

PROJECT MANUAL

2007 SOLAR DECATHLON SPECIFICATIONS

SOLAR DECATHLON
CORNELL UNIVERSITY



COMPLETED BY:
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FOR:
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DATE
August 7, 2007

SECTION 00 01 10

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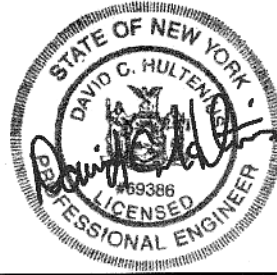
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END OF SECTION 00 01 01

CUSD Overturn Calculations

Prepared by David Bosworth, Reviewed & Approved by David C. Hultenius, P.E.

June 12, 2007



Basic Wind Loading Equation: $F = \frac{C_x S \rho v^2}{2}$

Where:

C_x = Constant, for drag = 1.0 – 1.3, we will conservatively use 1.3

S = Area perpendicular to wind direction [m^2]

ρ = density of air = 1.25 [kg/m^3]

v = wind speed [m/s]

F = Force due to wind loading [N]

Design Conditions:

60 mph (26.8 m/s) gust wind speed.

Overturn Calculation:

Assume that the area under the canopy effectively contains a pocket of air, which blocks wind from escaping through the photovoltaic array and over the top of the building. This assumption should provide a very conservative quantity for the maximum force due to wind speed on the long side of the building as the canopy will, of course, allow wind to pass through it. A lift calculation from the canopy will be performed later.

Area of building = area of North face of building plus projected area of the canopy.

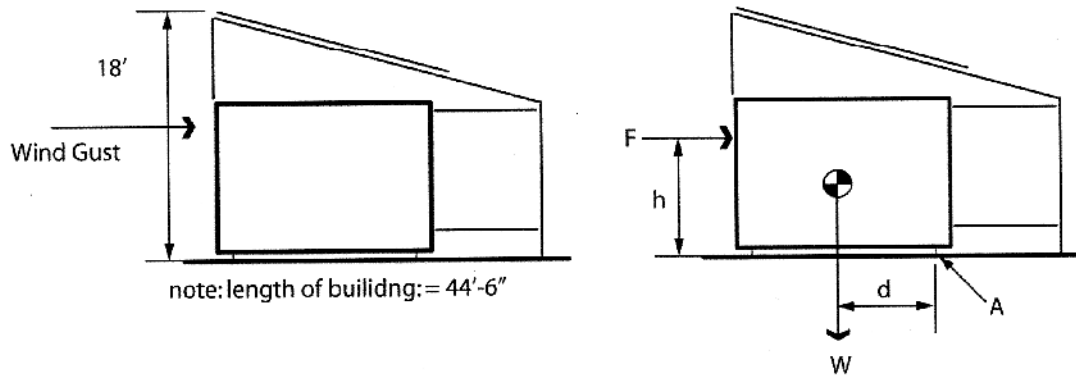


Figure 1: Free Body Diagram of Building Considering Overturn

$$F = \frac{(1.3)(72.8)(1.25)(26.8)^2}{2} = 42.5kN = 9555\#$$

Assuming that the deck provides no aid to the stability of the building, we assume a hinge point A for the possible overturn of the building at the W8x15 steel undercarriage, see Figure 1. The center of area of the building plus canopy is used.

$$h = 9'-0"$$

$$d = 6'-6"$$

Summing moments about hinge point A, we find the minimum weight of the building required to avoid overturn of the building:

$$\sum M_A = hF - dW = 0$$

$$W = \frac{hF}{d} = \frac{(9)(9555)}{6.5} = 13230\#$$

The minimum weight of the building required to avoid tipping over is 13,230#. As the estimated weight of the assembled building is around 42,500 # (see attached spreadsheet), this provides a factor of safety of 3.2 against the possibility of the building tipping over from a 60 mph gust of wind.

Lift Calculations:

Although it seems extremely unlikely, the worst-case scenario for the building being lifted from the ground by a gust of wind is in a situation where the direction of wind is perpendicular to the photovoltaic array, see Figure 2. Using the force equation above, with a total area of the photovoltaic array of 755 ft² (70.1m²):

$$F = \frac{(1.3)(70.1)(1.25)(26.8)^2}{2} = 40.9kN = 9,200\#$$

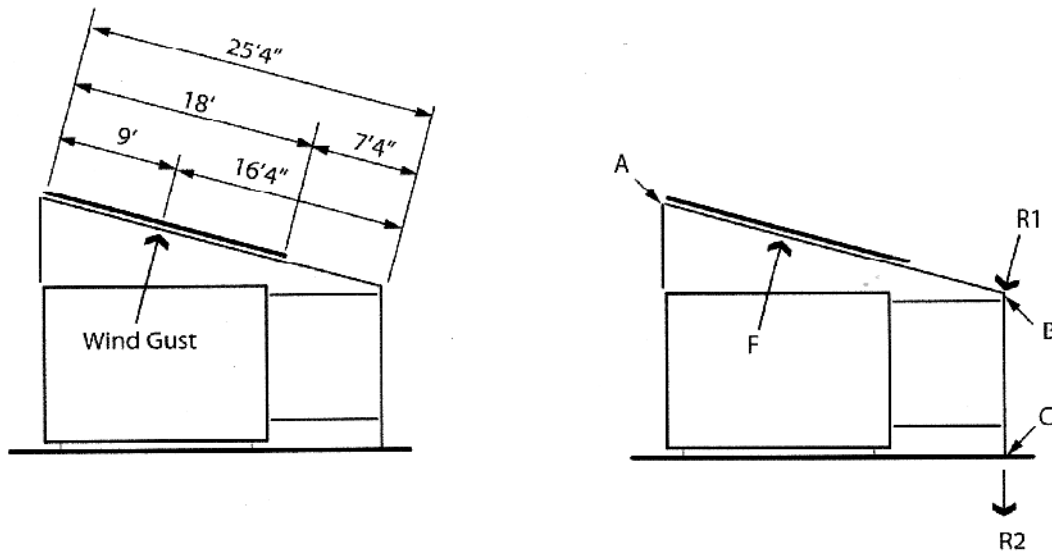


Figure 2: Free-Body Diagram of Building Considering Lift

Clearly 9,200# of lift will not be able to raise the building from the ground.

The Only other major failure mode to consider is the lifting of the deck on the South of the building from wind caught in the canopy. The required vertical component of reaction at Point B from uplift of the canopy due to force $F = 9,200\#$ will need to be provided by the self weight of the canopy and deck, and by weights applied to the deck footings at point C, see Figure 2. By summing moments about Point A, we find that the reaction force $R1$ at Point B is:

$$\sum M_A = 9F - 25.33R1 = 0$$

$$R1 = \frac{(9)(9200)}{25.33} = 3268\#$$

$$R2 = R1 \cos(12) = 3196\#$$

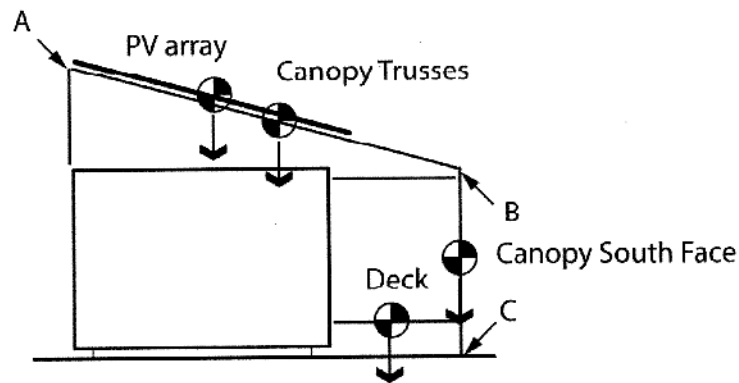


Figure 3: Major Components of Canopy Self-Weight

The dead weights of the major components of the canopy are:

PV Array: 1880# (PV panels) + 400# (mounting racks) = 2280#

Canopy Truss: 11 Trusses @ 175# each = 1925#

Deck: 6 #/ft² x 8' deep x 44' long = 2112#

Canopy South Face: 44'Dbl. Chord Truss @ 6.75#/ft² + 7 columns @33# each = 528#

Tributary Area Contributions From Each Element:

PV Array: ½ of length of canopy, or ½ of 25'-4", is 12'-8"

This leaves 18'-0" – 12'-8" = 5'-4" of PV array within the tributary area contributing to weight at point C. Percentage of total PV dead load is $5.333/18 = 29.6\%$ of total weight.

$0.296 \times 2280 = 675\#$

Canopy Truss: ½ of the canopy truss dead weight contributes to weight at Point C

$0.5 \times 1925 = 962.5\#$

Deck: ½ of the deck dead weight contributes to weight at Point C

$0.5 \times 2112 = 1056\#$

Canopy South Face: 100% of the Canopy South Face dead weight contributes to weight at Point C = 675#

Total Dead Weight of Canopy Parts Contributing to weight at Point C = 3,369#

As the expected conservative maximum uplift from a 60 mph gust on the canopy is 3,196#, the dead weight of the canopy itself should be sufficient to keep the deck and Canopy South Face from lifting off the ground. As the weight of the railings, footings, and solar thermal collectors have not been considered in this calculation, the dead weight of the canopy would be more than sufficient to halt any possible uplift of the deck or Canopy South Face.

total house weight calculator

element	area ft ²	weight lb/ft ²	ASSEMBLED TOTAL lb
SIP North Wall	413.244	8.65	3575
North Doors and Windows			90
Mech Closet Framing	167.355	10	1674
Mech Closet Equipment			820
SIP East Wall	92.325	8.65	799
East Doors and Windows			40
Inverter Box			1000
SIP South Wall	259.5	8.65	2245
South Doors and Windows			500
SIP West Wall	98.25	8.65	850
West Doors and Windows			40
Sunroom Framing	261	10	2610
Sunroom Doors and Windows			400
Granite Floor	27	84	2268
Steel Subframe w5			3328
Steel Subframe W8			1335
roof and parapet	700.875	10.9684312	7687
SIP Floor	584.804665	6.65	3889
raised floor permanent	182	2.575	469
raised floor removable	268	7.5	276
appliances			825
Canopy steel			6000
PVs			1879.2
		TOTAL	42597

REQUIRED FOOTING ARE

	28 ft ²
w8 bases	29.6666667 ft ²

Element Assembly details

Notes:

SIP Walls	lb/ft ²
Siding	1.375
Gussets	0.625
SIP	4.15
Gyp.	2.5
TOTAL	8.65

SIP Roof	lb/ft ²
roofing membrane	0.8296
decking	2.2
parapet	1.16883117
framing	0.12
SIP	4.15
Gypsum	2.5
TOTAL	10.9684312

SIP Floor	lb/ft ²
SIP	4.15
Gypsum	2.5
TOTAL	6.65

2x6 exterior stud wall	lb/ft ²
TOTAL	10

raised floor framing	lb/ft ²
framing	0.375
decking	2.2
TOTAL	2.575

cedar	22 lb/ft ³
6 5/8 SIP	4.15 lb/ft ²
1/2" plywood	1.5 lb/ft ²
5/8" gyp	2.5 lb/ft ²
3/4" ply	2.2 lb/ft ²
2x4	1.28 lb/ft
2x6	2 lb/ft
2x8	2.64 lb/ft
2x10	3.37 lb/ft
tate con-core	7.5 lb/ft ²
granite	162 lb/ft ³

SECTION 02 43 00

STRUCTURE MOVING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Methods, equipment and schedules necessary for the transportation of the Solar Decathlon House from Ithaca, NY to Washington DC and from Washington DC back to Ithaca, NY.
- B. Related Sections
 - 1. 02 43 16: Structure Raising
 - 2. 05 12 00: Structural Steel Framing

1.02 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. Dimensions of the Solar Decathlon House as whole, or as a series of connectable parts, shall not exceed 55 ft long by 18 ft wide; the allowable dimensions of a flatbed truck. The the house shall not exceed 13 ft 6 in height from the ground when resting on the bed of the truck.
- B. Performance Requirements:
 - 1. The Solar Decathlon House as a whole, or as a series of parts must perform identically before and after transportation and re-construction
 - 2. The Solar Decathlon House as a whole, or as a series of parts shall be transported using specified packing and securing methods and no components shall be damaged during transportation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Solar Decathlon House and all of its components shall be disassembled, reassembled, packed, secured and shipped by designated individuals in accordance with the specified instructions.

END OF SECTION 02 43 00

SECTION 02 43 16

STRUCTURE RAISING

PART 1 – GENERAL

1.01 SUMMARY

Section Includes: Methods, equipment and schedules necessary for the raising and lowering of the Cornell Solar Decathlon house using a series of hydraulic jacks.

A. Related Sections

1. 02 43 00: Structure Moving
2. 05 12 00: Structural Steel Framing

1.02 SYSTEM DESCRIPTION

A. Design Requirements:

1. The steel substructure of the house will be designed to accommodate attachment to a series of appropriately-sized hydraulic jacks that will be used to raise and lower the Cornell Solar Decathlon house during transportations.

B. Performance Requirements:

1. The weight on each jack must not exceed the manufacturer stated limits of the product.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- ###### A. Butler Products Corporation
- 71 Cavalier Blvd, Suite 313
Florence, KY 41042
Phone: 859-472-7031
Fax: 859-472-7061
www.butlerproducts.com

2.2 EXISTING PRODUCTS

- ###### A. Butler Universal Landing Gear
1. 19 inch travel
 2. 28,000 lb weight capacity per unit
 3. Quantity: 8

PART 3 – EXECUTION

3.1 INSTALLATION

- ###### A.
- All raising and lowering of the house will be performed in accordance with safety protocols and will not exceed manufacturer's stated weight limitations for each individual jacking device.

END OF SECTION 02 43 61

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Structural Steel Framing for Canopy
- B. Related Sections
 - 1. 09 97 00: Special Coatings
 - 2. 26 31 00: Photovoltaic Collectors

1.02 SYSTEM DESCRIPTION

- A. Hot dipped, galvanized system scaffold

1.03 SUBMITTALS

- A. Shop Drawings. Show installation details for scaffolding components
 - i. Include plans, elevations, and details of metal fabrication and their connections, Show anchorage and accessory items
 - ii. For installed products indicate to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Universal Manufacturing Group
P.O. Box 220
550 West New Castle Street
Zelienople, PA 16063
Phone: 724-452-8300
Email: info@universalscaffold.com

END OF SECTION 05 12 00



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System Scaffolding

Universal System Scaffolding eliminates many problems that face erectors such as limited access areas, job-site obstacles and radius structures.

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UNIVERSAL SYSTEM SCAFFOLD ADVANTAGES:

- Hot-dipped galvanized
- Pre-measured components/no measurement needed
- Erected quickly and easily
- Conforms to any angle or curve
- Rigid and safe
- Can be used in conjunction with tube and clamp scaffolding
- Maintenance free

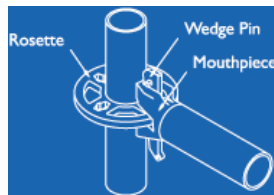


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The high-strength Mouthpiece uses a Wedge Pin with a reverse slope. The Wedge Pin engages the Rosette entirely through its vertical surface, ensuring a properly seated Mouthpiece on the Rosette while the Wedge Pin is in place. The lobes are reversed to dramatically increase the compression area at the bottom of the Mouthpiece.

