home & Environment
One Panasonic Way
Secaucus, NJ 07094
Phone: 1-866-292-7292
Website: www.panasonic.com/building

2.03 PERFORMANCE / DESIGN CRITERIA

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Refer to manufacturer's published installation instructions for detailed installation description.
- B. Tighten electrical connectors and terminals according to UL 486A and UL 486B

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



END OF SECTION 233423

SECTION 238126 - SPLIT SYSTEM AIR-CONDITIONERS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the following: Sanyo Inverter Multi Split System Air Conditioner

1. Indoor Units – XMHS0972
2. Outdoor Unit – CMH1972A

1.2 REFERENCES

- A. Comply with UL certification and bears the UL label.
- B. Wiring in accordance with National Electrical Code (N.E.C.)
- C. Comply with ASHRAE 15.
- D. Comply with NFPA 70.
- E. System efficiency meets or exceeds that described by ASHRAE 90.1, “Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.”

1.3 ACTION SUBMITTALS

A. Links to manufacturers published data sheet, including:

1. Specifications

Outdoor - <http://us.sanyo.com/HVAC-Multi-Split-Systems-Heat-Pumps-Outdoor-Units/Flexi-Multi-Inverter-Type-Heat-Pump>

2. Installation manuals:

For indoor unit (includes Service Manual):

http://s3.pexsupply.com/manuals/1271781997241/29283_PROD_FILE.pdf

For outdoor unit -

<http://us.sanyo.com/dynamic/product/Downloads/CMH%20A%20Installation%20Manual-29501052.pdf>

3. Operation Service manuals:

For outdoor unit – <http://us.sanyo.com/dynamic/product/Downloads/Service%20CMH%20-%20A%20Series%2019-24-31%20Rev%20A2011.06-5587259.pdf>

1.4 DELIVERY, STORAGE AND HANDLING

A. Store and handle unit according to the manufacture’s recommendations.

B. Ship the wireless controller inside carton with the indoor unit. It should be able to withstand 105 degrees Fahrenheit and 95% relative humidity without adverse effect.

PART 2- PRODUCTS

2.1 MANUFACTURERS

A. SANYO North America Corporation
Headquarters
2055 Sanyo Avenue
San Diego, CA 92154 U.S.A.
Tel: 619-661-1134
Fax: 619-661-6795

2.2 PRODUCTS

A. Model number: CMH1972A

1. Total Capacity: Cooling (9,800 – 19,100) Btu/h;
Heating (11,600 – 24,800) Btu/h
2. SEER (cooling): 16.4
3. Max Amps: Cooling, 14.5; Heating, 14.5
4. Power Inputs (W): Cooling, 1,500
Heating, 1,735
5. Power: 230, 1PH, 60Hz
6. Fuse Size, Max. (A): 20
7. Refrigerant: R410a
8. Control: Electric Expansion Valve

- 9. Dimensions (H x W x D): 29-1/8” x 35-7/16” x 12-19/32”
- 10. Weight: 143.3 lbs.
- 11. Operating Range

	Temperature	Indoor Air Intake Temp.	Outdoor Air Intake Temp.
Cooling	Maximum	95 °F D.B. / 71 °F W.B.	115 °F D.B.
	Minimum	67 °F D.B. / 57 °F W.B.	14 °F D.B.
Heating	Maximum	80 °F D.B. / 67 °F W.B.	75 °F D.B. / 65 °F W.B.
	Minimum	D.B. / W.B.	0 °F D.B.

PART 3 – EXECUTION

3.1 INSTALLERS

- A. Southeast Mechanical Contractors
 2120 S.W. 57th Terrace Hollywood, FL. 33023
 Office 954-981-3600 Fax 954-962-8630

3.2 INSTALLATION

- A. Refer to manufacturer’s published installation instructions for detailed installation description.

END OF SECTION 238126

SECTION 260526 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

- A. This section specifies general grounding and bonding requirements of electrical equipment operations and to provide a low impedance path for possible ground fault currents.
- B. “Grounding electrode system” refers to all electrodes required by NEC, as well as including made, supplementary, lightning protection system grounding electrodes.
- C. The terms “connect” and “bond” are used interchangeably in this specification and have the same meaning.

1.02 RELATED WORK

- A. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General electrical requirements and items that are common to more than one section of Division 26.
- B. Section 26 05 21, LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES (600 VOLTS AND BELOW): Low Voltage power and lighting wiring.
- C. Section 26 41 00, FACILITY LIGHTNING PROTECTION: Requirements for a lightning protection system.

1.03 SUBMITTALS

- A. Submit in accordance with Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS.
- B. Shop Drawings: Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
- C. Include the location of system grounding electrode connections and the routing of aboveground and underground grounding electrode conductors.

1.04 APPLICABLE PUBLICATIONS

Publications listed below (including amendments, addenda, revisions, supplements, and errata) form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.

- A. American Society for Testing and Materials (ASTM):
 - B1-2001.....Standard Specification for Hard-Drawn Copper Wire
 - B8-2004Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
- B. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
 - 81-1983.1.....IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
- C. National Fire Protection Association (NFPA):
 - 70-2008National Electrical Code (NEC)

- D. Underwriters Laboratories, Inc. (UL):
 - 44-2005 Thermoset-Insulated Wires and Cables
 - 83-2003 Thermoplastic-Insulated Wires and Cables
 - 467-2004 Grounding and Bonding Equipment
 - 486A-486B-2003 .. Wire Connectors

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes 6 mm² (10 AWG) and smaller shall be solid or stranded copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes 25 mm² (4 AWG) and larger shall be permitted to be identified per NEC.
- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes 6 mm² (10 AWG) and smaller shall be ASTM B1 solid bare copper wire.
- C. Isolated Power System: Type XHHW-2 insulation with a dielectric constant of 3.5 or less.
- D. Electrical System Grounding: Conductor sizes shall not be less than what is shown on the drawings and not less than required by the NEC, whichever is greater.

2.02 GROUND RODS

- A. Copper clad steel, 19 mm (3/4-inch) diameter by 3000 mm (10 feet) long, conforming to UL 467.
- B. Quantity of rods shall be as required to obtain the specified ground resistance.

2.03 SPLICES AND TERMINATION COMPONENTS

Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

2.04 GROUND CONNECTIONS

- A. Below Grade: Exothermic-welded type connectors.
- B. Above Grade:
 - 1. Bonding Jumpers: compression type connectors, using zinc-plated fasteners and external tooth lock washers.
 - 2. Ground Busbars: Two-hole compression type lugs using tin-plated copper

2.05 EQUIPMENT RACK AND CABINET GROUND BARS

Provide solid copper ground bars designed for mounting on the framework of open or cabinet-enclosed equipment racks with minimum dimensions of 3 mm thick by 19 mm wide (3/8 inch x ¾ inch).

2.06 GROUND TERMINAL BLOCKS

At any equipment mounting location (e.g. backboards and hinged cover enclosures) where rack-type ground bars cannot be mounted, provide screw lug-type terminal blocks.

2.07 SPLICE CASE GROUND ACCESSORIES

Splice case grounding and bonding accessories shall be supplied by the splice case manufacturer when available. Otherwise, use 16 mm² (6 AWG) insulated ground wire with shield bonding connectors.

PART 3 EXECUTION

3.01 GENERAL

- A. Ground in accordance with the NEC, as shown on drawings, and as hereinafter specified.
- B. System Grounding:
 - 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
 - 3. Isolation transformers and isolated power systems shall not be system grounded.
- C. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

3.02 LIGHTNING PROTECTION SYSTEM

Bond the lightning protection system to the electrical grounding electrode system.