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Zelienople, Pennsylvania 16063
(724) 452-8300 / info@universalscaffold.com

SECTION 06 12 00

STRUCTURAL PANELS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes the following:

1. Materials and methods necessary to install structural insulated panels

B. Related Sections

1. 02 43 00 Structure Moving
2. 03 41 00: Concrete Footing
3. 05 12 00: Structural Steel Framing
4. 06 15 00: Wood Decking
5. 07 40 00: Insulated Structural Panels

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. E 72 – 2005 Standard Test Methods of Conducting Strength Tests of Panels fore Building Construction
2. C 297 – 2004 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
3. D 1183 – 2003 Standard Practices for Resistance of Adhesives to Cyclic Laboratory Aging Conditions
4. E 455 – 2004 Standard Method for Static Load Testing of Framed Floor or Roof Diaphragm Constructions for Buildings
5. E 119 – 2000 Standard Test Methods for Fire Tests of Building Construction and Materials
6. E 695 – 2003 Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading

B. United Building Center (UBC)

1. 26-3 – Room Fire Test Standard for Interior of Foam Plastic Systems

1.03 DEFINITIONS

- A. Structural Insulated Panels: pressure laminated composites of approved oriented strand board (OSB) and urethane foam core. Urethane is a combination of isocyanate and a polyol/catalyst blend. Murus SIPs feature an ABS plastic,
- B. Cam Lock: glass reinforced installation aid devices located in the tongue-and-groove edges of the panel.

1.04 SYSTEM DESCRIPTION

A. The following materials will be required for complete SIP installation.

1. Panels
2. Fasteners
3. 2X Inlet Plates and Nailers
3. Spray Foam Sealant
4. Murus Panel Router

1.06 SUBMITTALS

- A. Product Data: Submit product data, including manufacturer's installation and finishing manual.
- B. Shop Drawings: Submit shop drawings showing layout, profiles, product components and accessories.
- C. Warranty: Provide a copy of manufacturer's warranty, with manufacturer's instructions, in the CUSD Operations and Maintenance Manual.

1.07 DELIVERY, STORAGE & HANDLING

A. Packing, Shipping, Handling, and Unloading

1. Unload panels with an all-terrain forklift, or truck mounted boom.
*(Delivery by a Murus truck with offloading equipment is available in some areas.)

B. Acceptance at Site

1. Examine panel bundles upon arrival at site. Notify the carrier and manufacturer of any damage.

C. Storage and Protection

1. Cover SIPs before and after construction to avoid damage caused from exposure to the elements.
2. Once SIPs are installed immediately apply code approved, weatherproof roofing , siding and trim so that the SIPs are completely covered and protected from rain, snow, high moisture, and ultraviolet light. For more information refer to the Roofing and Siding section of the Murus Installation and Finishing Manual.
3. For extended storage place wrapped bundles of panels in fully enclosed structure that will provide protection from exposure to wind, rain, moisture, and ultraviolet light. Be sure the storage surface is level and sound. Limit stacks to two bundles high with stickers installed under and between the bundles, spaced no more than 2 feet apart. If enclosed structure is not available, the bundles should remain in their original packaging and be covered with durable, waterproof tarps.

1.08 PROJECT CONDITIONS

- A. Building site should be relatively level, free of debris, and accessible to a 70 foot long tractor-trailer truck. Allowances must be made for truck maneuverability and level stacking of panels close to the structure.

1.09 WARRANTY

- A. Manufacturer's Warranty: Submit manufacturer's standard warranty document.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. The Murus Company
PO Box 220
3234 Route 549
Mansfield, PA 16933
Phone: 570-549-2100
Fax: 570-549-2101
Email: info@murus.com
Website: www.murus.com

2.2 MATERIALS

- A. Structural Insulated Panels:
 - 1. Panels: Polyurethane (PUR) Structural Insulating Panels (SIP)
 - 2. Fasteners:
 - a. cam-lock
 - b. 8d coated, ring shank nails
 - c. 6", 7", 8", or 9" galvanized ring shank nails or corrosion resistant panel screws.
 - d. 3" and 3-1/2" #8, galvanized screws
 - 3. 2X Inlet Plates and Nailers
 - a. All plates and nailers should be kiln dried to a moisture content of 19%, or less, SPF #2 grade, or better, unless otherwise specified in the panel drawings.
 - 4. Murus Panel Router

PART 3 – EXECUTION

3.1 INSTALLATION

- A. The structural insulated panels shall be installed in accordance with manufacturer's published instructions and those outlines in the CUSD construction documents.
- B. Manufacturer's installation instructions shall be located in the CUSD Operations and Maintenance Manual.

END OF SECTION 06 12 00

THE MURUS OSB-2100 INSULATING SANDWICH PANEL (OSB/PUR Foam Core/OSB)			
#	2145	2155	2165
Overall Thickness:	4-5/8"	5-5/8"	6-5/8"
Thickness Tolerance:	+/- 1/8"	*	*
Width:	48"	*	*
Width Tolerance: (Finish Size)	+0/-1/8"	*	*
Standard Lengths: (Feet)	4, 6, 8,9,10,12,14,16, 18, 20'	*	*
Length Tolerance:	+/- 1/4"	*	*
Weight:	3.75 lb/sf	3.95 lb/sf	4.15 lb/sf
Insulating Core			
Type:	Polyurethane closed cell foam		
Thickness:	3-11/16"	4-11/16"	5-11/16"
Density:	2.2 lb/cu.ft.	*	*
R-value	6.67 per inch thickness	*	*
Insulating Core Properties	⁴ Design Values		
K Factor: (aged foam)	.14	ASTM C-518	
Compressive Strength:	26 psi	ASTM D1621-94	
Compressive ¹ MOE:	936 psi	ASTM D1621-94	
Shear Strength:	22 psi	ASTM C-273	
Shear Modulus:	192 psi	ASTM C-273	
Flexure ² MOR (³ MD):	39 psi	ASTM C203-92	
Flexure Modulus (³ MD):	794 psi	ASTM C203-92	
Tensile Strength:	43 psi	ASTM D1623-78	
Tensile Modulus:	1133 psi	ASTM D1623-78	
MVT/ Perm Inches:	<2.0	ASTM E-96	
Foam Fire Rating:	Class 1	**ASTM E-84	
Flame Spread:	18	**ASTM E-84	
Smoke Developed	270	**ASTM E-84	
¹ MOE: Modulus of Elasticity ² MOR: Modulus of Rupture ³ MD: Machine Direction ⁴ Design Values are mean derived from multiple specimens *Specification or value is the same as the OSB 2145 Panel			

**ASTM E-84 is not necessarily a representation of performance in an actual fire.
Class 1 is the highest rating available for combustible materials.

Outside Skins

Type: APA or equivalent rated oriented strand board (OSB)

Grade: Exposure-1

Thickness: 7/16"

SECTION 06 73 00
COMPOSITE DECKING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes the following:
 - 1. Composite Decking
- B. Related Sections
 - 1. 05 12 00: Structural Steel Framing
 - 2. 05 51 33: Metal Ladders
 - 3. 05 52 00: Metal Railings
 - 4. 06 11 00: Wood Framing
 - 5. 10 82 00: Exterior Grilles and Screens
 - 6. 12 48 19: Entrance Floor Grate

1.02 REFERENCES

- A. ASTM D 1761 - Standard Test Methods for Mechanical Fasteners in Wood.

1.03 SYSTEM DESCRIPTION

- A. Performance Requirements
 - 1. Deck assembly shall be designed to withstand live and dead loads in accordance with local building codes and calculated loads required for the scope of the project.

1.04 SUBMITTALS

- A. 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
- B. Samples: For each finish product specified, one sample depicting the specified color and pattern

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary decking materials shall be provided by a single manufacturer specializing in composite decking for at least five (5) years.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep materials on a flat level surface away from direct sunlight to avoid decking material deformities.

1.07 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.

1.08 WARRANTY

- A. Provide to the owner, the manufacturer's original warranty document outlining the terms and conditions of the twenty-five (25) year limited product warranty.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. TREX Company, LLC
245 Capitol Lane
Winchester, VA 22602
Email: question@trex.com
Website: www.trex.com

2.2 MATERIALS

- A. Wood Polymer Composite: Trex decking with the following characteristic:
 - 1. Color:
 - 2. Dimensions:
 - 3. Performance Characteristics:
 - a. Flame Spread Index: 25 maximum. Class 1 or A in accordance with ASTM E 84.
 - b. Slip Resistance: 0.82 dry and 0.72 when wet; in accordance with ASTM F 1679.
 - c. Coefficient of Expansion: 0.000019 inches per inch per degree Fahrenheit maximum, in accordance with ASTM D 696.
 - d. Compressive Strength: 2605 psi (17961 kPa), minimum, parallel to grain in accordance with ASTM D 198.
 - e. Shear Strength: 2939 psi (20264 kPa), minimum, tested in accordance with ASTM D 143.
 - f. Screw Withdrawal: 806 psi (5557 kPa), minimum, in accordance with ASTM D 1761 using 2 inch galvanized self-tapping deck screws with 10 threads per inch.
 - g. Decay Resistance: No decay, in accordance with ASTM D 1413.
 - h. Termite Resistance: 10 - Highest Rating, in accordance with ASTM D 3345.
 - i. Water Absorption: 1.21 percent, maximum in accordance with ASTM D 570.
 - j. Modulus of Rupture (MOR): 3005 minimum at 24 inches (610mm) on center, 3149 minimum at 16 inches (406mm) on center, in accordance with ASTM D 6109.
 - k. Modulus of Elasticity: 441,000 psi (3041 MPa), minimum, at 24 inches (610mm) on center, 372,000 psi (2565 MPa), minimum, at 16 inches (406mm) on center, in accordance with ASTM D 6109.
 - l. Weatherability - 2000 Hours: 91 percent of baseline MOR in accordance with ASTM D 2565.

- B. Composite Deck Screws:
 - 1. Fastener with corrosion resistant coating and reverser upper threading.
 - 2. Fasteners must be long enough to penetrate at least 1-1/2 inch (38mm) into framing members or other solid backing.
- C. Carriage Bolts:
 - 1. Galvanized or stainless steel bolts, nuts and washers.
 - 2. Bolt diameter shall be as necessary to achieve point loading code requirements.
 - 3. Lengths vary based on material thickness.
- D. Hangers, Brackets and Ties:
 - 1. Galvanized or stainless steel hardware fastened with screws of same metal type.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Confirm that the deck framing is square and has the proper slope. If framing is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- C. Check all staircase footing locations and depth clearances near doors before installing decking. Notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- B. Deck boards may be pre-drilled for easier fastening.

3.3 DECKING INSTALLATION

- A. Install decking in accordance with manufacturer's most current application instructions.
- B. Install all blocking, bracing and brackets prior to installing decking.
- C. Wherever possible, position cut edges away from the most common line of sight. Edges may be beveled or routed as necessary to achieve the desired appearance.
- D. Miter cut all ends so decking lands solidly on deck joists. Fasten at every joist using two fasteners. Locate fasteners at least 1/2 inch away from the sides of the decking.
- E. Space deck boards 1/8 inch (3.2mm) apart to allow for proper drainage and expansion.

3.4 STAIRCASE INSTALLATION

- A. Install stairs in accordance with manufacturer's most current application instructions.
- B. Install all blocking, bracing and brackets prior to installing stairs.
- C. Miter cut all ends so treads land solidly on stringers. Fasten into each stringer using two fasteners. Locate fasteners at least 1/2 inch (13mm) away from the sides of the boards.
- D. Install risers so they rest on top of the preceding and below the succeeding tread.
- E. Space treads 1/8 inch (3.2mm) apart to allow for proper drainage and expansion.

3.5 CONSTRUCTION

- A. Special Techniques:
 - 1. Installation on a steel scaffolding sleeper system: refer to manufacturer's instructions. Substitute steel joists for wood joist sleeper system.

3.6 REPAIR/ RESTORATION

- A. Replace damaged decking and railings before substantial completion.

3.7 CLEANING

- A. Clean up and dispose of excess material in accordance with all federal, state and local guidelines.

3.8 PROTECTION

- A. Protect installed products until completion of project.

END OF SECTION 06 73 00

	Test Method	Value	
Abrasion Resistance	ASTM D2394	.01 wear/1000 revs.	
Hardness	ASTM D143	1124 lbs.	
Self Ignition Temperature	ASTM D1929	743°F	
Flash Ignition Temperature	ASTM D1929	698°F	
Flame Spread (a)	ASTM E84	80	
Water Absorption (sanded surface)	ASTM D1037	4.3%	
24 hr. Immersion			
Water Absorption (unsanded surface)	ASTM D1037	1.7%	
24 hr. Immersion			
Expansion/Contraction Properties (b)			
Thermal	Typical Trex Wood Polymer® lumber values for		
	Coefficient of Thermal Expansion/Contraction (36 long samples)		
	Width	35.2 x 10 ⁻⁶ to 42.7 x 10 ⁻⁶ (inch/inch/°F)	
	Length	16.1 x 10 ⁻⁶ to 19.2 x 10 ⁻⁶ (inch/inch/°F)	
Moisture	Typical Trex Wood Polymer lumber values for		
	Long Term Water Immersion	Constant High Humidity	
	(36" long samples)	(6 long samples)	
	Width	~3% ~1%	
Nail Withdrawal (c)	ASTM D1761	163 lbs/in	
Screw Withdrawal (c)	ASTM D1761	558 lbs/in	
Static Coefficient of Friction — Dry (d)	ASTM D2047	0.53/0.55	
Static Coefficient of Friction — Dry (d)	ASTM F1679	0.59/0.70	
Static Coefficient of Friction — Wet(d)	ASTM F1679	0.70/0.75	
Fungus Resistance (White & Brown Rot)	ASTM D1413	rating = No Decay	
Termite Resistance (e)	AWPAE1-72	rating = 9.6	
Specific Gravity (typical)	ASTM D2395	0.91 to 0.95	
		Ultimate(typical)	Design
		Values	Values
Compression Parallel (f)(g)	ASTM D198	1806 psi	550 psi
Compression Perpendicular (f)(h)	ASTM D143	1944 psi	625 psi
Tensile Strength (f)	ASTM D198	854 psi	250 psi
Shear Strength (f)	ASTM D143	561 psi	200 psi
Modulus of Rupture (f)	ASTM D4761	1423 psi	250 psi
Modulus of Elasticity (f)	ASTM D4761	175,000 psi	100,000 psi
Thermal Conductivity	ASTM C177	1.57 BTU-in/hr-ft @85°F	
Leachate (i)	TCLP-EPA 1311	pass	

Notes:

- Corresponding Smoke Developed Index is 285.
- Values shown are for reference only.** These values should not be used to calculate gapping for Trex Wood Polymer lumber. Follow Trex Wood Polymer lumber installation literature for proper width-to-width and end-to-end gapping information.
- 8d common wire nail, No. 10 wood screw.
- ASTM D2047 test conducted on sanded/unsanded unweathered samples with leather surface. ASTM F1679 test conducted on sanded/unsanded weathered samples with neolite surface.
- Material weight loss was 0%.
- Ultimate strength values are not meant for design analysis. Testing performed on a 2x6 cross section. Design values are for temperatures up to 130°F.
- Compressive strength parallel to the length.
- Compressive strength perpendicular to length.
- Leaching was below levels established by EPA for all constituent categories.


ESR-1190
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This report is subject to re-examination in one year.

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DIVISION: 06—WOOD AND PLASTICS
Section: 06500—Structural Plastics
Section: 06610—Plastic Railings and Guards

REPORT HOLDER:

TREX COMPANY, INC.
160 EXETER DRIVE
WINCHESTER, VIRGINIA 22603-8605
(540) 542-6300
www.trex.com

EVALUATION SUBJECT:

TREX® COMPOSITE LUMBER, TREX® HS24, TREX 2x2 BALUSTER™, TREX 1½ SQUARE BALUSTER, TREX 4x4 RAIL POST™, TREX® DESIGNER HANDRAIL

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2003 *International Building Code*® (IBC)
- 2003 *International Residential Code*® (IRC)
- BOCA® *National Building Code*/1999 (BNBC)
- 1999 *Standard Building Code*® (SBC)
- 1997 *Uniform Building Code*™ (UBC)

Properties evaluated:

- Structural
- Surface-burning characteristics
- Durability

2.0 USES

The Trex® Composite Lumber Trex® HS24 and Trex 2x2 Baluster™ are recognized for use as a flooring, guardrail (guard), or nonstructural trim component for exterior balconies, porches, decks, stair treads and other exterior walking surfaces of Type V-B (IBC), Type V-N (UBC), Type 5B (BNBC), and Type VI (SBC) construction, and in structures constructed in accordance with the IRC.