3.03 WIREWAY GROUNDING

- A. Ground and Bond Metallic Wireway Systems as follows:
 - 1. Bond the metallic structures of wireway to provide 100 percent electrical continuity throughout the wireway system by connecting a 16 mm² (6 AWG) bonding jumper at all intermediate metallic enclosures and across all section junctions.
 - 2. Install insulated 16 mm² (6 AWG) bonding jumpers between the wireway system bonded as required in paragraph 1 above, and the closest building ground at each end and approximately every 16 meters (50 feet).
 - 3. Use insulated 16 mm² (6 AWG) bonding jumpers to ground or bond metallic wireway at each end at all intermediate metallic enclosures and cross all section junctions.
 - 4. Use insulated 16 mm² (6 AWG) bonding jumpers to ground cable tray to column-mounted building ground plates (pads) at each end and approximately every 15 meters.

3.04 GROUND ROD INSTALLATION

- A. Drive each rod vertically in the earth 18 inches in depth.
- B. Where permanently concealed ground connections are required, make the connections by the exothermic process to form solid metal joints. Make accessible ground connections with mechanical pressure type ground connectors.
- C. Where rock prevents the driving of vertical ground rods, install angled ground rods or grounding electrodes in horizontal trenches.

END OF SECTION 260526

SECTION 260923.A1 LEVITONE SINGLE POLE SWITCH

PRODUCT SPECIFICATIONS / INFO



Color: White



5614-2W

UPC Code: 07847793869

Country of Origin: Mexico - *Eligible for ARRA funded projects > \$7,443,000

Description

15 Amp, 120/277 Volt, Decora Rocker Lighted Handle - Illuminated OFF 4-Way AC Quiet Switch, Residential Grade, Grounding, Quickwire Push-In & Side Wired, - White

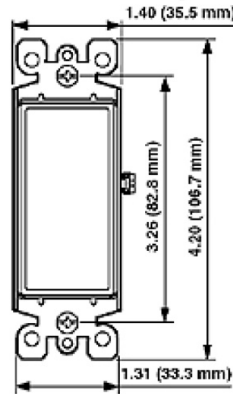
Product Features

- Grounding: Grounding
- Feature: Lighted Handle - Illuminated OFF
- Amperage: 15 Amp
- Voltage: 120/277 Volt
- HP Rating: 1/2HP-120V 2HP-240V-277V
- Max. Amperage: 12 Amp
- Termination: Quickwire Push-In & Side
- Actuator Material: Thermoplastic
- Body Material: Thermoplastic
- Strap Material: Steel
- Color: White
- Standards and Certifications: UL/CSA
- Warranty: 2 Year Limited



*Disclaimer

Dimensional Diagram



SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:	
JOB NUMBER:		

Leviton Manufacturing Co., Inc.
201 North Service Road, Melville, NY 11747
Telephone: 1-800-323-8920 · FAX: 1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.T. Monday-Friday): 1-800-824-3005

Leviton Manufacturing of Canada, Ltd.
165 Hymus Boulevard, Pointe Claire, Quebec H9R 1E9 · Telephone: 1-800-469-7890 ·
FAX: 1-800-824-3005 · www.leviton.com/canada

Leviton S. de R.L. de C.V.
Lago Tana 43, Mexico DF, Mexico CP 11290 · Tel.: (+52)55-5082-1040 · FAX: (+52)5386-1797 ·
www.leviton.com.mx

Visit our Website at: www.leviton.com
© 2007-2011 Leviton Manufacturing Co., Inc. All rights reserved. Subject to change without notice.

Leviton has a global presence.
If you would like to know where your local Leviton office is located please go to:
www.leviton.com/international/contacts/

**Buy American Compliant Logo -- The American Recovery And Reinvestment Act of 2009 ("ARRA") provides federal grants and loans for projects throughout the country. Section 1605 of the Act, named the "Buy American" provision, requires that certain materials and manufactured products used in projects funded by the Act be manufactured in the United States. The appearance of the Recovery Act Logo in relation to a Leviton product is only intended to reflect that such product may be used in an ARRA funded project. It does not mean that such product or Leviton is sponsored or endorsed by, or that Leviton receives funds from, the federal government or the Recovery Accountability and Transparency Board. Nothing in Leviton's use of the logo is intended to suggest anything regarding the requirements for funding under ARRA.*



FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887



http://www.leviton.com/OA_HTML/ibeCCtPltmDspRte.jsp?item=624324§ion=10053&minisite=10026

END OF SECTION 260923.A1

SECTION 260923.A2 LEVITONE SINGLE POLE SWITCH

PRODUCT SPECIFICATIONS / INFO



Color: White



5613-2W

UPC Code: 07847751828

Country of Origin: United States - *Eligible for ARRA funded projects

Description

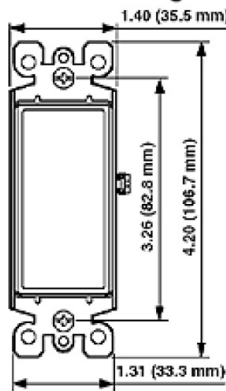
15 Amp, 120/277 Volt, Decora Rocker 3-Way AC Quiet Switch, Residential Grade, Illuminated When Off, Grounding, Quickwire Push-In & Side Wired, - White

Product Features

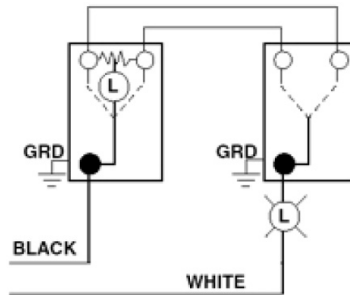
- Grounding: Grounding
- Amperage: 15 Amp
- Voltage: 120/277 Volt
- HP Rating: 1/2HP-120V 2HP-240V-277V
- Max. Amperage: 12 Amp
- Termination: Quickwire Push-In & Side
- Actuator Material: Thermoplastic
- Body Material: Thermoplastic
- Strap Material: Steel
- Color: White
- Standards and Certifications: UL/CSA
- Warranty: 2 Year Limited



Dimensional Diagram



Wiring Diagram
3-Way Lighted



SPECIFICATION SUBMITTAL

JOB NAME:	CATALOG NUMBERS:
JOB NUMBER:	

Leviton Manufacturing Co., Inc.
201 North Service Road, Melville, NY 11747
Telephone: 1-800-323-8920 · FAX: 1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.T. Monday-Friday): 1-800-824-3005

Leviton Manufacturing of Canada, Ltd.
165 Hymus Boulevard, Pointe Claire, Quebec H9R 1E9 · Telephone: 1-800-469-7890 ·
FAX: 1-800-824-3005 · www.leviton.com/canada

Leviton S. de R.L. de C.V.
Lago Tana 43, Mexico DF, Mexico CP 11290 · Tel.: (+52)55-5082-1040 · FAX: (+52)5386-1797 ·
www.leviton.com.mx

Visit our Website at: www.leviton.com
© 2007-2011 Leviton Manufacturing Co., Inc. All rights reserved. Subject to change without notice.