The Trex® Designer Handrail evaluated in this report is limited to exterior use as a guardrail system for balconies, porches, and decks of Group R Occupancy buildings of Type V-B (IBC) and Type V-N (UBC) construction, and in structures constructed in accordance with the IRC.

3.0 DESCRIPTION

3.1 General:

Trex® is a wood thermoplastic composite lumber (WTCL) made from 50 percent wood fiber and 50 percent

polyethylene by weight, and is an alternative to preservative-treated or naturally durable lumber. Trex® is manufactured by a continuous extrusion process, in accordance with the Trex Company quality control manual, producing comparable solid sawn lumber-sized members up to a nominal thickness of 3 inches (76 mm) and a maximum nominal depth of 12 inches (305 mm) in seven colors (saddle, woodland brown, natural, madeira, burnished amber, cayenne and winchester grey) and two textures (Trex Origin™ and Trex Accents™).

Trex® shall not be used in framing applications, such as components of trusses, or as joists, rafters, studs, beams, columns, or axial loaded posts. Refer to Section 4.1 for additional information on structural capacity.

3.2 Deck Board:

3.2.1 General: Trex® is manufactured in sizes comparable to solid sawn lumber-sized members up to a nominal thickness of 3 inches (76 mm) and a maximum nominal depth of 12 inches (305 mm). See Figures 1 and 2 for a typical cross section. The Trex® nominally 2-inch-by-6-inch [actual dimensions 1.5 inches by 5.5 inches (38 mm by 140 mm)] and nominally 2-inch-by-8-inch [actual dimensions 1.5 inches by 7.25 inches (38 mm by 184 mm)] composite lumber is permitted to be used as stair treads provided the maximum span does not exceed that stated in Table 2 of this report.

3.2.2 Durability: When subjected to weathering, insect attack, and other decaying elements, material used to manufacture Trex® is equivalent in durability to preservative-treated or naturally durable lumber when used in locations described in Section 2.0 of this report. Trex® has been evaluated for a temperature range from -20°F (-29°C) to 125°F (52°C).

3.2.3 Surface-burning Characteristics: When tested in accordance with ASTM E 84, Trex® has a flame-spread index of no greater than 200.

3.3 Guardrail System:

3.3.1 General: Trex® members designated as Trex 2x2 Baluster™, Trex 1½ Square Baluster, Trex 4x4 Rail Post™, and Trex® Designer Handrail are permitted for use in guardrail assemblies constructed in accordance with Tables 4 and 5. The use of these rails as "handrails" is outside the scope of this report. These rails are only permitted for use as guards in accordance with the applicable code. See Figure 3 for typical component cross sections.

3.3.2 Durability: When subjected to weathering, insect attack, and other decaying elements, material used to manufacture Trex® is equivalent in durability to preservative-treated or naturally durable lumber when used in locations described in Section 2.0 of this report. Trex® has been evaluated for a temperature range from -20°F (-29°C) to 125°F (52°C).

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The Specifier

Trex®

Create Your Space®

3.3.3 Surface-burning Characteristics: When tested in accordance with ASTM E 84, Trex® has a flame-spread index of no greater than 200.

4.0 DESIGN AND INSTALLATION

4.1 General:

Installation of Trex® shall comply with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions shall be available at the jobsite at all times during installation. When the manufacturer's published installation instructions differ from this report, this report shall govern.

4.2 Deck Boards:

4.2.1 General: Allowable withdrawal and lateral design values for nails and bolts used as fasteners in Trex® material shall be determined using the nail and bolt design formula in accordance with the applicable code requirements for solid-sawn lumber. For purposes of fastener calculation only, Trex® shall be assumed to have an effective specific gravity of 0.50. There shall be no increases made to the load values indicated in the AF&PA NDS when designing fasteners for Trex®. Refer to Table 5 of this report for minimum nail spacing distances. Trex® shall be fastened using fasteners with the following diameters:

- Nails having diameters less than or equal to 16d common wire [0.162 inch (4 mm)]
- Screws having diameters less than or equal to No. 12 [0.216 inch (5.5 mm)]
- Bolts having diameters less than or equal to 1/2 inch (12.7 mm)

4.2.2 Structural:

4.2.2.1 Deck Boards: Table 1 lists the allowable stress values for Trex® lumber, Trex® 2x2 Baluster™ and Trex® HS24 lumber. These values shall not be adjusted by any of the adjustment factors permitted for wood framing by the AF&PA NDS or applicable code, with the exception that increases for load duration shall be permitted. The allowable stress values are applicable in uses up to a temperature of 125°F (52°C).

Table 3 lists allowable spans for Trex® used as planking (flatwise bending). This table shall be used for determining the maximum allowable span of Trex® used as decking unless the user/designer submits structural calculations to the code official for approval of additional span lengths using the design values indicated in Table 1.

4.2.2.2 Deck Boards Used as Stair Treads: Trex® 2-inch-by-6-inch (51 mm by 152 mm) and 2-inch-by-8-inch (51 mm by 203 mm) composite lumber, when used as a stair tread, is satisfactory to resist the code-prescribed concentrated load of 300 lbf (1.33 kN) when installed at a maximum center-to-center spacing of 12 inches (305 mm), and shall have a minimum of three continuous spans over four supports. Trex® 5/8-inch-by-6-inch (32 mm by 152 mm) composite lumber, when used as a stair tread, is satisfactory to resist the code-prescribed concentrated load of 300 lbf (1.33 kN) when installed at a maximum center-to-center spacing of 10.5 inches (267 mm), and shall have a minimum of two continuous spans over three supports.

4.3 Guardrail System:

4.3.1 General: Fasteners used to construct guardrails shall comply with the footnotes of Tables 4 and 5.

4.3.2 Structural: Tables 4 and 5 indicate material and installation requirements for the Trex® Railing Assembly and the Trex® Designer Rail Assembly. When installed in

accordance with this report, the system complies with the structural load requirements specified in the applicable building code for lateral load conditions applied to balcony railings and guardrails.

4.3.2.1 Trex® Railing Assembly: The system covered in Table 4 is capable of resisting a uniform load of 50 lbs/ft. (730 N/m) or a concentrated load of 200 pounds (890 N) applied horizontally to the top of the rail. Additionally, the system is capable of withstanding a load of 200 pounds (890 N) applied horizontally over a 1-square-foot (0.093 m²) tributary area of the balusters, and a 200-pound (890 N) concentrated load at the top of the post.

4.3.2.2 Trex® Designer Rail Assembly: The system covered in Table 5 is capable of resisting a uniform load of 50 lbs/ft. (730 N/m) or a concentrated load of 200 pounds (890 N) applied horizontally to the top of the rail. Additionally, the system is capable of withstanding a load of 50 pounds (222 N) applied horizontally over a 1-square-foot (0.093 m²) tributary area of the balusters, and a 200-pound (890 N) concentrated load at the top of the post.

5.0 CONDITIONS OF USE

The Trex® Composite Lumber described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- Trex® shall not be used as a component of trusses or structural diaphragms, and shall not be used in framing applications for joists, rafters, studs, beams, columns, or posts.
- The design and installation of Trex® shall be in accordance with this report and the manufacturer's published installation instructions.
- When Trex® is used in guardrail assemblies, information shall be submitted to the code official to verify compliance with Tables 4 and 5 of this report. When required by the applicable code or the code official, such documents shall be prepared, signed and sealed, and submitted by a registered design professional in accordance with the registration laws of the state in which the project is located.
- The maximum design stresses for Trex®, Trex® HS24 and Trex® 2x2 Baluster™ shall comply with those listed in Table 1. The maximum spans of decking shall comply with Table 3 unless structural calculations, in accordance with Table 1, are provided. Guardrail assemblies shall comply with Tables 4 and 5.

The design values listed in Tables 1, 2 and 3 of this report are for loads of normal duration and are applicable to either dry or wet conditions of use. There shall not be any allowable design stress increases permitted by the applicable code or the AF&PA NDS, with the exception that increases for load duration, such as due to impact, shall be permitted. The design values are applicable in uses up to a temperature not exceeding 125°F (52°C).

- Allowable capacity of fasteners installed in Trex® shall comply with Section 4.2.1 of this report.
- Trex® used as decking shall be designed and installed to limit bending deflection under total design load to less than or equal to L/360.
- Trex® shall be limited to use with building types where the use of combustible material is permitted. Trex® shall not be used as a component of heavy timber construction.

- 5.8 The use of the Trex® as a component of a fire-resistance-rated assembly is outside the scope of this report.
- 5.9 Trex® decking shall be gapped to permit adequate drainage in accordance with the manufacturer's published installation instructions. Trex® shall not be attached to any solid surface or watertight flooring systems, such as sheathing, waterproof membranes, concrete, roof decks or patios.
- 5.10 Trex® shall be fastened directly to the supporting construction. At the request of the code official, calculations shall be submitted to confirm that the construction supporting Trex® has been designed to resist all of the applicable loads.
- 5.11 The compatibility of the fasteners, metal post mount components and other metal hardware with the supporting construction, including chemically treated wood, is outside the scope of this report.
- 5.12 Deck boards shall be installed in a minimum of a two-span condition. Deck boards used as stair treads shall be installed in a minimum of a two- or three-span condition as indicated in Table 2.
- 5.13 The allowable design values for Trex® greater than 3 inches thick have not been evaluated and are outside the scope of this report.
- 5.14 The use of Trex® as a handrail has not been evaluated and is outside the scope of this report.

5.15 Use of deck boards as a walking surface of the means of egress is outside the scope of this report.

5.16 Trex® is produced in Winchester, Virginia, and Fernley, Nevada, under a quality control program with inspections by PFS (AA-652).

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Thermoplastic Composite Lumber Products (AC109), dated June 2004.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Deck Board Span Ratings and Guardrail Systems (Guards and Handrails) (AC174), dated April 2002 (editorially revised July 1, 2004; corrected December 2004).

7.0 IDENTIFICATION

The Trex® described in this evaluation report shall be identified on each piece with the manufacturer's name and address, the product name, the manufacturing location, the name or logo of the inspection agency (PFS) and the evaluation report number (ESR-1190).

Additionally, Trex® shall have the date of manufacture stamped, labeled or branded into each piece as part of the lot number.

TABLE 1— ALLOWABLE DESIGN STRESS VALUES FOR TREX®

ASTM STANDARD	PROPERTY	ALLOWABLE DESIGN VALUES (psi) ^{1,2,3,4}		
		Trex® (Maximum 3-Inch Thickness)	Trex 2x2 Baluster™	Trex HS24
ASTM D 4761	Flexural stress	250	600	375
ASTM D 198	Tension	250	350	250
ASTM D 476-1	Modulus of elasticity	1.0×10^5	2.0×10^5	1.7×10^5
ASTM D 198	Compression parallel to grain	550	1,000	550
ASTM D 198	Compression perpendicular to grain	625	1,000	625
ASTM D 143	Shear	200	250	200

For SI: 1 psi = 6.89 kPa, 1 pcf = 16.02 kg/m³, t° C = (t° F - 32)/5/9.

¹Trex® used as decking shall be designed and installed to limit computed deflection under total design load to less than L/360.

²Design values indicated are applicable for uses where temperatures do not exceed 125°F (52°C).

³Trex® has a density of approximately 60 pcf, and Trex 2x2 Baluster™ has a density of approximately 64 pcf.

⁴The allowable design values for Trex® more than 3 inches (76 mm) thick have not been evaluated and are outside the scope of this report.

TABLE 2—MAXIMUM STAIR TREAD SPANS

DECK BOARDS USED AS STAIR TREADS	MAXIMUM SPAN (in) ^{1,2}
Trex 5/4 × 6 Deck Board	10.5
Trex 2 × 6 and 2 × 8 Deck Boards	12.0

For SI: 1 inch = 25.4 mm; 1 lbf/ft² = 47.9 Pa.

¹Maximum span is measured center-to-center of the supporting construction.

²5/4 × 6 Deck Boards are based on a two-span condition, and 2 × 6 and 2 × 8 Deck Boards are based on a three-span condition.

TABLE 3—TREX® DECKING SPAN CHART^{1,2,3}

MEMBER SIZE	MAXIMUM UNIFORM LIVE LOADING	
	100 psf	200 psf
	Maximum Member Span Between Supports	
5/4 × 6	16 inches	12 inches
2 × 4, 2 × 6, 2 × 8	20 inches	16 inches
3 × 6	Not determined	24 inches
HS24 Marine Grade 2 × width	24 inches	16 inches

For SI: 1 inch = 25.4 mm, 1 psf = 48 Pa.

¹Tabulated span values are for Trex® members used as planking (flatwise bending). The values are permitted to be used in lieu of application-specific calculations. Other applications or loading conditions require submittal of design calculations, showing compliance with this evaluation report, to the code official for approval.

²Trex® members shall be supported by a minimum of three joists and shall be fastened at each joist.

³Tabulated spans are based on a deflection limit of L/360.

TABLE 4—TREX® RAIL ASSEMBLIES¹

COMPONENT		INSTALLATION REQUIREMENTS ^{2,3}
Baluster (parts fabricated or milled from other Trex® profiles into baluster shapes are not permitted)		Trex 2×2 Baluster™ spaced a maximum of 5 1/8 inches on center
		Trex 1 3/8" Square Baluster spaced a maximum of 5 inches on center
Railings	Top plate	Trex® 2×6, 5/4×6, 2×8, or 2×10
	Top rail	Trex® 2×4, 5/4×6, 2×6, 2×8 or 2×10
	Bottom rail	Trex® 2×4, 5/4×6, 2×6, 2×8, or 2×10. Bottom rail shall be supported and attached to the deck at a maximum of 18 inches (457 mm) on center. Bottom rail is not required when balusters are attached directly to the deck structural members.
Posts		Trex 4×4 Rail Post™ or other approved post material, such as solid-sawn lumber or steel. Maximum post spacing shall be 6 feet on center. Posts shall not be notched.

For SI: 1 inch = 25.4 mm, 1 ft = 0.3 m.

¹Evaluation of framing members supporting the guardrail assembly is outside the scope of this evaluation report.

²Standard guardrail components shall be connected as follows:

- Post-to-framing connection: Minimum two 1/2-inch-diameter (13 mm) machine bolts, 5 1/8 inches (130 mm) apart, each post.
- Baluster-to-top-rail connection: Minimum two No. 8 by 2 1/2-inch-long (64 mm) screws, 2 inches (51 mm) apart vertically, through each baluster.
- Top-rail-to-top-plate connection: Minimum two No. 8 by 2 1/2-inch-long (64 mm) screws spaced 12 inches (305 mm) on center.
- Top-rail- and top-plate-to-post connection: Minimum two No. 8 by 3-inch-long (76 mm) screws, 2 inches (51 mm) apart, into each post.

³The minimum height of the guardrail assembly shall be 42 inches (1067 mm) from the deck boards. The maximum opening under the bottom rail shall be 3 inches (76 mm), except for the SBC, where the maximum opening under the bottom rail shall be 2 inches (51 mm).

TABLE 5—TREX® DESIGNER RAIL ASSEMBLIES¹

COMPONENT		INSTALLATION REQUIREMENTS ^{2,3}
Baluster (parts fabricated or milled from other Trex® profiles into baluster shapes are not permitted)		Trex 2×2 Baluster™ spaced a maximum of 5 1/4 inches on center.
Railings	Trex® Designer Top Rail	Mount the top of the balusters to the Trex® Designer Top Rail. Top rail shall be attached to the posts using the Trex® Railing Bracket. Bottom rail shall be supported and attached to the deck at a maximum of 18 inches (457 mm) on center.
	Trex® Designer Bottom Rail	Mount the bottom of the balusters to the Trex® Designer Bottom Rail. Bottom rail shall be attached to the posts using the Trex® Railing Bracket. Bottom rail shall be supported and attached to the deck at a maximum of 18 inches (457 mm) on center.
Posts		Trex 4×4 Rail Post™ or other approved post material, such as solid-sawn lumber or steel. Maximum post spacing shall be 6 feet on center. Posts shall not be notched.