Leviton has a global presence.
If you would like to know where your local Leviton office is located please go to:
www.leviton.com/international/contacts/



**Buy American Compliant Logo – The American Recovery And Reinvestment Act of 2009 (“ARRA”) provides federal grants and loans for projects throughout the country. Section 1605 of the Act, named the “Buy American” provision, requires that certain materials and manufactured products used in projects funded by the Act be manufactured in the United States. The appearance of the Recovery Act Logo in relation to a Leviton product is only intended to reflect that such product may be used in an ARRA funded project. It does not mean that such product or Leviton is sponsored or endorsed by, or that Leviton receives funds from, the federal government or the Recovery Accountability and Transparency Board. Nothing in Leviton’s use of the logo is intended to suggest anything regarding the requirements for funding under ARRA.*

http://www.leviton.com/OA_HTML/ibeCCtPltmDspRte.jsp?item=4045§ion=10053&minisite=10026

END SECTION OF 260923.A2

PRODUCT SPECIFICATIONS / INFO



ODC0S-I1W

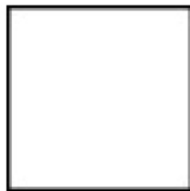
UPC Code: 07847788188

Country of Origin: Please Contact Customer Service

Description

1000W INC 1000VA FL, 120 Volt AC 60Hz, PIR, 360 Degree, 530 Sq. Ft. Coverage, Ceiling Mount Self-Contained Occupancy Sensor, Commercial Grade - White.

Color: White



Product Features

Sensor Type: PIR
 Adjustment: Manual
 Sensor Technology: Passive Infrared
 Pattern Degrees: 360
 Coverage Range Sq. Ft.: 530
 Manual Time Adjustment: 20s-15m
 Load Rating: 1000W INC 1000VA FL
 Input Voltage: 120 Volt AC 60Hz
 Photo Cell: Ambient Override ON
 Feature: Self-Contained
 Color: White
 Standards and Certifications: UL/CSA
 Warranty: 5-Year Limited
 Code Compliance: California Title 24

Control Specifications	
Adjustment	Manual
Manual Time Adjustment	20s-15m

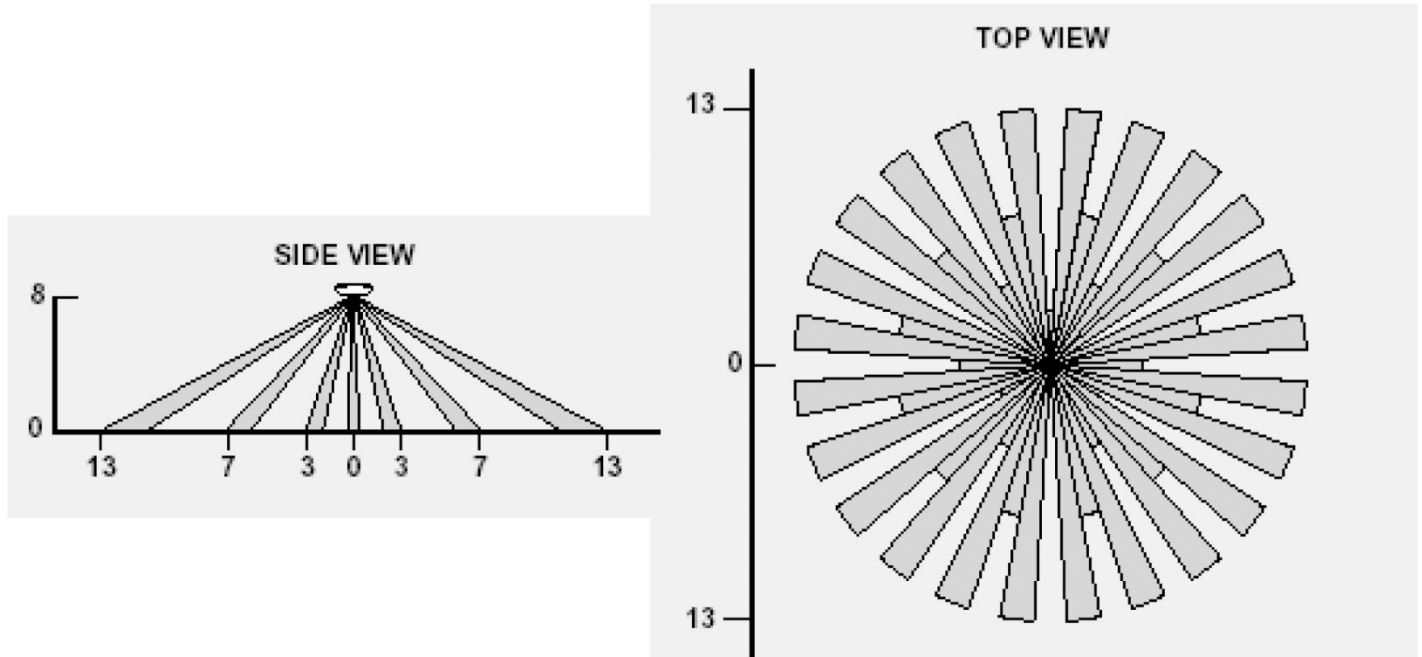
Material Specifications	
Color	White

Standards and Certifications	
Code Compliance	California Title 24

Electrical Specifications	
Input Voltage	120 Volt AC 60Hz
Load Rating	1000W INC 1000VA FL

Mechanical Specifications	
Sensor Technology	Passive Infrared
Pattern Degrees	360
Coverage Range Sq. Ft.	530
Photo Cell	Ambient Override ON
Feature	Self-Contained

Field of View (in feet)



SPECIFICATION SUBMITTAL

JOB NAME: <input type="text"/>	CATALOG NUMBERS: <input type="text"/>	
JOB NUMBER: <input type="text"/>	<input type="text"/>	<input type="text"/>

Leviton Manufacturing Co., Inc.
 201 North Service Road, Melville, NY 11747
 Telephone: 1-800-323-8920 · FAX: 1-800-832-9538 · Tech Line (8:30AM-7:30PM E.S.T. Monday-Friday): 1-800-824-3005

Leviton Manufacturing of Canada, Ltd.
 165 Hymus Boulevard, Pointe Claire, Quebec H9R 1E9 · Telephone: 1-800-469-7890 · FAX: 1-800-824-3005 · www.leviton.com/canada

Leviton S. de R.L. de C.V.
 Lago Tana 43, Mexico DF, Mexico CP 11290 · Tel.: (+52)55-5082-1040 · FAX: (+52)5386-1797 · www.leviton.com.mx

Visit our Website at: www.leviton.com
 © 2007-2011 Leviton Manufacturing Co., Inc. All rights reserved. Subject to change without notice.

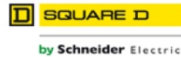
Leviton has a global presence.
 If you would like to know where your local Leviton office is located please go to:
www.leviton.com/international/contacts/



SECTION 262416 – PANEL BOARDS

Product Data Sheet

HOM2040M200TC
LOAD CENTER HOM MB 240V 200A 1PH 20SP



List Price \$764.00 USD

Availability Stock Item: This item is normally stocked in our distribution facility.

Technical Characteristics

Ampere Rating	200A
Bus Material	Tin Plated Aluminum
Enclosure Type	Indoor
Box Number	9
Enclosure Rating	NEMA 1
Main Type	Convertible - Factory installed main breaker
Grounding Bar	Factory Installed
Maximum Single Pole Circuits	40
Application	Designed to meet residential, commercial and industrial requirements to protect electrical systems, equipment and people.
Approvals	UL Listed
Short Circuit Current Rating	22kA
Cover Type	Combination Flush/Surface
Marketing Trade Name	Homeline
Maximum Tandem Circuit Breakers	20
Phase	1-Phase
Depth	3.75 Inches
Spaces	20
Voltage Rating	120/240VAC
Wire Size	#4 to 250 AWG/kcmil (Al/Cu)
Wiring Configuration	3-Wire
Height	29.86 Inches
Width	14.25 Inches

Shipping and Ordering

Category	00045 - Load Centers, Type HOM 12 - 42 Circuit, NEMA1 Indoor
Discount Schedule	DE3C
GTIN	00785901083993
Package Quantity	1
Weight	29 lbs.
Availability Code	Stock Item: This item is normally stocked in our distribution facility.
Returnability	Y
Country of Origin	US

As standards, specifications, and designs change from time to time, please ask for confirmation of the information given in this document.

Generated: 01/03/2011 11:56:26

© 2011 Schneider Electric. All rights reserved.



PART 1 GENERAL

The design includes two panels, one for interior power distribution and another for the mechanical room DC disconnect. Copper wiring will be used throughout with appropriate AWG wiring per NEC 2008 code.

1.01 REFERENCES

- A. NEMA PB 1 -Panelboards; National Electrical Manufacturers Association; 2000.
- B. NEMA PB 1.1 -General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association; 2002.
- C. NETA STD ATS -Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association; 2009.
- D. NFPA 70 -National Electrical Code; National Fire Protection Association; 2008.

1.02 SUBMITTAL

- A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.
- B. Manufacturer's Installation Specifications: Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Project Record Documents: Record actual locations of panelboards in REVIT and record actual circuit arrangements.

1.03 QUALITY ASSURANCE

- A. Conforms to Underwriters Laboratories and NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. General Electric

1. Model # TM3215CCU

2.

http://products.geindustrial.com/IndustrialProducts/Dispatcher?REQUEST=SPECPAGE&CATALOG=ED&PRODUCT_NUMBER=TM3215CCU

B. Schneider Electric

2.02 INSTALLATION

- A. Installed with conformance to NEC article 240.
- B. Includes rated AFCI and non-AFCI breakers ranging from 15A to 50A.

END OF SECTION 262416

SECTION 262713 - ELECTRICITY METERING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings.
- B. 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.
- C. Coordinate with utility companies for services and components they furnish.

PART 2 - PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by NREL.
- B. Current-Transformer Cabinets: Comply with requirements of electrical power utility company.
- C. Meter Sockets: Comply with requirements of electrical power utility company.
 - 1. Square D: URTRS213B METER SOCKET
<http://www.schneider-electric.us/products-services/product-detail/?event=productDetail&partNumber=URTRS213B&countryCode=us>
- D. Meter Sockets: Steady-state and short-circuit current ratings shall meet indicated circuit ratings.
- E. Modular Meter Center: Factory-coordinated assembly of a main service disconnect device, wireways, tenant meter socket modules, and tenant feeder circuit breakers arranged in adjacent vertical sections. Assembly shall be complete with interconnecting buses and other features as specified below:
 - 1. Comply with requirements of utility company for meter center.
 - 2. Housing: NEMA 250, Type 3R enclosure.
 - 3. Minimum Short-Circuit Rating: 22,000 A symmetrical at rated voltage.

4. Main Disconnect Device: Circuit breaker, series-combination rated for use with downstream feeder and branch circuit breakers: Provided by NREL
5. Tenant Feeder Circuit Breakers: Series-combination-rated molded-case units, rated to protect circuit breakers in downstream tenant and to house load centers and panel boards that have 10,000-A interrupting capacity.
 - a. Identification: Not yet determined
 - b. Physical Protection: Tamper resistant, with hasp for padlock.
6. Meter Socket: Rating coordinated with indicated tenant feeder circuit rating.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install equipment for utility company metering. Install raceways and equipment according to utility company's written requirements. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
- C. Install modular meter center according to NECA 400 switchboard installation requirements.

END OF SECTION 262713

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. 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.

PART 2 - PRODUCTS

2.1 FUSIBLE AND NONFUSIBLE SWITCHES

- A. Fusible Switches, 600 A and Smaller: UL 98 and NEMA KS 1, Type HD, that accommodate specified fuses, and with lockable handle interlocked with cover in closed position.

- 1. Square D: D221N Safety Switch:
 - a. <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=D221N&countrycode=us>
- 2. Square D: H361RB Safety Switch:
 - a. <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=H361RB&countrycode=us>

- B. Nonfusible Switches, 600 A and Smaller: UL 98 and NEMA KS 1, Type HD, with lockable handle interlocked with cover in closed position.

1. Sunny Boy integrated disconnect:

- a. http://www.sma-america.com/en_US/products/grid-tied-inverters/sunny-boy/sunny-boy-3000-us-3800-us-4000-us.html

2.2 MOLDED-CASE CIRCUIT BREAKERS

- A. Description: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to meet available fault currents.
 - 1. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with field-adjustable instantaneous trip settings.
 - a. Square D QO115 Miniature Circuit Breaker

- 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO115&countrycode=us>
 - b. Square D QO120 Miniature Circuit Breaker
 - 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO120&countrycode=us>
 - c. Square D QO230 Miniature Circuit Breaker
 - 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO230&countrycode=us>
 - d. Square D QO240 Miniature Circuit Breaker
 - 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO240&countrycode=us>
 - e. Square D QO250 Miniature Circuit Breaker
 - 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO250&countrycode=us>
2. GFCI Circuit Breakers: Single- and two-pole configurations with 5-mA trip sensitivity.
 - a. Square D QO115GFI Miniature Circuit Breaker
 - 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO115GFI&countrycode=us>
 - b. Square D QO120GFI Miniature Circuit Breaker
 - 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO120GFI&countrycode=us>
 3. AFCI Circuit Breakers: Single pole configuration with 75-A line-to-neutral arc detection trip sensitivity.
 - a. Square D QO115AFI Miniature Circuit Breaker
 - 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO115AFI&countrycode=us>
 - b. Square D QO120AFI Miniature Circuit Breaker
 - 1) <http://www.schneider-electric.us/products-services/product-detail/?event=datasheet&partnumber=QO120AFI&countrycode=us>
- B. Features and Accessories:
1. Lugs: Suitable for number, size, trip ratings, and conductor material.
 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

3. Ground-Fault Protection: Comply with UL 1053; integrally mounted, self-powered type with ground-fault indicator; relay with adjustable pickup and time-delay settings, and push-to-test feature.
4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.

2.3 ENCLOSURES

- A. NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
 1. Outdoor Locations: NEMA 250, Type 3R.
 2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
 3. Other Wet or Damp Indoor Locations: NEMA 250, Type

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
- B. Comply with mounting and anchoring requirements specified in Division 26 Sections "Common work Results for Electrical".
- C. Install fuses in fusible devices.
- D. Comply with NECA 1.

3.2 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

END OF SECTION 262816

SECTION 263100 - PHOTOVOLTAIC COLLECTORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Specification for monocrystalline photovoltaic collectors.