For SI: 1 inch = 25.4 mm, 1 ft = 0.3 m.

¹Evaluation of framing members supporting the guardrail assembly is outside the scope of this evaluation report.

²Designer handrail components shall be connected as follows:

- Post-to-framing connection: Minimum two 1/2-inch-diameter (13 mm) machine bolts, 5 1/8 inches (130 mm) apart, each post.
- Baluster-to-Designer-top-handrail connection: Minimum one 16-gage finish head nail by 2-inch-long (51 mm) through the side of the top Designer handrail and side of baluster.
- Baluster-to-Designer-bottom-handrail connection: Minimum one 16-gage finish head nail by 2-inch-long (51 mm) through the bottom of the designer bottom rail and the bottom of the baluster.
- Top-rail-to-post connection: Attach the Trex® Railing Support Bracket to the post using two No. 9 by 1 1/2-inch-long (38.1 mm) screws provided. Hang the top Designer Handrail on the Trex® Railing Support Bracket and attach using one No. 9 by 1 1/2-inch-long (38.1 mm) screw provided with the bracket.
- Bottom-rail-to-post connection: Attach the Trex® Railing Support Bracket to the post using two No. 9 by 1 1/2-inch-long (38.1 mm) screws provided. Hang the bottom rail on the Trex® Railing Support Bracket and attach using one No. 9 by 1 1/2-inch-long (38.1 mm) screw, provided, through the top of the bottom rail down through the bracket.
- Support balusters under bottom rail: Attach support balusters under the bottom rail and setting on the deck at a maximum of 18 inches between supports.

³The minimum height of the guardrail assembly shall be 42 inches (1067 mm) from the deck boards. The maximum opening under the bottom rail shall be 3 inches (76 mm).

TABLE 6— MINIMUM NAIL SPACING DISTANCES¹

HOLE PREPARATION	EDGE DISTANCE	END DISTANCE		SPACING (PITCH) BETWEEN ROWS OF FASTENERS		SPACING (GAGE) BETWEEN ROWS OF FASTENERS	
		Tension Load Parallel to Grain	Compression Load Parallel to Grain	Parallel to Grain	Perpendicular to Grain	In Line	Staggered
Not prebored	2.5d	15d	10d	15d	10d	5d	2.5d
Prebored	2.5d	10d	5d	10d	5d	3d	2.5d

¹Dimension d equals the diameter of the nail.

SECTION 07 21 00

THERMAL INSULATION

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Natural Cotton Fiber Insulation
- B. Related Sections
 - 1. Division 7 Sections that apply to thermal protection
 - 2. Division 6 Sections that apply to wood framing

1.2 REFERENCES

- A. ASTM E 84 – Surface Burning Characteristics of Building Materials
- B. ASTM E 119 – Fire Testing of Building Materials (1-Hour Rating)
- C. ASTM C 518 – Test Methods for Steady-State Thermal Transmissions properties by means of HeatFlow Meter Apparatus.
- D. ASTM C 423-90A – Standard Test Methods for Sound Absorption and Sound AbsorptionCoefficient by the Reverberation Method.
- E. ASTM E795-93 – Standard Practices for Mounting Test Specimens during Sound AbsorptionTest
- F. ASTM E90 – Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- G. ASTM E 413-87 – Classification for Sound Insulation Rating
- H. ASTM E 1332-90 – Classification for Determination of Outdoor-Indoor Transmission Class.
- I. ASTM C 739-9.0 – Corrosiveness of Cellulosic Fiber Insulation
- J. ASTM C 739-11.0 – Fungi Resistance of Cellulosic Fiber Insulation
- K. ASTM C 739 –13.-- - Odor Emission of Cellulosic Fiber Insulation
- L. ASTM C 739-12 – Moisture Absorption of Cellulosic Fiber Insulation

1.3 SUBMITTALS

- A. Product Data: Submit Manufacturer's printed product data and specifications

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Bonded Logic Inc.
411 East Ray Road
Chandler, AZ 85225
Phone: 480-812-9114
Fax: 480-812-9633
Web: www.bondedlogic.com

2.2 MATERIALS

- A. Ultra Touch Natural Cotton Fiber Insulation – Unfaced batts made from post-industrial cotton fibers that have been thermally bonded
- B. R-Value: R-19
- C. Fire Rating: Flame Spread – 5(Class A), Smoke Developed – 35(Class-A)
- D. Fire Rating: 1-Hour
- E. Mold/Mildew/Funghi Resistance: Pass – No Growth (ASTM C 739)
- F. Corrosion Resistance: Pass (ASTM C 739)
- G. Odor Emission: Pass (ASTM C 739)
- H. Moisture Absorption: Pass – Less than 15% (ASTM C 739)
- I. Retardant used also acts as excellent pest inhibitor)
- J. Environmentally safe, sustainable, non-allergenic, non-hazardous, non-formaldehyde, non-itch insulation product

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify on site conditions
- B. Verify insulation layout and dimensions
- C. Ensure areas are ready for insulation and accurately match accepted project drawings

3.2 PREPARATION

- A. Remove batts from packaging and shake to activate binding fibers. Batts should be given 5-10 minutes to begin rebound activity

3.3 INSTALLATION

- A. Install insulation in accordance with manufacturer's instructions.

END OF SECTION 07 21 00

UltraTouch®

Natural Cotton Fiber Insulation



Description

UltraTouch Natural Fiber Building Insulation is a Class A building material that offers excellent thermal and acoustical performance. Made from natural fibers, UltraTouch contains no fiberglass and does not itch or cause skin irritation. The fibers used to manufacture UltraTouch offer excellent sound absorption properties. Every natural fiber used to manufacture UltraTouch is individually treated with an EPA registered fungal inhibitor that offers excellent protection from mold, mildew, fungi, and pests as well as fire resistance.

Uses

Use UltraTouch Natural Fiber Building Insulation for interior/exterior wall and ceiling applications. UltraTouch can be installed in either wood or metal framing cavities or between furring channels by using a simple friction fit. UltraTouch does not itch and contains no harmful irritants making it safe to handle and install without the need of protective respiratory gear or clothing.

Product Features

- **Excellent Noise Absorption**
- **Strong Thermal Protection**
- **No Itch or Skin Irritation**
- **Resists Microbial Growth**
- **No Formaldehyde**



Bonded Logic, Inc.
411 East Ray Road
Chandler, AZ 85225
(480) 812-9114
(480) 812-9633 - Fax
www.BondedLogic.com

Physical Properties

PROPERTIES	PERFORMANCE	TEST METHOD
Surface Burning Characteristics (Fire Hazard Classification)	Flame Spread 5 (Class 1) Smoke Developed 35 (Class 1)	ASTM E 84 UL 723
Corrosion Resistance	Pass	ASTM C 739
Fungi Resistance	Pass - No Growth	ASTM C 739
Bacteria Resistance	Pass - No Growth	ASTM C 739
Moisture Absorption	Pass - Less Than 15 %	ASTM C 739
Fire Test Of Building Materials	Pass - 1 Hour Rating	ASTM E 119 / UL 263

Thermal Technical Data

Tested in accordance with ASTM C 518 at mean temperature of 75°.

THICKNESS		WIDTH		LENGTH		R-VALUE*
Inch	(mm)	Inch	(mm)	Inch	(mm)	
3.5	(89)	16	(406)	94	(2387)	13
3.5	(89)	24	(609)	94	(2387)	13
5.5	(139)	16	(406)	94	(2387)	19
5.5	(139)	24	(609)	94	(2387)	19

* The higher the R-Value, the greater the insulating power.

Acoustical Performance

Sound Absorption was tested in accordance with ASTM E90-02, ASTM C423 (Type A mounting per ASTM E 795)

PRODUCT		ABSORPTION COEFFICIENTS @ OCTAVE BAND FREQUENCIES (Hz)						
Size	Thickness	125	250	500	1000	2000	4000	NRC/STC
R-13	3.5"	.95	1.30	1.19	1.08	1.02	1.00	NRC 1.15
R-19	5.5"	.97	1.37	1.23	1.05	1.00	1.01	NRC 1.15
R-13	3.5"	21	40	48	52	46	48	STC 45

Product Compliances

UltraTouch Natural Fiber Building Insulation has the physical properties that regularly meet the requirements of the following current specifications, standards, and codes.

BUILDING CODES

ICBO International Conference of Building Officials
BOCA Building Officials and Code Administrators
CABO Council of American Building Officials
SBCCI Southern Building Code Congress International

State of California Bureau of Thermal Insulation
(License #TI-1367 Reg. # CA-T367AZ)



Available Sizes

PRODUCT	R-VALUE	LENGTH		WIDTH		THICKNESS		SQ. FT. / BUNDLE		BUNDLE WEIGHT	
		Inch	(mm)	Inch	(mm)	Inch	(mm)	Ft.	(m)	Lbs.	(kg)
BLP 11026	R-13	94	(2387)	16	(406)	3.5	(89)	104	(9.7)	39	(18)
BLP 11027	R-13	94	(2387)	24	(609)	3.5	(89)	126	(11.7)	39	(18)
BLP 11050	R-19	94	(2387)	16	(406)	5.5	(139)	52	(4.9)	30	(14)
BLP 11054	R-19	94	(2387)	24	(609)	5.5	(139)	63	(5.9)	37	(17)

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor

Occupational Safety and Health Administration
(Non-Mandatory Form)

Form Approved:

OMB No. 121B-0072

ULTRATOUCH NATURAL COTTON FIBER INSULATION

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name BONDED LOGIC, INC.	Emergency telephone Number (480) 812-9114
Address (Number, Street, City, State, and ZIP Code) 411 E. RAY ROAD	Telephone Number for Information (480) 812-9114
CHANDLER, AZ 85225	Date Prepared 7/13/01
	Signature of Preparer (optional)

Section II -- Hazardous Ingredients/Identity Information

Hazard Components (Specific Chemical Identity: Common Name(s))	OSHA DEL	ACGIH-TLV	Other Limits Recommended	% (optional)	
RECYCLED FIBER PRODUCTS	N/A	N/A	N/A		
OSHA PARTICULATES NOT OTHERWISE REGULATED -					
BORAX 5 MOL - Sodium Tetraborate Pentahydrate CAS No. 12179-04-3	10 mg/m ³	1 mg/m ³	5 mg/m ³		
BORIC ACID CAS NO: 10043-35-3	15 mg/m ³	10 mg/m ³	N/A		

Section III -- Physical/Chemical Characteristics

Boiling Point	N/A				Specific Gravity (H ₂ O = 1)	N/A
Vapor Pressure (mm Hg)	N/A				Molting Point	N/A
Vapor Density (AIR = 1)	N/A				Evaporation Rate (Butyl Acetate = 1)	N/A
Solubility in Water NONE						
Appearance and Odor COLOR - WHITE/ALUMINIUM - NO ODOR						

Section IV -- Fire and Explosion Hazard Data

Flash Point (Method Used)	N/A	Flammable Limits	N/A	LEL	N/A	UEL	N/A
Extinguishing Media	ANY STANDARD METHOD						
Special Fire Fighting Procedures	NO SPECIAL METHOD - MATERIAL IS TREATED FOR FLAME RESISTANCE						
Unusual Fire and Explosion Hazards	NONE KNOWN						

Section V -- Reactivity Data

Stability	Unstable		Conditions to Avoid	PROLONGED TEMPERATURES EXCEEDING 250°F
	Stable	X		
Incompatibility (Materials to Avoid)	N/A			
Hazardous Decomposition or Byproducts	COMBUSTION PRODUCTS AS FIBER PRODUCTS			
Hazardous Polymerization	May Occur		Conditions to Avoid	N/A
	Will Not Occur	X		

Section VI -- Health Hazard Data

Route(s) of Entry:	Inhalation?	YES	Skin?	NO	Ingestion?	YES
Health Hazards (Acute and Chronic)	NONE KNOWN					

Carcinogenicity:	None Known	NTP?	NO	IARC Monographs?	NO	OSHA Regulated?	NO
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Signs and Symptoms of Exposure	NONE KNOWN			
Medical Conditions Generally Aggravated by Exposure	NONE KNOWN			
Emergency and First Aid Procedures	INGESTION: IF LARGE AMOUNT IS CONSUMED, SEEK MEDICAL ATTENTION			
Section VII -- Precautions for Safe Handling and Use				
Steps To Be Taken in Case Material Is Released or Spilled	PICK UP LARGE QUANTITIES AND USE OR DISPOSE			
Waste Disposal Method	IN ACCORDANCE WITH FEDERAL AND/OR STATE REGULATIONS COVERING SOLID WASTE DISPOSAL			
Precautions To Be Taken In Handling and Storing	STORE MATERIAL IN DRY PLACE			
Other Precautions	NONE REQUIRED			
Section VIII -- Control Measures				
Respiratory Protection (<i>Specify Type</i>)	OSHA APPROVED AIR MASK			
Ventilation	Local Exhaust	YES	Special	NONE
YES	Mechanical (<i>General</i>)	NO	Other	NONE
Protective Gloves	OPTIONAL		Eye Protection	OPTIONAL
Other Protective Clothing or Equipment	NOT NORMALLY REQUIRED			
Work/Hygienic Practices	NO SPECIFIC REQUIREMENT - USE COMMON SENSE			



From: Tod Kean – General Manager
411 East Ray Road
Chandler, AZ 85225
480-812-9114 – Phone

Subject: Recycled Content Certificate / Rapidly Renewable Resources

To Whom It May Concern:

Please find attached the requested information regarding the recycled content for Bonded Logic's insulation products as well as our rapidly renewable material resources usage.

RECYCLED CONTENT

<u>Product</u>	<u>% Post Consumer</u>	<u>% Post Industrial</u>
Bonded Logic Natural Cotton Fiber Insulation Products	0%	85%

RAPIDLY RENEWABLE RESOURCES

<u>Product</u>	<u>Raw Material Source</u>	<u>% Utilized</u>
Bonded Logic Natural Cotton Fiber Insulation Products	Cotton	85%

Bonded Logic utilizes natural cotton fibers in the manufacturing of its insulation products. This cotton fiber is harvested from the cotton plant, which is a rapidly renewable resource. Bonded Logic sources its cotton fibers locations across the United States and Mexico.

Signature: _____

Job Title: General Manager

Company Name: Bonded Logic, Inc.

SECTION 07 27 00

AIR BARRIERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes the following:
 - 1. Air barriers
- B. Related Sections:
 - 1. 05 12 00: Structural Steel Framing
 - 2. 06 11 00: Wood Framing
 - 3. 06 12 00: Structural Insulated Panels
 - 4. 06 15 00: Wood Decking
 - 5. 06 46 00: Wood Door and Window Casings
 - 6. 07 22 16: Roof Board Insulation
 - 7. 07 46 43: Composite Siding
 - 8. 07 53 23: Ethylene-Propylene-Diene-Monomer Roofing
 - 9. 07 55 63: Vegetated Protected Membrane Roofing
 - 10. 07 62 00: Sheet Metal Flashing and Trim
 - 11. 07 65 26: Self Adhering Sheet Flashing
 - 12. 08 10 00: Doors and Frames
 - 13. 08 52 00: Wood Windows
 - 14. 08 95 00: Vents
 - 15. 09 20 00: Plaster and Gypsum Board
 - 16. 10 82 00: Exterior Grilles and Screens

1.02 REFERENCES

- A. American Standards for Testing of Materials (ASTM)
 - 1. E 96 – 2000 Water Vapor Transmission of Materials
 - 2. E 1677 - 2000 Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls
- B. American Association of Textile Chemists and Colorists (AATCC)
 - 1. 127 – 2004 Water Resistance: Hydrostatic Pressure Test
- C. Technical Association of the Pulp and Paper Industry (TAPPI)
 - 1. T460 – Air Resistance of Paper (Gurley Method)

1.03 SUBMITTALS

- A. 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.