1.02 ACTION SUBMITTALS

- A. Product Data
- B. Comply with UL 1703

<http://us.sunpowercorp.com>

- C. Manufacturer's Instructions

1.03 WARRANTY

- A. Manufacturer Limited Product Warranty
 - 1. SunPower warrants the product to be free from defects in materials and workmanship under normal application, installation, use, and service conditions. If the PV modules fail to conform to this warranty, then for a period ending ten (10) years from date of delivery to "the Customer", SunPower will, at its option, either repair or replace the product, or refund the purchase price as paid by the Customer. The repair, replacement or refund remedy shall be the sole and exclusive remedy provided under the Limited Product Warranty and shall no extend beyond the ten (10) year period.
- B. Manufacturer Limited Power Warranty
 - 1. SunPower additionally warrants: If, within twelve (12) years from date of delivery any PV module(s) exhibits a power output less than 90% of the Minimum Peak Power as specified at the date of delivery in SunPower's Product datasheet, provided that such loss in power is determined by SunPower (at its sole and absolute discretion) to be due to defects in material or workmanship SunPower will replace such loss in power by either providing additional PV modules to make up such loss in power or by providing monetary compensation equivalent to the cost of additional PV modules required to make up such loss in power or by repairing or replacing the defective PV modules, at the option of SunPower.
 - 2. SunPower additionally warrants: If, within twenty five(25) years from date of delivery any PV module(s) exhibits a power output less than 80% of the Minimum Peak Power as specified at the date of delivery in SunPower's Product datasheet, provided that such loss in power is determined by SunPower (at its sole and absolute discretion) to be due to defects in material or workmanship SunPower will replace such loss in power by either providing additional PV modules to make up such loss in power or by providing monetary compensation

equivalent to the cost of additional PV modules required to make up such loss in power or by repairing or replacing the defective PV modules, at the option of SunPower.

http://us.sunpowercorp.com/downloads/about/Limited_Warranty_for_PV_Modules_versionE_001_03266_OE_.pdf

PART 2 - PRODUCTS

2.01 PRODUCT TYPE

- A. SunPower – SPR-315E-WHT

2.02 MANUFACTURERS

- A. SunPower Corporation

2.03 PERFORMANCE / DESIGN CRITERIA

A. Capacities

1. The module electrical ratings are measured under Standard Test Conditions, (STC) of 1 kW/m² irradiance with AM 1.5G spectrum and a cell temperature of 25° C and solar spectral irradiance per IEC 60904-3.
2. Under normal conditions, a photovoltaic module may produce more current and/or voltage than reported at Standard Test Conditions. Accordingly, the values of I_{sc} marked on the module should be multiplied by a factor of 1.25 when determining component ampacity ratings to comply with NEC article 690.8 (A). An additional 1.25 multiplier may be required by the NEC for sizing fused and conductors as described in NEC Section 690-8(B).
3. Voc should be increased by a factor on the lowest ambient temperature recorded for the location. To determine the corrected value for Maximum System Voltage follow the guidelines in article 690.7 of the NEC.

PART 3 - EXECUTION

3.01 INSTALLERS

- A. Florida International University Team Solar Decathlon Team

3.02 INSTALLATION

A. Special Techniques

1. See the General Installation Manual for Sunpower Photovoltaic Modules.

http://staging.sunpowercorp.com/Products-and-Services/~media/Downloads/for_products_services/SunPower_Safety_Installation_Manual_UL_certified_product_Letter_UL_OD_12.ashx

3.03 PROTECTION

- A. For information regarding the protection of the photovoltaic collectors, see the General Installation Manual for Sunpower Photovoltaic Modules.

3.04 MAINTENANCE

- A. Inspect all modules annually for safe electrical connections, sound mechanical connection, and freedom from corrosion.

- B. Periodically clean module surface with water and a soft cloth or sponge. Fingerprints may be removed with standard glass cleaner.
- C. Do not use harsh cleaning materials such as scouring powder, steel wool, scrapers, blades, or other sharp instruments to clean the glass surface of the module. Use of such materials will invalidate the product warranty.

END OF SECTION 263100

SECTION 265626.A1 -SOLAR POWERED LIGHT POST SOLVINDEN BY IKEA



<http://www.ikea.com/us/en/catalog/products/00200928>

END OF SECTION 265626.A1

Division 28 – Electronic Safety and Security

28 31 00 Electronic Detection & Alarm

SECTION 283100 - ELECTRONIC DETECTION AND ALARM

PART 1 – GENERAL

1.1 SECTION REQUIREMENTS

- A. System Description: Noncoded, conventional, hardwired, 120-V ac loop system.
 - 1. Initiating Device Circuits: NFPA 72, Class B, Style B.
- B. Submittals: Product Data and system operating description.
- C. Submittals to Authorities Having Jurisdiction: In addition to distribution requirements for submittals, make an identical submittal to authorities having jurisdiction. To facilitate review, include copies of annotated Contract Drawings as needed to depict component locations.
- D. Comply with NFPA 72.
- E. UL listed and labeled.
- F. 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.

PART 2 - PRODUCTS

2.1 ALARM-INITIATING DEVICES

- A. Kiddie 12060: Smoke Detectors: UL 268, 120-V ac with 9-V dc battery backup, ionization type, hardwired.
 - 1. http://www.kidde.com/utcfs/ws-384/Assets/i12060_Sheet.pdf

2.2 NOTIFICATION APPLIANCES

- A. Bells: Electric-vibrating type, with 85 dB at 10 feet.

2.3 WIRE AND CABLE

- A. General: UL listed and labeled as complying with NFPA 70, Article 760.

- B. Signaling Line Circuits: Twisted, shielded pair, size as recommended by system manufacturer.
- C. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, colorcoded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install and test systems according to NFPA 72. Comply with NECA 1.
- B. Wiring Method: Install wiring in exposed on ceilings and walls where indicated.
- C. Ground the FACP and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to the FACP.

END OF SECTION 283100

Division 31 – Earthwork

31 20 00 Earth Moving

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Unit prices for rock excavation are included in Division 01 Section "Unit Prices."
- B. Unauthorized excavation consists of excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.
- C. Do not interrupt existing utilities serving facilities occupied by Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, or other deleterious matter.
- B. Unsatisfactory Soil: ASTM D 2487 Soil Classification Groups GC, SC, ML, MH, CL, CH, OL, OH, and PT.
- C. Backfill and Fill: Satisfactory soil materials.
- D. [Engineered Fill] [Subbase Material]: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch (37.5-mm) sieve and not more than 12 percent passing a No. 200 (0.075-mm) sieve.
- E. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.
- F. Drainage Course: Narrowly graded mixture of [washed] crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent

passing a No. 8 (2.36-mm) sieve.

- G. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Protect and maintain erosion and sedimentation controls during earth moving operations.
- B. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.
- C. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- D. Explosives: [Do not use explosives] [Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site].
- E. Excavate to subgrade elevations regardless of character of materials and obstructions encountered.
- F. Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by Architect. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents.
- G. Excavate for structures, building slabs, pavements, and walkways. Trim subgrades to required lines and grades.
- H. Utility Trenches: Excavate trenches to indicated slopes, lines, depths, and invert elevations. Maintain 12 inches (300 mm) of working clearance on each side of pipe or conduit.
1. Place, compact, and shape bedding course to provide continuous support for pipes and conduits over rock and other unyielding bearing surfaces and to fill unauthorized excavations.
2. Place and compact initial backfill of satisfactory soil material or subbase material, free of particles larger than 1 inch (25 mm), to a height of 12 inches (300 mm) over the utility pipe or conduit. Place and compact final backfill of satisfactory soil material to final subgrade.
- I. Plow strip or break up sloped surfaces steeper than 1 vertical to 4 horizontal to receive fill.
- J. Proof-roll subgrade [below the building slabs and pavements] <Insert locations> with a pneumatic-tired [and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes)] <Insert requirement> to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

- K. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface, pulverize, moisture-condition or aerate soil, and recompact.
- L. Place backfill and fill in layers not more than 8 inches (200 mm) in loose depth at optimum moisture content. Compact each layer under structures, building slabs, pavements, and walkways to [95] <Insert number> percent of maximum dry unit weight according to ASTM D 698; elsewhere to [90] <Insert number> percent.
- M. Grade areas to a smooth surface to cross sections, lines, and elevations indicated. Grade lawns, walkways, and unpaved subgrades to tolerances of plus or minus [1 inch (25 mm)] <Insert dimension> and pavements and areas within building lines to plus or minus 1/2 inch (13 mm).
- N. Under pavements and walkways, place subbase course material on prepared subgrades and compact at optimum moisture content to required grades, lines, cross sections, and thicknesses.
- O. Under slabs-on-grade, place drainage course on prepared subgrade and compact to required cross section and thickness.
- P. Allow testing agency to inspect and test each subgrade and each fill or backfill layer and verify compliance with requirements.
- Q. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

32 93 00 Plants

SECTION 329300 - PLANTS

PART 7 - GENERAL

7.01 SECTION REQUIREMENTS

Submittals: Plants may be purchased at any of the listed nurseries grown in accordance with ANSI standards/ American Landscape Nursery Association standards.