1.04 QUALITY ASSURANCE

- A. Pre-installation Meetings: Convene a pre installation meeting two weeks before start of installation of air barrier. Require attendance of parties directly affecting work of this section. Review installation, protection, and coordination with other work.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage:
 - 1. Store products in manufacturer's unopened packaging until ready for installation.
 - 2. Store materials in a clean, dry area in accordance with manufacturer's instructions.
 - 3. Rolls of material should be stored vertically on their ends and in their shipping wrappers.
- C. Handling: Protect materials during handling and installation to prevent damage.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. DuPont Weatherization Systems
4417 Lancaster Pike
Building 728
Wilmington, DE 19805
Phone: 1-800-448-9835
Website: www.tyvek.com

2.2 MATERIALS

- A. DuPont™ Tyvek® Homewrap®: A flash spunbonded olefin, non-woven, non-perforated secondary weather resistant barrier.
- B. Performance Characteristics
 - 1. AATCC-127, Water Penetration Resistance, exceeded at 210
 - 2. TAPPI T-460, Gurley Hill (sec/100cc) Air infiltration at 300 seconds
 - 3. ASTM E 96 Method B(g/m2-24hr.) Water vapor transmission of 400
 - 4. TAPPI T-41D, Basis weight of 1.8oz/yd
 - 5. ASTM E96 Method B, Water Vapor Transmission, 58 perms
 - 6. ASTM E1677, Air Retarder Material Standard Specification, Type I air barrier
- C. Sealing Tape/Fasteners
 - 1. DuPont™ Tyvek® Tape, DuPont Weatherization Systems.
 - 2. For wood frame construction: DuPont™ Tyvek® Wrap Caps, DuPont Weatherization Systems. Nails with large heads or plastic washers. Wide staples with a 1.0 inch minimum crown may be used if applied on wood sheathing.
 - 3. Caulks and Sealants: polyurethane or elastomeric sealants
 - a. Available Products:
 - i. OSI® Quad Pro-Series®, solvent release butyl rubber sealant
 - ii. DAP® Dynaflex 230™
 - iii. Other products as approved and recommended by air barrier/weather resistant barrier manufacturer.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas to receive air barrier. Do not begin installation until unacceptable conditions have been corrected.
- B. Verify site dimensions.
- C. Commencement of work will imply acceptance of substrate.

3.2 INSTALLATION

- A. Install Air Barrier over exterior side of structurally insulated panels.
 - 1. Install Air Barrier before windows and doors are installed. Install lower level barrier prior to upper layers to ensure proper shingling of layers.
 - 2. Overlap Air Barrier at corners of building by a minimum of 12 inches.
 - 3. Overlap Air Barrier vertical seams by a minimum of 6 inches.
 - 4. Ensure barrier is plum and level with foundation, and unroll extending Air Barrier over window and door openings.
 - 5. Attach Air Barrier to wood, insulated sheathing board or exterior gypsum with plastic cap nails every 12" to 18" on vertical stud line with wood stud framing, and screws with washers to metal stud framing. When attaching to wood sheathing, a minimum 1.0 inch crown staple may be used. When attaching to masonry, use adhesive recommended by manufacturer.
 - 6. Prepare window and door rough openings as follows:
 - a. Prepare each window rough opening by cutting a modified "I" pattern in the Air Barrier.
 - i. Horizontally cut Air Barrier along bottom of header.
 - ii. Vertically cut Air Barrier down the center of window openings from the top of the window opening down to 2/3 of the way to the bottom of the window openings.
 - iii. Diagonally cut Air Barrier from the bottom of the vertical cut to the left and right corners of opening.
 - iv. Fold side and bottom flaps into window opening and fasten every 6 inches. Trim off excess.
 - b. Prepare each rough door opening by cutting a standard "I" pattern in the Air Barrier.
 - i. Horizontally cut Air Barrier along bottom of door frame header and along top of sill.
 - ii. Vertically cut Air Barrier down the center of door openings from the top of the door opening (header) down to the bottom of the door opening (sill).
 - iii. Fold side flaps inside around door openings and fasten every 6 inches. Trim off excess.
 - 7. Tape all horizontal and vertical seam of Air Barrier with DuPont™ Tyvek® Tape.
 - 8. Seal all tears and cuts in Air Barrier with DuPont™ Tyvek® Tape.

END OF SECTION 07 27 00



ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

The Subcommittee on Evaluation has reviewed the data submitted for compliance with the *Standard Building Code®* and the International One and Two Family Dwelling Code and submits to the Building Official or other authority having jurisdiction the following report. The Subcommittee on Evaluation, ICC-ES and its staff are not responsible for any errors or omissions to any documents, calculations, drawings, specifications, tests or summaries prepared and submitted by the design professional or preparer of record that are listed in the Substantiating Data Section of this report. Portions of this report were previously included in Evaluation Reports #9392, #95105, #95105A, #95105B, and #95105C.

REPORT NO.: 95105D

EXPIRES: See the current EVALUATION REPORT INDEX

CATEGORY: FLOOR, WALL AND ROOF SYSTEMS

SUBMITTED BY:

E. I. DuPONT de NEMOURS & COMPANY, INC.
NONWOVENS
P.O. BOX 80728
CHESTNUT RUN PLAZA
WILMINGTON, DELAWARE 19880-0728

1. PRODUCT TRADE NAME

- 1.1 Tyvek® HomeWrap™
- 1.2 Tyvek® StuccoWrap™ - Style 1062X
- 1.3 Tyvek® CommercialWrap™ - Style 1162B

2. SCOPE OF EVALUATION

- 2.1 Surface Burning Characteristics
- 2.2 Air Infiltration Barrier
- 2.3 Moisture Protection Barrier

3. USES

- 3.1 Tyvek® HomeWrap™ is used as an air infiltration barrier and/or moisture protection barrier in exterior walls of Type VI construction under the *Standard Building Code®*.
- 3.2 Tyvek® StuccoWrap™ is used as a component of a Listed Exterior Insulation and Finish System (EIFS) as an air infiltration barrier and/or moisture protection barrier in exterior walls of Type VI construction under the *Standard Building Code®*. (For Listed EIFS Manufacturers, see the current Evaluation Report Index).

- 3.3 Tyvek® CommercialWrap™ - Style 1162B is used as an air infiltration barrier and/or moisture protection barrier in exterior walls of Type VI construction under the *Standard Building Code®*.

4. DESCRIPTION

4.1 General

4.1.1 Tyvek® HomeWrap™ is a white polyethylene sheet of ultra-fine fibers made from high density polyethylene intended for use as an air infiltration barrier or moisture protection barrier installed over the studs or on the exterior of building sheathing boards on buildings of Type VI Construction. Tyvek® HomeWrap™ is formed by spinning the fibers and then bonding them into a sheet using heat and pressure. Tyvek® HomeWrap™ is manufactured with a UV stabilizer added to the polymer which provides protection for a maximum of 120 days exposure to the sun during construction. Tyvek® HomeWrap™ is available in the following roll sizes:

10' x 150'	5' x 200'	9'6" x 100'
10' x 100'	3' x 165'	9'6" x 150'
9' x 150'	3' x 100'	
9' x 100'	18" x 100'	

4.1.2 Tyvek® StuccoWrap™ - Style 1062X is the same material as Tyvek® HomeWrap™ except that it has been textured to provide vertical drainage channels to assist in water management.

4.1.3 Tyvek® CommercialWrap™ - Style 1162B is the same material as Tyvek® HomeWrap™ except that it has been processed to provide increased air and water resistance and mechanical strength.

4.2 Surface Burning Characteristics

4.2.1 Tyvek® HomeWrap™ demonstrated a flame spread index (FSI) of 5 and a smoke developed index (SDI) of 20 when tested under ASTM E 84.

4.2.2 Tyvek® StuccoWrap™ demonstrated a flame spread index (FSI) of 5 and a smoke developed index (SDI) of 25 when tested under ASTM E 84.

4.2.3 Tyvek® CommercialWrap™ demonstrated a flame spread index (FSI) of 10 and a smoke developed index (SDI) of 10 when tested under ASTM E 84.

4.3 Water Vapor Transmission Rate

4.3.1 Tyvek® HomeWrap™ demonstrated a water vapor transmission rating of 405 g/m²/24hrs, or 59 U.S. perms when tested under ASTM E 96 Method B.

ICC-ES legacy 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, Inc., express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

4.3.2 Tyvek® StuccoWrap™ demonstrated a water vapor transmission rating of 344 g/m²/24hrs, or 50 U.S. perms when tested under ASTM E 96 Method B.

4.3.3 Tyvek® CommercialWrap™ demonstrated a water vapor transmission rating of 197 g/m²/24hrs, or 28 U.S. perms when tested under ASTM E 96 Method B.

4.4 Moisture Protection Barrier

Tyvek® HomeWrap™, Tyvek® StuccoWrap™ and Tyvek® CommercialWrap™ were tested for equivalency with Type 15 felt for water resistance, dry tensile strength, cracking and pliability resistance, and air infiltration and exfiltration as a component of a wall assembly. The testing demonstrated that Tyvek® HomeWrap™, Tyvek® StuccoWrap™ and Tyvek® CommercialWrap™ may be used as an alternate to Type 15 Felt for use as a moisture protection barrier for wood framed wall construction as per Section 2303.3 of the *Standard Building Code®*.

5. INSTALLATION

5.1 General

Tyvek® HomeWrap™, Tyvek® StuccoWrap™, and Tyvek® CommercialWrap™ are installed on the exterior side of exterior walls over exterior sheathing or insulation. The printed side is installed facing to the outside.

Tyvek® HomeWrap™, Tyvek® StuccoWrap™, and Tyvek® CommercialWrap™ are installed after wall framing is completed, and before or after windows and doors are installed. The roll is placed about one foot from the corner and fastened using staples, washer nails, or roofing nails spaced a maximum of 18 inches and then unrolled around the building and fastened with nails or staples spaced 16 inches o.c. maximum. A minimum of 6 inches overlap for the sheet in both vertical and horizontal dimensions is recommended.

When applying over foam insulation boards, the fabric is fastened with roofing nails or other large headed nails long enough to penetrate the insulation and grip framing studs.

The manufacturer's published installation instructions and this report shall be strictly adhered to and a copy of these instructions shall be available at all times on the job site during installation.

The instructions within this report govern if there are any conflicts between the manufacturer's instructions and this report.

5.2 Tyvek® StuccoWrap™

Tyvek® StuccoWrap™ is installed only with SBCCI PST & ESI Listed EIFS Manufacturers for which they are a listed component and are approved by the EIFS Manufacturers. Tyvek StuccoWrap™ is installed in accordance with the EIFS manufacturers' assembly Listing and published installation instructions. For Listed EIFS Manufacturers, see the current SBCCI PST & ESI Evaluation Report Listing.

6. SUBSTANTIATING DATA

- 6.1 Manufacturer's descriptive literature and installation instructions.
- 6.2 Test report on surface burning characteristics under ASTM E 84, S.G.S. U.S. Testing Company Inc., Number

119053-1, August 13, 1996, signed by Steve Caldarola and Frank Pepe.

- 6.3 Test report, United States Testing Company, Inc., Report Number 096899, February 16, 1990, signed by Jonathan A. Koppel and Frank Pepe. The following testing was performed:

- Moisture Vapor Transmission Rate under ASTM E 96, Method B
- Breaking Strength under ASTM D 882, Method A
- Basis Weight under TAPPI T 410
- Caliper under ASTM D 374, Method D
- Hydrostatic Resistance (Sute) under AATCC 127
- Porosity (Gurley) under TAPPI T 460

- 6.4 Test Report on UV Exposure, DSET Laboratories, Inc., DSET Order No. 36599, Client Authorization No. P.O. 98532D, January 29, 1990, signed by Karla Leiler and Larry Bard.

- 6.5 Test Report on Weathered Samples for Hydrostatic Resistance under FTMS 191A-5514-Modified and Pliability Test under Canadian Spec. CAN2-51.33-M80, United States Testing Company, Inc., Report Number 005973, February 9, 1990, signed by Danny O'Regan and Dominik Martucci.

- 6.6 Test report on air infiltration and exfiltration of wall assembly under ASTM E 283, Architectural Testing Inc., Report No. ATI-8507/8508, July 29, 1991, Revised March 10, 1992, signed by Daniel J. Wise and David G. Moyer.

- 6.7 Test report on Thermal Transmittance under ASTM C 236, Southwest Research Institute, SwRI Project No. 01-7283-405, Final Report, May 3, 1983, signed by Eugene L. Anderson.

- 6.8 Test reports, Comparison Testing of Hydrostatic Head Leakage of Tyvek® with Type 15 Felt, Ramtech Laboratories, Inc., Laboratory No. 6775-83 and 6775A-83, September 29, 1983, signed by Ronald A. Macey, P.E.

- 6.9 Engineering evaluation of DuPONT Tyvek® as moisture protection for exterior walls, Walker Engineering, Inc., dated 28, 1992, signed and sealed by Gary W. Walker, P.E.

- 6.10 Test report, S.G.S. U.S. Testing Company Inc., Number 119053, August 26, 1996, signed by Leon Venech. The following testing was performed:

- Moisture Vapor Transmission Rate under ASTM E 96, Method B
- Breaking Strength under ASTM D 882, Method A
- Hydrostatic Resistance (Sute) under AATCC 127
- Porosity (Gurley) under TAPPI T 460

- 6.11 Test report on physical properties of Tyvek® StuccoWrap™ - 1062X, S.G.S. U.S. Testing Company Inc., Number 102439-1, January 9, 1998, signed by C. R. Roberti. The following testing was performed:

- Water Vapor Transmission Rate Method B, under ASTM E 96.
- Breaking Strength under ASTM D 882
- Hydro Static Resistance (Seuter) under AATCC 127.
- Pliability
- Porosity (Gurley) under TAPPI 460

- 6.12 Test report on surface burning characteristics under ASTM E 84 for Tyvek StuccoWrap™ 1062X, S.G.S. U.S. Testing Company Inc., Number 102439-1, 12/15/97, signed by Steve Caldarola and Frank Pepe.

- 6.13 Test reports on physical properties of control and aged samples of Tyvek Commercial Wrap - Style 1162B, S.G.S. U.S. Testing Company Inc., Report Number

106340, April 16, 1998 and Report Number 106331, May 18, 1998, signed by J. S. Fritz and C. R. Roberti. The following testing was performed:

- Tensile Strength, ASTM D 882
- Trapezoid Tear Strength, ASTM D 1117
- Gurley Porosity, TAPPI T-460
- Water Vapor Transmission Rate Method A and B, ASTM E 96
- Hydrostatic Head, AATCC 127
- Pliability 1/16 and 1/8 mandrels

- 6.14 Test report on surface burning characteristics under ASTM E 84 for Tyvek CommercialWrap - Style 1162B, S.G.S. U.S. Testing Company Inc., Report No. 106340-1, April 1, 1998, signed by Arthur D. Fiorino and Ken Elkin.

7. CODE REFERENCES

Standard Building Code - 1999 Edition

Section 103.7	Alternate Materials and Methods
Section 608	Type VI Construction
Section 708	Thermal Insulating Materials
Section 2303.3	Moisture Protection

International One and Two Family Dwelling Code - 1998 Edition

Section 108	Alternate Materials and Systems
Section 319	Insulation
Section 701	Wall Covering - General
Section 703	Exterior Covering
Section 703.2	Weather-Resistant Sheathing Paper
Table 703.4	Weather-Resistant Siding Attachment and Minimum Thickness
Figure 703.7	Masonry Veneered Wall Detail

8. COMMITTEE FINDINGS

The Subcommittee on Evaluation in review of the data submitted finds that, in their opinion, the Tyvek® HomeWrap™, Tyvek® StuccoWrap™, and Tyvek® CommercialWrap™ as described in this report conform with or are suitable alternates to that specified in the *Standard Building Code*® and the *International One and Two Family Dwelling Code* or Supplements thereto.

9. LIMITATIONS

- 9.1 This Legacy Evaluation Report and the installation instructions, when required by the building official, shall be submitted at the time of permit application.
- 9.2 Tyvek® HomeWrap™, Tyvek® StuccoWrap™, and Tyvek® CommercialWrap™ shall be installed in accordance with the manufacturer's published installation instructions.
- 9.3 Tyvek® HomeWrap™, Tyvek® StuccoWrap™, and Tyvek® CommercialWrap™ shall not be exposed to sunlight for more than 120 days.
- 9.4 Tyvek® HomeWrap™, Tyvek® StuccoWrap™, and Tyvek® CommercialWrap™ shall not be used as a roofing paper.
- 9.5 Tyvek® StuccoWrap™ shall only be used with Listed EIFS Systems, see Section 5.2 above.
- 9.6 Tyvek® HomeWrap™, Tyvek® StuccoWrap™, and Tyvek® CommercialWrap™ shall only be installed in exterior walls of Type VI construction under *Standard Building Code*®.

10. IDENTIFICATION

Each roll of E.I. DuPont de Nemours and Company, Inc.'s Tyvek® HomeWrap™, Tyvek® StuccoWrap™, and Tyvek® CommercialWrap™ shall bear the name and address of the manufacturer, the SBCCI Public Safety Testing and Evaluation Services, Inc. Seal or initials (SBCCI PST & ESI), and the number of this report for field identification.

11. PERIOD OF ISSUANCE

SEE THE CURRENT EVALUATION REPORT INDEX FOR STATUS OF THIS LEGACY EVALUATION REPORT.

For information on this report contact:
Michael P. O'Reardon, P.E.
205/599-9800

SECTION 07 58 00

FLUID APPLIED ROOFING

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Materials and methods necessary to install fluid applied roofing

1.2 SUBMITTALS

- A. Product Data: Submit Manufacturer's printed product data and specifications, including testing reports and MSDS.

1.3 DELIVERY, STORAGE & HANDLING

- A. Storage and Protection
 - 1. Minimum storage temperature 0° C (32°F)
 - 2. Maximum Storage Temperature: 80° (180° F)
 - 3. Use of absorbent to contain or absorb spill is recommended
 - 4. Store in tightly-closed containers in a well-ventilated area

PART 2 – PRODUCTS

2.1 MAUFACTURERS

- A. Acrylabs
730 Commercial Lane
Honeybrooke, PA 19344
Phone: 610-273-1355
Fax: 610-273-1357
Email: www.acrylabs.com

2.2 MATERIALS

- A. 2100B Acrylic Base Coat
- B. 2100HT Acrylic Finish Coat

PART 3 – EXECUTION

- A. Installation on a roof complies with the 2 percent slope requirement
- B. Initial installation shall be performed with a manufacturer's representative who will provide on-site training and application assistance.

END OF SECTION 07 56 00



ACRYLIC COATINGS

2100B Acrylic Base Coat

PRODUCT DATA

2100B is a water born 100% acrylic coating for the construction market. Utilizing advanced technology the **2100B** is formulated for maximum adhesion to asphalt, metal, modified bitumen, concrete, wood, EPDM, and most single ply membrane systems.

2100B cures to a strong durable finish that is easily maintained. **2100B** is the tack or base coat (adhesive) for most ACRYLAB ROOF SYSTEMS.

2100B is available in Gray only.

Application: can be brushed, rolled or sprayed. Final thickness of **2100B** will vary depending on surface conditions (porosity, etc.). A uniform dry film thickness of 12 mils (DFT) is suggested to maintain a pinhole free membrane. Allow two to four hours between coats.

2100B is available in 1, 5, and 55 gallon plastic containers.

For more detailed instructions refer to our Installation Guide or consult ACRYLABS, INC. technical department.



ACRYLIC COATINGS

2100B TECHNICAL DATA

TYPICAL PROPERTIES

WEIGHT PER GALLON	12.1 LBS.	ASTM D1475-90
% SOLIDS BY WEIGHT	66.9	ASTM D2369-97
% SOLIDS BY VOLUME	50.8	ASTM D2697-86
PIGMENT VOLUME	43.0%	
VISCOSITY	100-115 Ku	ASTM D562-01
V.O.C.	<100 g/l	ASTM D3960-01
PH	8.6 -9.2	ASTM E70-97
FLASH POINT	N/A	

TYPICAL PROPERTIES (20 mil DFT)

LOW TEMPERATURE FLEXABILITY	Passes 1/8" mandrel bend	
ELONGATION AT MAX STRESS	240% @ 74F	ASTM C-734
	80% @ 0F	
ELONGATION AT BREAK	245% @ 74F	ASTM D-412
	130% @ 0F	
TENSILE STRENGTH AT MAX STRESS	175psi @ 74F	ASTM D-412
	725psi @ 0F	
TENSILE STRENGTH AT BREAK	165psi @ 74F	ASTM D-412
	660psi @ 0F	
RECOVERY AFTER 25% ELONGATION	65%	ASTM D-412
PERMEABILITY (20MILS)	<20 PERMS	ASTM E96-80
ACCELERATED WEATHERING	NO EFFECT 2 YEARS WEATHEROMETER	ASTM G-53

AcryLabs, 730 Commercial Lane, Honeybrook, PA 19344
Phone 610-273-1355, Fax 610-273-1357
www.acrylabs.com



ACRYLIC COATINGS

MATERIAL SAFETY DATA SHEET

SECTION I: PRODUCT IDENTIFICATION

Product Name: Acrylabs 2100 B Series Coatings
Chemical Name: Acrylic Coating Solution
Date of Revision: 5/11/2005

SECTION II: COMPANY IDENTIFICATION

Address: Acrylabs, Inc.
730 Commercial Lane
Honey Brook, PA 19344

Emergency Phone Number: (610) 273-1355
Informational Phone Number: 866-273-1355

SECTION III: INGREDIENTS

<u>Ingredient</u>	<u>CAS Regulation #</u>	<u>Weight (%)</u>	<u>Vapor Pressure (mm HG @ Temp.)</u>	<u>Occupational Exposure Limits</u>
Acrylic Polymers	N/A	15.00 - 25.00	N/A	N/A
Aqua Amonia 19%	1336-21-6	<1.00	755.00 mm Hg @ 80° F	ACGIH TWA 25 ppm
Calcium Carbonate	1317-65-3	30.00 - 40.00	N/A	10 mg/m ³ (dust)
Ester-Alcohol	25265-77-4	<2.00	<.01 mm Hg @ 20° C	None Established
Hydroxyethylcellulose	9004-62-0	<2.00	N/A	None Established
Iron Oxide Black	12227-89-3	<1.00	N/A	10 mg/m ³ (dust)
Petroleum-based Defoamer	Proprietary	<1.00	N/A	5 mg/m ³ TWA
Propylene Glycol	57-55-6	1.00 - 5.00	.22 mm Hg @ 68° F	None Established
Titanium Dioxide	13463-67-7	5.00 - 10.00	N/A	10 mg/m ³ (dust)
Water	7732-18-5	30.00 - 35.00	760.00 mm Hg @ 68° F	N/A
Zinc Oxide	1314-13-2	1.00 - 5.00	N/A	10 mg/m ³ (dust)

SECTION IV: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Colored semi-viscous liquid
State: Liquid
Odor Characteristics: Mild ammonia odor
Vapor Density: Heavier than air (air = 1)
Vapor Pressure: No data
Weight Per Gallon: 11.8 - 12.5
Boiling Point: 250° F
Solubility in Water: Soluble
VOC: <100 g/L
Evaporation Rate: Slower than ether

SECTION V: FIRE AND EXPLOSION DATA

Flash Point: >100° C (212° F); After evaporation of water, residue may burn.

Means of Extinguishing: Foam, CO₂, Dry chemical, Water Fog.

Personal Protective Equipment: Wear full protective gear and use a self-contained breathing apparatus (pressure-demand, NIOSH approved or equivalent).

Unusual Fire and Explosion Hazards: In the case of a fire, pressure may build up in tightly closed containers, resulting in the rupture of the container. Keep containers cooled with water spray in order to prevent such occurrences.

SECTION VI: REACTIVITY DATA

Instability: Material used in the creation of this product is considered to be stable. Avoid polymer decomposition, which takes place at or above temperatures of 177° C (350° F). Time and Temperature determine thermal decomposition.

Hazardous Decomposition Products: Acrylic monomers may be produced as a result of thermal decomposition; ex. oxides of carbon.

Hazardous Polymerization: Does not apply. Product will not undergo hazardous polymerization.

Incompatibility: No incompatibilities known.

SECTION VII: HEALTH HAZARD DATA

Acute Eye: Eye contact may cause a slight irritation.

Acute Skin: Absorption due to skin contact is not likely. Moderate skin irritation or reddening may occur.

Acute Inhalation: Although not likely, inhalation of vapor or mist may cause irritation of the nose, throat, and lungs.

Acute Ingestion: Material is harmful if swallowed. Gastrointestinal irritation, nausea, vomiting, or diarrhea may occur.

Chronic Effects: This product does not contain any ingredients deemed by IARC, NTP, ACGIH, or OSHA to contain probable or suspectable carcinogens.

SECTION VIII: FIRST AID MEASURES

Eye Exposure: Flush with a steady, gentle stream of water for a minimum of 15 minutes. If redness, itching or a burning sensation develop, seek medical attention.

Skin Exposure: Wash affected areas thoroughly with soap and water. If redness, itching or burning occur, seek medical attention.

Inhalation: Move subject to fresh air. If breathing becomes difficult, supply oxygen. If breathing ceases, induce artificial respiration. Seek medical attention immediately.

Ingestion: Drink 1-2 glasses of milk or water. DO NOT induce vomiting. If vomiting occurs, keep airway clear. DO NOT give anything orally to an unconscious person. Seek medical attention immediately.

** No health problems have been reported when handled according to recommendations. Physicians should treat symptomatically.*

SECTION IX: ACCIDENTAL RELEASE MEASURES

Procedures: This material is not regulated or harmful. Use of an absorbent to contain or absorb the spill is recommended. Dispose of absorbent in an approved landfill or similar facility. Floor may be slippery; take care to avoid falling. Keep spills and runoffs out of municipal sewers and open bodies of water.

Personal Protection: Compatible, chemically resistant gloves and protective clothing, including splash-proof goggles and rubber overshoes may be worn.

SECTION X: HANDLING AND STORAGE

Storage Conditions: Minimum Storage Temperature: 0° C (32° F), Maximum Storage Temperature: 80° C (180° F). Store in tightly-closed containers in a well-ventilated area.

Handling Procedures: Use in well-ventilated areas. Avoid breathing vapors and mists. Do not allow product to freeze. Keep out of reach of children.

Other: Improper disposal or re-use of this container may be dangerous and illegal. Consult applicable local, state and federal regulations for more information.

SECTION XI: EXPOSURE CONTROLS-PERSONAL PROTECTION

Respiratory Protection: Under normal operating conditions, there are no requirements. Whenever workplace conditions warrant the use of a respirator, a respiratory protection program meeting OSHA 1910.134 and ANSI Z88.2 requirements or equivalent must be used. An approved, mechanical filter respirator may be used during application to remove solid, airborne particles from overspray.

Eye Protection: Use ANSI Z87.1 approved or equivalent chemical splash goggles or face shield. Eye protection worn must be compatible with the respiratory protection system being used.

Hand Protection: Chemical-resistant gloves should be worn whenever handling this material. Gloves should be rinsed and removed immediately after use. Hands should be washed with soap and water.

Other Protection: To avoid prolonged or repeated skin contact, a chemically-resistant apron or impervious clothing should be worn.

Engineering Controls (Ventilation): An exhaust ventilation with a minimum capture velocity of 100 ft/min (.5m/sec) at the point of vapor evolution should be used. Information on the design, installation, use and maintenance of exhaust systems can be found in the current edition of Industrial Ventilation: A Manual of Recommended Practice, published by the American Conference of Governmental Industrial Hygienists.

Work-Hygiene Practices: Good hygiene and industrial practice should be used with this material. After handling, remove contaminated clothing and launder or dry clean before reuse. Wash thoroughly with soap and water.

SECTION XII: DISPOSAL CONSIDERATIONS

Procedure: Dispose of in accordance with local, state, and federal regulations.

SECTION XIII: TRANSPORT INFORMATION

US DOT Class: Paint, not regulated by the US Department of Transportation.

SECTION XIV: OTHER INFORMATION

Ratings

Health Hazard Rating: 1
Flammability Rating: 1
Reactivity Rating: 0

Scale

4=Extreme
3=High
2=Moderate
1=Slight
0=Minimal/Insignificant

Prepared by Acrylabs, Inc.- Technical Department 5/11/05

The information contained herein relates only to the specific material identified and is believed to be accurate and reliable by all those associated with Acrylabs, Inc. No representations, guarantee or warranty, expressed or implied, is made as to the accuracy, reliability, or completeness of the information provided. Users assume all risks associated with the use of the material and are advised to confirm in advance that the information contained in this MSDS is correct, applicable, and suitable to their circumstances. In accordance with the OSHA Federal Hazard Communication Standard, the actual percentages of ingredients have been omitted.



ACRYLIC COATINGS

2100HT Acrylic Finish Coat

PRODUCT DATA

2100HT is a water born 100% acrylic coating for the construction market. Utilizing advanced technology the **2100HT** is formulated for maximum tensile strength and elongation. Adheres to asphalt, metal, modified bitumen, concrete, wood, EPDM, PUF, and most single ply membrane systems. The **2100HT** is also utilized in high traffic areas.

2100HT cures to a strong durable finish that is easily maintained. **2100HT** is the finish coat for ACRYLAB Roof and Deck Systems.

2100HT is available in 13 standard colors. Custom matches can be done, however minimum order quantities apply; consult ACRYLABS for more information.

Application: can be brushed, rolled or sprayed. Final thickness of **2100** will vary depending on surface conditions (porosity, etc.). A uniform dry film thickness of 12 mils (DFT) is suggested to maintain a pinhole free membrane. Allow two to four hours between coats.

2100 is available in 1, 5, and 55 gallon plastic containers.

For more detailed instructions refer to our Installation Guide or consult ACRYLABS, INC. technical department.