Sandy's Plants, Inc. –Herbaceous Perennials Source

8011 Bell Creek Road
Mechanicsville, VA 23111
Main Phone: (804)746-7092
Main Fax: (800)329-0413
spi@sandysplants.com

American Native Plants Nursery-Herbaceous/Native Grasses Source

Contact Us

American Native Plants, Inc.
P.O. Box 158
Perry Hall, MD 21128

Telephone: 410 529 0552
Fax: 410 529 3883

Email: info@americannativeplants.net



<http://www.americannativeplants.net/>

Meadow Farms Nurseries-Vegetable Source

<http://www.meadowfarms.com/v.php?pg=341>

Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1. See attached spreadsheet next page.

PLANTING SCHEDULE					
QUANT.	Botanical Name	Common Name	SIZE	PLANT SPACING	NOTES
24	<i>Lobelia cardinalis</i>	Cardinal Flower	1 qt	18" OC Staggered	
24	<i>Panicum virgatum</i>	Switchgrass	1 Gal	2' OC	
77	<i>Carex crinita</i>	Fringed Sedge	1 qt	18" OC	
18	<i>Scirpus robustus</i>	Bullrush	1 qt	16" OC Mixed Randomly	
16	<i>Juncus effusus</i>	Sedge	1 qt	16" OC Mixed Randomly	
8	<i>Nymphaea odorata</i>	Lotus-	1/2 qt	24" in Row	
16	<i>Cephalanthus occidentalis</i>	Buttonbush	1 qt/1 Gal	12"	
10	<i>Vaccinium macrocarpon</i>	American cranberry	1 qt	2'	
20	<i>Aronia melanocarpa</i>	Black Chokeberry	1 Gal.	2'-6"	
4	<i>Brassica rapa var. chinensis 'Bok Choi'</i>	Bok Choi	1 qt	18"	
3	<i>Brassica rapa var. chinensis 'Red Choi'</i>	Red Cabbage	1 qt	18"	
3	<i>Ocimum basilicum var. thyrsoiflora</i>	Thai Basil	1 qt	24"	
5	<i>Lactuca sativa L. var. longifolia</i>	Romaine Lettuce	1 qt	18"	
2	<i>Phaseolus vulgaris</i>	Pole Bean-Green Bean	2 qt	32"	
3	<i>Capsicum frutescens</i>	Cayenne Pepper	1 qt	16"	

- A. Planting Restrictions: Plant during one of the following periods:
 - 1. Planting: <Late Summer>.
- B. Maintain trees and shrubs until established, but not less than 3 weeks.
- C. Maintain ground covers and plants until established, 3 weeks.

PART 8 - PRODUCTS

8.01 PLANTING MATERIALS

- A. Tree and Shrub Material: Nursery grown, with healthy root systems, well shaped, fully branched, healthy, and free of insects, eggs, larvae, defects, and disfigurement.
- B. Ground Covers and Plants: Established and well rooted in pots or similar containers.

In all cases, container grown nursery stock shall meet the following general requirement:

All container grown nursery stock shall be healthy, vigorous, well rooted, and established in the container in which it is growing. Container grown nursery stock shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.

8.02 SOIL AND AMENDMENTS- **Below Amendments are not to be added unless directed on site during competition.**

- A. Topsoil: ASTM D 5268, with pH range of 5.5 to 7, free of stones **1 inch (25 mm)** or larger and other extraneous materials harmful to plant growth.
- B. Lime: ASTM C 602, Class T, agricultural limestone.
- C. Compost: Well-composted, stable, and weed-free organic matter; pH range of 5.5 to 8.
- D. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.
- E. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture, free of chips, stones, sticks, soil, or toxic materials.
- F. Bonemeal: Commercial, raw, finely ground; minimum of **[1]** percent nitrogen and **[10]** percent phosphoric acid.

- G. Commercial Fertilizer: Commercial-grade complete fertilizer, consisting of 1 lb/1000 sq. ft. (0.5 kg/100 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
- H. Slow-Release Fertilizer: Granular fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium; 5 percent nitrogen; 10 percent phosphorous; 5 percent potassium; by weight.
- I. **Organic Mulch:** Panorama Pay Dirt Mulch Shall be used from Charlottesville VA.

8.03 MISCELLANEOUS

- A. **Jute Erosion Control Fabric** shall be laid according to Planting Section in L Sheet Set.

8.04 PLANTING SOIL MIX

- A. Plants Shall not be taken out of plant container for duration of Competition.
 - 1. Weight of Lime per 1000 Sq. Ft. (92.9 Sq. m): <NA>
 - 2. Ratio of Loose Compost to Topsoil by Volume: <NA>
 - 3. Ratio of Loose Peat to Topsoil by Volume: <NA>
 - 4. Ratio of Loose Wood Derivatives to Topsoil by Volume: <NA>.
 - 5. Weight of Bonemeal per 1000 Sq. Ft. (92.9 Sq. m): <NA>
 - 6. Weight of Commercial Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): <NA>
 - 7. Weight of Slow-Release Fertilizer per 1000 Sq. Ft. (92.9 Sq. m): <NA>

PART 9 - EXECUTION

9.01 PREPARATION

- A. Planting Bed Establishment: No prep is needed. Plants shall rest on planting areas and are to be covered with jute mesh and mulched to create a faux planting bed.
- B. Shrubs:
- C. If retaining first paragraph below, revise spacing to suit Project.
- D. Plant ground cover and plants as per planting schedule dictates. Water after planting. Do not cover plant crowns with wet soil or mulch.

- E. Mulching: [**Before mulching, install weed-control barriers.**] Apply [**organic mulch, 3 inches (75 mm) thick,**] [**mineral mulch, 2 inches (50 mm) thick,**] and finish level with adjacent finish grades. Do not place mulch against trunks or stems.
- F. Anchor Pins for Jute Matting: Install anchor with stakes driven below top grade of soil line. Pins shall not be exposed.
- G. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- H. Ground Cover and Plant Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.

END OF SECTION 329300

33 16 13 Aboveground Water Utility Storage Tanks

SECTION 331613 – ABOVEGROUND WATER UTILITY STORAGE TANKS

PART 1 - POTABLE WATER STORAGE TANKS

PART 2 - GENERAL

2.01 SECTION REQUIREMENTS

- A. Submittals: Product Data, and manufacturer's color charts showing the full range of colors available for factory-applied finishes.
- B. Comply with USDA and FDA regulations for storage and processing of food
- C. Verify dimensions by field measurements before ordering tank
- D. Warranties: Provide standard manufacturer's written warranty, without monetary limitation, signed by manufacturer agreeing to promptly repair or replace products that fail in materials or workmanship for the period of **10** years.