ACRYLIC COATINGS

2100HT TECHNICAL DATA

TYPICAL PROPERTIES

WEIGHT PER GALLON	11.1 LBS.	ASTM D1475-90
% SOLIDS BY WEIGHT	64 .0	ASTM D2369-97
% SOLIDS BY VOLUME	51	ASTM D2697
PIGMENT VOLUME	43.0%	
VISCOSITY	95-110 Ku	ASTM D562-01
V.O.C.	<100 g/l	ASTM D3960-01
PH	9.0 -9.6	ASTM E70-97
FLASH POINT	N/A	
Solids by weight and volume can vary by 2%		

TYPICAL PROPERTIES (20 mil DFT)

FUNGUS GROWTH	NONE
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ACCELERATED WEATHERING

WEATHEROMETER	NO EFFECT 2 YEARS	ASTM G-53
LOW TEMPERATURE FLEXABILITY	Passes 1/8" mandrel bend	
	@ -30 Degrees	ASTM C-734

ELONGATION AT BREAK	460% @ 74F	ASTM D-412
	100% @ 0F	
TENSILE STRENGTH AT BREAK	670% @ 74F	ASTM D-412
	2100% @ 0F	
PERMEABILITY (20MILS)	<20 PERMS	ASTM E96-80
GLOSS (60 DEGREE METER)	15	ASTM D-523
OZONE DEGRADATION	NO EFFECT	ASTM D-1149

AcryLabs, 730 Commercial Lane, Honey Brook, PA 19344
Phone 610-273-1355, Fax 610-273-1357
www.acrylabs.com



ACRYLIC COATINGS

MATERIAL SAFETY DATA SHEET

SECTION I: PRODUCT IDENTIFICATION

Product Name: Acrylabs 2100 HT Series Coatings
Chemical Name: Acrylic Coating Solution
Date of Revision: 5/11/2005

SECTION II: COMPANY IDENTIFICATION

Address: Acrylabs, Inc.
730 Commercial Lane
Honey Brook, PA 19344

Emergency Phone Number: (610) 273-1355
Informational Phone Number: 866-273-1355

SECTION III: INGREDIENTS

<u>Ingredient</u>	<u>CAS</u>	<u>Weight (%)</u>	<u>Vapor Pressure (mm</u>	<u>Occupational Exposure</u>
	<u>Regulation #</u>		<u>HG @ Temp.)</u>	<u>Limits</u>
2-N-Octyl-4-isothiazolin-3-one	26530-20-1	<1.00	.22 mm Hg @ 68° F	.2 mg/m ³ TWA
Acrylic Polymers	N/A	20.00 - 30.00	N/A	N/A
Aqua Amonia 19%	1336-21-6	<1.00	755.00 mm Hg @ 80° F	ACGIH TWA 25 ppm
Calcium Carbonate	1317-65-3	20.00 - 30.00	N/A	10 mg/m ³ (dust)
Ester-Alcohol	25265-77-4	<2.00	<.01 mm Hg @ 20° C	None Established
Hydroxyethylcellulose	9004-62-0	<2.00	N/A	None Established
Petroleum-based Defoamer	Proprietary	<1.00	N/A	5 mg/m ³ TWA
Propylene Glycol	57-55-6	1.00 - 5.00	.22 mm Hg @ 68° F	None Established
Titanium Dioxide	13463-67-7	1.00 - 5.00	N/A	10 mg/m ³ (dust)
Water	7732-18-5	30.00 - 35.00	760.00 mm Hg @ 68° F	N/A
Zinc Oxide	1314-13-2	1.00 - 5.00	N/A	10 mg/m ³ (dust)

SECTION IV: PHYSICAL AND CHEMICAL PROPERTIES

Appearance: Colored semi-viscous liquid
State: Liquid
Odor Characteristics: Mild ammonia odor
Vapor Density: Heavier than air (air = 1)
Vapor Pressure: No data
Weight Per Gallon: 10.8 - 11.5
Boiling Point: 250° F
Solubility in Water: Soluble
VOC: <100 g/L
Evaporation Rate: Slower than ether

SECTION V: FIRE AND EXPLOSION DATA

Flash Point: >100° C (212° F); After evaporation of water, residue may burn.

Means of Extinguishing: Foam, CO₂, Dry chemical, Water Fog

Personal Protective Equipment: Wear full protective gear and use a self-contained breathing apparatus (pressure-demand, NIOSH approved or equivalent).

Unusual Fire and Explosion Hazards: In the case of a fire, pressure may build up in tightly closed containers, resulting in the rupture of the container. Keep containers cooled with water spray in order to prevent such occurrences.

SECTION VI: REACTIVITY DATA

Instability: Material used in the creation of this product is considered to be stable. Avoid polymer decomposition, which takes place at or above temperatures of 177° C (350° F). Time and Temperature determine thermal decomposition.

Hazardous Decomposition Products: Acrylic monomers may be produced as a result of thermal decomposition; ex. oxides of carbon.

Hazardous Polymerization: Does not apply. Product will not undergo hazardous polymerization.

Incompatibility: No incompatibilities known.

SECTION VII: HEALTH HAZARD DATA

Acute Eye: Eye contact may cause a slight irritation.

Acute Skin: Absorption due to skin contact is not likely. Moderate skin irritation or reddening may occur.

Acute Inhalation: Although not likely, inhalation of vapor or mist may cause irritation of the nose, throat, and lungs.

Acute Ingestion: Material is harmful if swallowed. Gastrointestinal irritation, nausea, vomiting, or diarrhea may occur.

Chronic Effects: This product does not contain any ingredients deemed by IARC, NTP, ACGIH, or OSHA to contain probable or suspectable carcinogens.

SECTION VIII: FIRST AID MEASURES

Eye Exposure: Flush with a steady, gentle stream of water for a minimum of 15 minutes. If redness, itching or a burning sensation develop, seek medical attention.

Skin Exposure: Wash affected areas thoroughly with soap and water. If redness, itching or burning occur, seek medical attention.

Inhalation: Move subject to fresh air. If breathing becomes difficult, supply oxygen. If breathing ceases, induce artificial respiration. Seek medical attention immediately.

Ingestion: Drink 1-2 glasses of milk or water. DO NOT induce vomiting. If vomiting occurs, keep airway clear. DO NOT give anything orally to an unconscious person. Seek medical attention immediately.

** No health problems have been reported when handled according to recommendations. Physicians should treat symptomatically.*

SECTION IX: ACCIDENTAL RELEASE MEASURES

Procedures: This material is not regulated or harmful. Use of an absorbent to contain or absorb the spill is recommended. Dispose of absorbent in an approved landfill or similar facility. Floor may be slippery; take care to avoid falling. Keep spills and runoffs out of municipal sewers and open bodies of water.

Personal Protection: Compatible, chemically resistant gloves and protective clothing, including splash-proof goggles and rubber overshoes may be worn.

SECTION X: HANDLING AND STORAGE

Storage Conditions: Minimum Storage Temperature: 0° C (32° F), Maximum Storage Temperature: 80° C (180° F). Store in tightly-closed containers in a well-ventilated area.

Handling Procedures: Use in well-ventilated areas. Avoid breathing vapors and mists. Do not allow product to freeze. Keep out of reach of children.

Other: Improper disposal or re-use of this container may be dangerous and illegal. Consult applicable local, state and federal regulations for more information.

SECTION XI: EXPOSURE CONTROLS-PERSONAL PROTECTION

Respiratory Protection: Under normal operating conditions, there are no requirements. Whenever workplace conditions warrant the use of a respirator, a respiratory protection program meeting OSHA 1910.134 and ANSI Z88.2 requirements or equivalent must be used. An approved, mechanical filter respirator may be used during application to remove solid, airborne particles from overspray.

Eye Protection: Use ANSI Z87.1 approved or equivalent chemical splash goggles or face shield. Eye protection worn must be compatible with the respiratory protection system being used.

Hand Protection: Chemical-resistant gloves should be worn whenever handling this material. Gloves should be rinsed and removed immediately after use. Hands should be washed with soap and water.

Other Protection: To avoid prolonged or repeated skin contact, a chemically-resistant apron or impervious clothing should be worn.

Engineering Controls (Ventilation): An exhaust ventilation with a minimum capture velocity of 100 ft/min (.5m/sec) at the point of vapor evolution should be used. Information on the design, installation, use and maintenance of exhaust systems can be found in the current edition of Industrial Ventilation: A Manual of Recommended Practice, published by the American Conference of Governmental Industrial Hygienists.

Work-Hygiene Practices: Good hygiene and industrial practice should be used with this material. After handling, remove contaminated clothing and launder or dry clean before reuse. Wash thoroughly with soap and water.

SECTION XII: DISPOSAL CONSIDERATIONS

Procedure: Dispose of in accordance with local, state, and federal regulations.

SECTION XIII: TRANSPORT INFORMATION

US DOT Class: Paint, not regulated by the US Department of Transportation.

SECTION XIV: OTHER INFORMATION

Ratings

Health Hazard Rating: 1
Flammability Rating: 1
Reactivity Rating: 0

Scale

4=Extreme
3=High
2=Moderate
1=Slight
0=Minimal/Insignificant

Prepared by Acrylabs, Inc.- Technical Department 5/11/05

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www.momentumtech.net

Accreditations



ISO/IEC 17025



Associations



Roof Coating
Manufacturers
Association

Final Test Report

AcryLabs Inc.
730 Commercial Lane
Honey Brook, PA 19344

Date: March 16, 2004

Testing Provided: Analysis of AcryLabs 2100
performance requirements per
ASTM D 6083.

Project ID: EX18L3A

1.0 Stormer Viscosity

By: ASTM D 6083 – Table 1 (ASTM D 562)
Temperature: 75°F

Measurement	Kreb Units, KU
1	119.6
2	120.4
3	119.7
Average	119.9
D 6083 Requirement	85 – 141

Results: AcryLabs2100 meets the requirements of ASTM D 6083 – Table 1 (ASTM D 562)

2.0 Brookfield Viscosity

By: ASTM D 6083 - Table 1 (ASTM D 2196)
No. 4 spindle, 6 rpm, 75°F
Brookfield Model: RVDV1+

Reading	Viscosity, cPs
1	33,390
2	33,350
3	33,360
Average	33,366
D 6083 Requirement	12,000 – 85,000

Results: AcryLabs2100 meets the requirements of ASTM D 6083 – Table 1 (ASTM D 2196)

3.0 Volume Solids

By: ASTM D 6083 – Table 1 (ASTM D 2697)

Measurement	% Solids
1	55.20
2	55.41
3	54.83
4	55.62
5	55.06
Average	55.23
D 6083 Requirement	50%, minimum

Results: AcryLabs 2100 meets the requirements of ASTM D 6083 – Table 1
(ASTM D 2697)

4.0 Weight Solids

By: ASTM D 6083 – Table 1 (ASTM D 1644)

Measurement	% Solids
1	68.0
2	68.0
Average	68.0
D 6083 Requirement	60%, minimum

Results: AcryLabs 2100 meets the requirements of ASTM D 6083 – Table 1
(ASTM D 1644)

5.0 Tensile and Elongation (original)

- By: ASTM D 6083 – Table 2 (ASTM D 2370)
- Film Preparation as described in 6.3 of ASTM D 6083 (two coats to yield a finished coat thickness of 20 mils, cured at 25°C (73.4°F) and 50% RH).
 - Specimen Size: ½ in. X 3 in.
 - Cross Head Speed: 1.0 in/min
 - Gage Length: 1.0 in.

Result	Tensile, psi, 73°F	Elongation, %, at 73°F	Tensile, psi, at 0°F	Elongation %, at 0°F
Mean	250.54	303.44	763.61	118.62
D 6083 Requirement	200	100	NR	NR

Results: AcryLabs 2100 meets the requirements of ASTM D 6083 – Table 2 (ASTM D 2370)

6.0 Tensile and Elongation (aged)

- By: ASTM D 6083 – Table 2 (ASTM D 2370)
- Film Preparation as described in 6.3 of ASTM D 6083 (two coats to yield a finished coat thickness of 20 mils, cured at 25°C (73.4°F) and 50% RH).
 - Specimen Size: ½ in. X 3 in.
 - Aging Cycle: ASTM D 4798 (Cycle A, 1000 hours, 63°C, inner and outer borosilicate, 1260KJ/m² at 340nm, 151.2 MJ/m² at 300 to 400 nm)
 - Cross Head Speed: 1.0 in/min
 - Gage Length: 1.0 in.

Result	Elongation, %, at 73°F
Mean	141.19
D 6083 Requirement	100

Results: AcryLabs 2100 meets the requirements of ASTM D 6083 – Table 2 (ASTM D 2370)

7.0 Permeance

- By: ASTM D 6083 – Table 2 (ASTM D 1653)
- Film Preparation as described in 6.3 of ASTM D 6083 (two coats to yield a finished coat thickness of 20 mils, cured at 25°C (73.4°F) and 50% RH).
 - Mean Film Thickness of Coatings: 0.022 in (0.56 mm)
 - Method Used: Method B (Inverted)
 - Temperature: 75 +/- 2°F
 - Relative Humidity in the Chamber: 100%
- Permeance: 6.43 Perms

Results: AcryLabs 2100 meets the requirements of ASTM D 6083 – Table 2 (ASTM D 1653)

Requirement: Maximum of 50 perms.

8.0 Water Swelling

- By: ASTM D 6083 – Table 2 (ASTM D 471)
- Film Preparation as described in 6.3 of ASTM D 6083 (two coats to yield a finished coat thickness of 20 mils, cured at 25°C (73.4°F) and 50% RH).
 - Sample Exposure: 168 hours beginning March 12, 2003 at 75°F (23°C) in distilled water.

Sample	Wt. Before, grams	Wt. After, grams	Wt. Gain, %
1	1.5238	1.6262	6.72
2	1.2747	1.3579	6.53
3	1.4147	1.5055	6.42
4	1.6213	1.7239	6.33
Average	NA	NA	6.50
D 6083 Requirement	NA	NA	20%, maximum

Results: AcryLabs 2100 meets the requirements of ASTM D 6083 – Table 2 (ASTM D 471).

9.0 Peel Adhesion

- By: ASTM D 6083 – Table 2 (ASTM D C 794/ASTM D 903)
- Specimens were prepared as described in Section 7.6.2 of ASTM D 6083. (Two coats to yield 20-mil total dry thickness with a cloth strip embedded between coats. Allowed to cure 336 hours at 73.4°F, 50%RH)
 - Specimens were soaked in tap water at 73.4°F for 168 hours prior to testing.
 - Cross Head Speed – 2 in/min.
 - Tested at 75°F, 50% RH
 - Substrates Tested: Steel and Poly ISO Foam

Sample	Average
Concrete	4.68
PVC	3.90
EPDM	3.48
SPS Foam	6.45
Galvanized	2.02
Aluminum	2.75
Steel	2.73
Wood	4.08
BUR	3.23
SBS Granular	11.66
D 6083 Requirements, mean	2.0 pli

Results: AcryLabs 2100 meets the requirements of ASTM D 6083
– Table 2 (ASTM C 794 / ASTM D 903)

10.0 Fungi Resistance

- By: ASTM D 6083 – Table 2 (ASTM G 21)
- Film Preparation as described in 6.3 of ASTM D 6083 (two coats to yield a finished coat thickness of 20 mils, cured at 25°C (73.4°F) and 50% RH).
 - Replicate samples, measuring 1 X 1-inch were exposed to mixed fungal shore suspension consisting of *Aspergillus niger*, *Aureobasidium pullulans*, *Chaetomium globosum*, *Gliocladium virens* and *Penicillium pinophilum*.
 - Fungal Growth Rating – Zero (Requirement- Zero Rating)

Results: AcryLabs 2100 meets the requirements of ASTM D 6083
– Table 2 (ASTM G 21)

11.0 Tear Resistance

- By: ASTM D 6083 – Table 2 (ASTM D 624)
- Film Preparation as described in 6.3 of ASTM D 6083 (two coats to yield a finished coat thickness of 20 mils, cured at 25°C (73.4°F) and 50% RH).
 - Die C
 - Test Temperature 75°F (23°C)
 - Test Machine – Instron Model 5565

Sample	Tear Strength, lbf/in.
1	70.50
2	70.23
3	70.86
4	71.04
5	82.14
Mean	70.55
D 6083 Requirement	60, minimum

Results: AcryLabs 2100 meets the requirements of ASTM D 6083
– Table 2 (ASTM D 624)

12.0 Visual Assessment after Xenon Arc Weathering

- By: ASTM D 6083 – Table 2 (ASTM D 4798)
- Film Preparation as described in 6.3 of ASTM D 6083 (two coats to yield a finished coat thickness of 20 mils, cured at 25°C (73.4°F) and 50% RH).
 - Aging Cycle: ASTM D 4798 (Cycle A, 1000 hours, 63°C, inner and outer borosilicate, 1260KJ/m² at 340nm, 151.2 MJ/m² at 300 to 400 nm)
 - Visual Assessment – No cracking or checking

Results: AcryLabs 2100 meets the requirements of ASTM D 6083
– Table 2 (ASTM D 4798)

Requirement: No Cracking or Checking

13.0 Low Temperature Flexibility after Xenon Arc Weathering

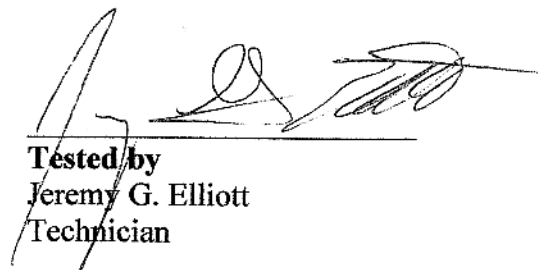
By: ASTM D 6083 – Table 2 (ASTM D 522)
-Film Preparation as described in 7.8 of ASTM D 6083 (one coat to yield a finished coat thickness of 14 mils to an aluminum substrate, cured at 25°C (73.4°F) and 50% RH for 72 hours followed by 120 hours at 122°F (50°C)).
-Aging Cycle: ASTM D 4798 (Cycle A, 1000 hours, 63°C, inner and outer borosilicate, 1260KJ/m² at 340nm, 151.2 MJ/m² at 300 to 400 nm)
-Samples exhibited no cracking when bent over a ½" (12.7 mm) mandrel at -15°F (-26.1°C).