PART 3 - PRODUCTS

3.01 MATERIALS

- A. Linear Polyethylene plastic
- B. Ultraviolet light stabilizers and fillers
- C. Pigment upon request

1. Competition potable supply tank

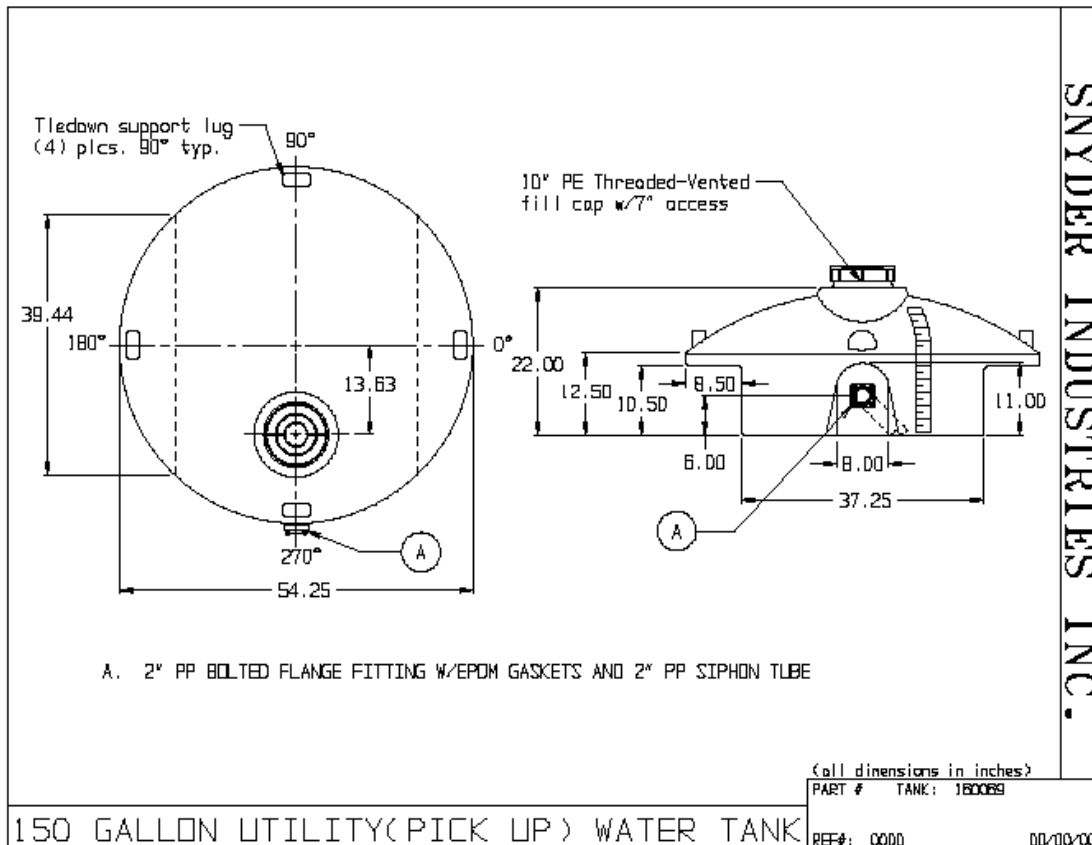
Snyder Industries:

<http://www.snydernet.com/pdf/septic/160069.pdf>

PART 4 - EXECUTION

4.01 INSTALLATION

- A. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place.
- B. Fasten tanks securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.
- C. Tank shall be positioned and leveled 3.5 inches from ground elevation on plywood sheathing.



END OF SECTION 331613

SECTION 333000 - SANITARY SEWERAGE UTILITIES

PART 1 – WASTE WATER STORAGE TANKS

PART 2 - GENERAL

2.01 SECTION REQUIREMENTS

- A. Submittals: Product Data, and manufacturer's color charts showing the full range of colors available for factory-applied finishes.
- B. Comply with USDA/local building codes for agricultural grade materials for storage of greywater.
- C. Verify dimensions by field measurements before ordering tank
- D. Warranties: Provide standard manufacturer's written warranty, without monetary limitation, signed by manufacturer agreeing to promptly repair or replace products that fail in materials or workmanship for the period of **10** years.

PART 3 - PRODUCTS

3.01 MATERIALS

- A. Linear Polyethylene plastic
- B. Ultraviolet light stabilizers and fillers
- C. Pigment upon request

3.02 MANUFACTURERS – See Drawings for Sizes)

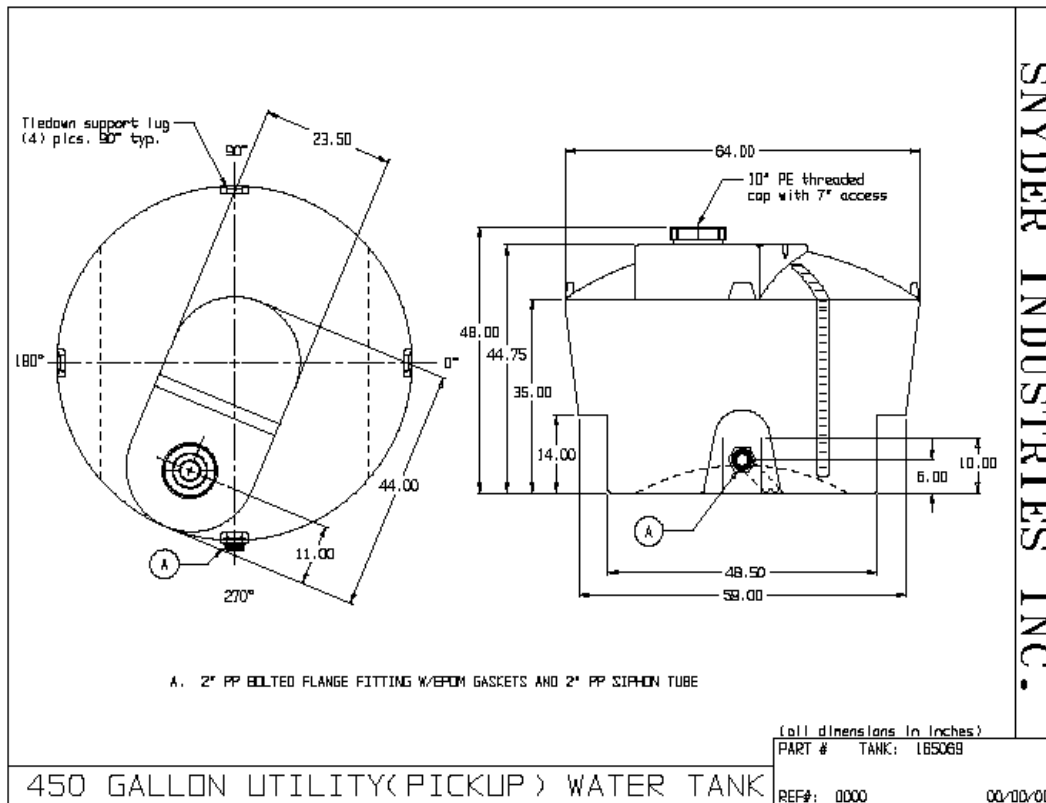
A. Snyder Industries

1. Competition Waste Water Storage Tank http://www.snydernet.com/_pdf/_septic/165069.pdf

PART 4 - EXECUTION

4.01 INSTALLATION

- A. Set units level, plumb, and true to line, without warp or rack of frames and panels and anchor securely in place.
- B. Fasten tanks securely in place, with provisions for thermal and structural movement. Install with concealed fasteners, unless otherwise indicated.
- C. Tank shall be positioned and leveled 3.5 inches from ground elevation on plywood sheathing.



END OF SECTION 333000

33 41 13 Storm Utility Drain

SECTION 334113 – STORM UTILITY DRAIN

PART 10 - GENERAL

10.01 SECTION REQUIREMENTS

- A. Submittals: Specification cut sheet.

PART 11 - PRODUCTS

11.01 PIPE

- A. Corrugated PE Pipe: AASHTO M 294, Type S, with smooth waterway for coupling joints.
 - 1. Diameter: Varies, shown on drawings
 - 2. Color: Black

PART 12 - EXECUTION

12.01 INSTALLATION

- A. Pipe used for cover of water tanks to provide shade & used as a planter support, refer to S & L drawings.

END OF SECTION 334113

41 – Material Processing and Handling Equipment

41 22 13.23 Mobile Cranes

SECTION 412213.23 - MOBILE CRANES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Telescopic Boom Truck Crane

1.2 SUBMITTALS

A. Link to manufacturer’s published data sheet, including:

1. Product details
2. Dimensions and measurements

1.3 DELIVERY, STORAGE AND HANDLING

A. Acceptance at site:

1. Inspect product upon delivery. Report any damaged or missing components directly to the manufacturer.
2. Provide appropriate matting material beneath crane feet to comply with required load factors.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Link Belt Cranes

Link-Belt Construction Equipment Company

Lexington, KY

www.linkbelt.com

2.2 PRODUCTS

- A. HTC 8690 90-Ton Hydraulic Crane
 - 1. Maximum lifting capacity: 90 tons at 8 feet
 - 2. Telescopic boom: 38 feet to 140 feet
 - 3. Lattice jib: 35 feet to 90 feet
 - 4. Carrier engine/output: 6-cylinder, 445 hp Detroit Diesel Engine
 - 5. Crane engine/output:
 - 6. Drive/Steering:
 - 7. Travel Speed: 62.3 mph
 - 8. Operational Weight: 16,880 lbs
 - 9. Total Counterweight: 39,500 lbs

PART 3 – EXECUTION

3.1 OPERATION

- A. Assumed weight of assembly to be lifted is 20,000 lbs.
- B. Assumed radius of lift is 80'-0".
- C. Counterweights required total 32,500 lbs.

END OF SECTION 412213.23

SECTION 416516 - MOBILE GENERATORS

PART 1 - GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Specification for engine generators to be used during initial construction of site.

1.02 ACTION SUBMITTALS

- A. Product Data
- B. Manufacturer's Instructions
- C. Shop drawings

1.03 WARRANTY

- A. Manufacturer Warranty
 - 1. The warranty policy is a separate document that will be given by dealer at time of purchase.

PART 2 - PRODUCTS

2.01 PRODUCT TYPE

- A. EM5000is with GX340K1 Honda Engine

2.02 MANUFACTURERS

- A. HONDA Engines

2.03 PERFORMANCE / DESIGN CRITERIA

- A. Capacities
 - 1. EPA Compliant
 - 2. 4-stroke, OHV, single cylinder engine type
 - 3. AC Output:
 - Rated voltage 120/240AV (5000 W)
 - Rated frequency 60 Hz,
 - Rated Ampere (5000 W) 41.6/20.8 A; (4500 W) 37.5/18.8 A,
 - Rated Output 4.5 kVa
 - Maximum output 5.0 kVa
 - 4. Receptacles: 20A 125V Duplex , 30A 125V Locking Plug, 30A 125/250V Locking Plug
 - 5. DC Output: N/A
 - 6. Starting system: recoil, electric
 - 7. Fuel Tank Capacity: 4.49 gals.
 - 8. Oil Capacity: 1.16 qt.

9. Reduction Gear Oil Capacity: 10 oz.
10. Run time per Tankful: 5.7 hrs. @ rated load, 15.2 hrs. @ 1/4 load
11. Dimensions: L 31.9 x W 26.4x H 27.2
12. Weight: 209 pounds without battery
13. Noise level: 68 dB @ rated load; 62 dB @ ¼ load

PART 3 - EXECUTION

3.01 INSTALLERS

- A. Florida International University Solar Decathlon Team

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 by a ground fault circuit interrupter (GFCI) for protection against the shock hazard of ground fault current. 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 damage.
 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.
- D. 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 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.
- E. It is also recommended to inspect the mechanical and electrical connections annually.

<http://www.hondapowerequipment.com/pdf/manuals/31Z11604.pdf>

<http://www.hondapowerequipment.com/products/modeldetail.aspx?page=modeldetail§ion=P2GG&modelName=EM5000iS&modelid=EM5000ISAN>

FLORIDA INTERNATIONAL UNIVERSITY, Modesto A. Maidique Campus , School of Architecture
11200 SW 8th Street PCA 386 A, Miami, Florida, 33199, USA

Marilys Nepomechie, FAIA, Marilys.Nepomechie@fiu.edu, Tel. 305.348.1887
END OF SECTION 416516



SECTION 481916 - ELECTRICAL POWER GENERATION INVERTERS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Specification for grid-tied, electrical power generation inverters.

1.02 ACTION SUBMITTALS

- A. Product Data
- B. Comply with New UL 1741 / IEEE 1547
- C. Manufacturer’s Instructions

1.03 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements

1. All Sunny Boy inverters are thoroughly tested and inspected before they are packed and shipped. Although they are shipped in sturdy, recyclable packaging; damage can still occur during shipping. It is important to carefully inspect the shipping container prior to beginning the installation. If any external damage to the packaging makes you suspect the inverter itself could be damaged, or if you find that the inverter is damaged after unpacking it, report the damage immediately to your SMA dealer and to the shipping company that delivered the Sunny Boy. If it becomes necessary to return the Sunny Boy, use the original packaging in which it was delivered.

1.04 WARRANTY

A. Manufacturer Warranty

1. A ten year warranty applies to the following products: Sunny Boy SB700US, SB3000US, SB4000US, SB5000US, SB6000US, and SB7000US. The SMA factory warranty covers any repair or replacement part costs incurred during the agreed period, beginning on the device’s purchase date, subject to the conditions listed below. This is not associated with the durability warranty.

PART 2 - PRODUCTS

2.01 PRODUCT NAME

A. Sunny Boy 4000US Grid-Tied Inverter

<http://download.sma.de/smaprosa/dateien/4776/SUNNYBOY34-DUS102720W.pdf>

2.02 MANUFACTURERS

A. SMA Solar Technology

2.03 PERFORMANCE / DESIGN CRITERIA

A. Capacities

1. See the Sunny Boy Data Sheet for input and output data as well product efficiencies, weights, and dimensions.

PART 3 - EXECUTION

3.01 INSTALLERS

- A. Florida International Solar Decathlon Team

3.02 INSTALLATION

- A. Special Techniques
 1. See the Sunny Boy Solar Inverter Installation guide for instructions on unpacking, mounting, and wiring the inverters with a parallel connection.
 2. Confirm compatibility of string sizing with photovoltaic panels and inverters.

3.03 MAINTENANCE

- A. See the Sunny Boy Solar Inverter Installation Guide for instructions on cleaning the fans and handle covers, testing the fans, and exchanging the fuses.

END OF SECTION 481916