Results: AcryLabs 2100 meets the requirements of ASTM D 6083
– Table 2 (ASTM D 522)

Requirement: No Cracking

CONCLUSION: AcryLabs 2100 meets all requirements of ASTM D 6083.

Verified by
Joseph W. Mellott
Vice President – Technology



Tested by
Jeremy G. Elliott
Technician

SECTION 08 14 00

WOOD DOORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Hinged Patio Doors
 - 2. Glass door components:
 - a. Primed wood frame
 - b. sliding/folding and locking hardware
 - c. weather stripping
 - d. glass and glazing

1.01 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.

1.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in sealed, unopened cartons or crates. Protect units from damage. Store material under cover, protected from weather and construction activities.

1.03 WARRANTY

- A. Provide manufacturer's standard warranty against defects in materials and workmanship.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. JELD-WEN, inc.
PO Box 1329
Klamath Falls, OR 97601
Phone: 1-800-JELD-WEN

2.2 PRODUCTS

- A. WFYU1-30X6B Primed Exterior Outswing Patio Door
- B. WFEU1-30X6B Primed Exterior Inswing Patio Door

3.1 INSTALLATION

- A. Install frame in accordance with manufacturer's recommendations and installation instructions. Properly flash and waterproof around the perimeter of the opening.
- B. Installer to provide appropriate anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.
- C. If necessary, adjust hardware for proper operation.

END OF SECTION 08 14 00

PRODUCT SPECIFICATIONS

EXTERIOR FINISH

The standard exterior is factory-applied latex primer with an option for unfinished (stain grade) natural pine exterior available.

AURALAST® WOOD

AuraLast® wood is fundamentally different from wood treated in traditional millwork preservation processes in that it uses a proprietary vacuum/pressure process to provide protection throughout the wood parts used to make windows and doors. AuraLast® wood is distinguished from wood using traditional preservation methods by its unique ability to achieve greater penetration of the active ingredients into the wood parts, with a minimum treatment penetration of 92%.

INTERIOR FINISH

Interior surfaces are unfinished clear pine ready for on-site finishing. Optional prefinished pine interiors include four acrylic colors (Moderate White, Extra White, Natural Choice, Pure White), four stains (Wheat, Cherry, Fruitwood, Cordovan) and a clear lacquer topcoat. Primed interior is also available.

FRAME

Frame is assembled from select kiln-dried pine AuraLast® wood on all exterior parts. Standard jamb width is 4-9/16". Radius frames are produced in only three different radii: 90-9/32", 37-19/16", and 31-19/32".

PANELS

1-23/32" thick select kiln-dried pine AuraLast® wood. The top and bottom rails are formed from solid Western Pine veneers laminated to a kiln dried edge-and-end-glued core, while the stiles have the same veneer laminated to a Timberstrand core. The layout is 4-5/8" top rail and stiles, and a 6-5/8" bottom rail. Other door rail options include wide bottom rail, lock rail and raised panels.

GLAZING

Insulating glass is constructed from two panes of tempered glass, utilizing a continuous roll formed stainless steel spacer with dual seal sealant. A computer-controlled application of clear silicone is used to bed the exterior of the insulating glass into the panel. An acrylic sealant is used to bed the interior. All insulating glass units comply with the performance requirements of IGCC in accordance with either ASTM E774 or E2190.

GLAZING OPTIONS - TEMPERED

Tempered insulating glass available in Low-E with Argon, Low-E, Clear, tinted, or obscure, or other specialty glass as specified. Preserve® film is a 0.003" thick polyethylene film with a low tack acrylic adhesive applied to the glass for protection during shipping and installation. Installations at 4,000 foot elevations and higher require a capillary tube to equalize environmental stress (otherwise known as High Altitude glazing). High altitude glazing does not allow the use of Argon as listed under glazing options

WEATHER-STRIPPING

Engineered system with dual foam filled bulb seal compressed between the exterior of the panel and the frame in a continuous plane on all four sides.

SILL

The sill is a dark bronze anodized aluminum with interior trim and an adjustable composite threshold in combination with a vinyl fin-and-bulb bottom door sweep. An optional handicapped sill with a maximum height of 1/2" is available to meet the standards set forth by the ADA for handicapped access.

HARDWARE

The door panels are mounted into the frame utilizing 4" x 4" heavy gauge solid brass hinges with stainless steel pins. Three hinges are used on 6-8 and 7-0 heights, and four hinges on all larger heights. Optional adjustable hinges are also available providing both vertical and horizontal adjustment. The standard finish for all hinges is Polished Brass, with optional finishes available in Antique Brass, Polished Chrome, Stainless Steel Satin, Oil Rubbed Bronze, White Powder Coat, and Black Powder Coat, Brushed Chrome, and PVD Brass. The standard locking system is a single point mortise with lever handle, and thumb turn dead bolt, shipped separately for field installation. Matching dummy handle sets are included for French Door applications. Optional multipoint lock systems are factory installed securing the active panel at three points. The system is manually activated from the handle.

INSECT SCREENS

Optional exterior sliding screen is assembled with 18 x 16 fiberglass mesh screen cloth set in an extruded aluminum frame supplied with all necessary hardware. Standard colors are Brilliant White, Chestnut Bronze, Desert Sand, French Vanilla, Hartford Green, Mesa Red, Black Licorice, Heirloom White, Hunter Green, Redwood, Sage Brown, and Smoke. Screens not available for Single Swing, French or Radius doors. Insect screens are intended to allow air and light in and to keep insects out. They are not intended to keep anyone or anything from falling through an open window. For safety screens or other security devices contact your local building supply retailer.

GRILLES

SDL (Simulated Divided Lites) - extruded pre-primed aluminum muntins permanently applied to the exterior of the insulating glass unit (not available on textured glass) in 7/8", 1-1/8", or 1-3/8" widths. Profiles are bead stop in all widths, and a putty profile in the 7/8" and 1-1/8" widths only. SDL is standard with a light bronze internal shadow bar to give a true divided lite appearance. As an option, SDL may be ordered with a silver shadow bar or without a shadow bar. Clear wood interior muntin bars match the exterior muntin width and are permanently bonded to the interior of the glass. Also available is a 2-5/16" SDL bar, which simulates a double-hung checkrail.

PDL (Precise Divided Lites) - Wood or extruded aluminum muntins permanently applied to the exterior of the insulating unit (not available on textured glass) in 3/4" and 1-1/2" widths or without a shadow bar. Clear wood interior muntin bars match the exterior muntin width and are permanently bonded to the interior of the glass.

Full Surround Removable Wood Grilles - Rectangular, unfinished interior clear pine wood grilles in 7/8", 1-1/8", and 1-3/8" are available in patterns selected by the owner.

GBG (Grilles between the Glass) - 5/8" flat, 23/32" contour, or 1" contour grilles mounted between the glass panes suspended within the air cavity.

Continued on next page

PRODUCT SPECIFICATIONS

EXTERIOR TRIM

Brickmould standard with optional 3-1/2", 4-1/2", 5-1/2" flat trim, 3-1/2" Adams and 1 x 4 Backband trim. Optional mull covers to accommodate 1" (spread only), 2", 3-1/2" and 6" spread and stud pocket mull.

EXTENSION JAMBS

Extension jambs are available for wall depths up to 6-9/16".

INSTALLATION

Installation per JELD-WEN Installation Method for Wood Patio Doors. See www.jeld-wen.com/resources for instructions.

PERFORMANCE

ANSI/AAMA/NWWDA/101/I.S.2-97
AMMA/WDMA/CSA 101/I.S.2/A440-05
WDMA Hallmark Certified

See www.jeld-wen.com for architectural and performance information.

QUICK SPEC GUIDE

SPECIFICATION	STANDARD FEATURES	OPTIONAL FEATURES <i>Some options may require additional lead times. Consult your JELD-WEN Sales Representative.</i>
EXTERIOR FINISH	<ul style="list-style-type: none"> Primed 	<ul style="list-style-type: none"> Natural Panel Only: <ul style="list-style-type: none"> Natural Copper* Speckled Patina Copper Hand Rubbed Copper <i>*Copper is only available when ordered with a clad panel</i>
EXTERIOR TRIM	<ul style="list-style-type: none"> Brickmould & Subsill 	<ul style="list-style-type: none"> Adams Casing 3-1/2" Flat Casing 4-1/2" Flat Casing 5-1/2" Flat Casing
INTERIOR WOOD	<ul style="list-style-type: none"> Western Pine 	
INTERIOR FINISH	<ul style="list-style-type: none"> Natural 	<ul style="list-style-type: none"> Priming Available Pre-finished Interior Options are: <ul style="list-style-type: none"> Paint - Pure White, Extra White, Natural Choice, Moderate White Stain - Wheat, Fruitwood, Cherry, Cordovan Clear Lacquer
SIZE	<ul style="list-style-type: none"> Width: 2-0, 2-6, 2-8, 3-0, 3-6, 5-0, 5-4, 6-0, 7-6, 8-0, 9-0 Height: 6-8, 7-0, 8-0, 9-0 	<ul style="list-style-type: none"> Any Panel Width: 2-0 to 3-6 (Certain restrictions apply) Any Panel Height: 4-0 to 10-0 (Certain restrictions apply)
GLAZING (ALL TEMPERED)	<ul style="list-style-type: none"> Low-E Tempered Insulating Glass (with Argon) Preserve® Protective Film 	<ul style="list-style-type: none"> Clear Obscure Tints: Bronze, Gray, Solex Glue Chip Safety Laminates in Clear, Bronze or Gray Rain Narrow Reed Impact Resistant
GRILLES		<ul style="list-style-type: none"> High Altitude (Breather Tube, no Argon) SDL Bead Profile: <ul style="list-style-type: none"> 7/8", 1-1/8", 1-3/8", 2-5/16" with Light Bronze Shadow Bar 7/8", 1-1/8", 1-3/8", 2-5/16" with Silver Shadow Bar 7/8", 1-1/8", 1-3/8", 2-5/16" with No Shadow Bar SDL Putty Profile: <ul style="list-style-type: none"> 7/8" and 1-1/8" with Light Bronze Shadow Bar 7/8" and 1-1/8" with Silver Shadow Bar 7/8" and 1-1/8" with No Shadow Bar <ul style="list-style-type: none"> 1" Copper SDL PDL: <ul style="list-style-type: none"> 3/4" or 1-1/2" Precise Divided Lite GBG (Grilles between the Glass): <ul style="list-style-type: none"> 5/8" Flat, 23/32" Contour, 1" Contour Full Surround: <ul style="list-style-type: none"> 7/8", 1-1/8", 1-3/8" Wood Grilles

Continued on next page

SECTION 08 35 13

FOLDING DOORS

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes the following:

1. Sliding/folding aluminum and glass door system designed to provide an opening glass wall, with sizes and configurations as shown on drawings and specified herein.
2. Glass door components:
 - a. aluminum frame
 - b. threshold
 - c. panels
 - d. sliding/folding and locking hardware
 - e. weather stripping
 - f. glass and glazing

1.01 REFERENCES

A. American Architectural Manufacturers Association (AAMA):

1. AAMA 611.98, Voluntary Specification for Anodized Architectural Aluminum.
2. AAMA 2603.02, Voluntary Specifications, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
3. AAMA 1303.5, Voluntary Specifications for Forced Entry Resistant Aluminum Sliding Glass Doors.

B. American National Standards Institute (ANSI):

1. ANSI Z97.1, Safety Performance Specifications and Methods of Test for Safety Glazing Material Used In Buildings.

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 547, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Cyclic Static Air Pressure Differential.

D. Consumer Product Safety Commission (CPSC):

1. CPSC 16CFR-1201, Safety Standard for Architectural Glazing Materials.

E. 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.

1.02 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 Owner's Manual from manufacturer. Identify with project name, location and completion date, type and size of unit installed.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Provide complete, precision built, engineered, pre-fitted unit by a single source manufacturer with at least 15 years experience in providing folding/sliding door systems for large openings in the North American market.
- B. Performance Requirements: Unit to comply with applicable manufacturer's independently certified testing results. Testing results include air infiltration in accordance with ASTM E 283, water penetration in accordance with ASTM E 547, structural loading in accordance with ASTM E 330, and forced entry in accordance with AAMA 1303.5 and CAWM 300-96.
- C. Thermal Performance: Unit to comply with the U value, rated, certified and labeled or simulated in accordance with NFRC 100, shown in manufacturer's latest published data for the glazing and sill specified.
- D. Solar Heat Gain Coefficient: Unit to comply with the solar heat gain coefficient, simulated in accordance with NFRC 200, shown in manufacturer's latest published data for the glazing specified.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in sealed, unopened cartons or crates. Protect units from damage. Store material under cover, protected from weather and construction activities.

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 by manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. 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@nanawallsystems.com

2.2 PRODUCTS

- A. NanaWall SL70 Monumental, Thermally Broken Aluminum Framed Folding System.
B. Five Panel
C. Quantity: 2

2.3 MATERIALS

- A. Frame and Panels: From manufacturer's standard profiles, provide head jamb, side jambs, and panels with dimensions shown on drawings.
1. Provide panels with standard one lite
 2. Provide standard bottom rail
 3. Aluminum Extrusion: Extrusions with nominal thickness of .098" (2.5 mm). Alloy specified as AlMgSi0.5 with strength rated as 6063-T5. Anodized conforming to AAMA 611.98 or powder coated conforming to AAMA 2603.02
 4. Thermally broken with _" (18.5 mm) polyamide plastic reinforced with glass fibers with additional insulating foam.
 5. Aluminum Finish: clear anodized. Same finishes on inside and outside.
- B. Glass: 1" (38 mm) insulating argon filled Low-E tempered. ASTM C 1048 Kind FT, select glazing quality float glass; fully tempered safety glass complying with applicable codes. Provide EPDM gaskets and extruded aluminum snap-in glazing bead for dry glazing per manufacturer's instructions. All glass to comply with safety glazing requirements of ANSI Z97.1 and CPSC 16CFR 1201.
- C. Locking Hardware and Handles: Provide manufacturer's standard nylon handle and concealed two point locking hardware operated by 180 degree turn of handle between each pair of folding panels and on any secondary swing panel. Face applied flush bolt locking will not be allowed.

- D. For locking operation from inside only, on main entry swing panel or pair of bi-fold panels, provide manufacturer's standard nylon handle and concealed two point locking hardware operated by 180 degree turn of handle.
1. Nylon handle finish: Closest match to frame and panel finish from 13 available colors.
- E. 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 track will not be allowed.
1. Provide upper guide carriage and lower running carriage with four vertical fiber glass reinforced polyamide wheels and two horizontal 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 440 lbs.
 2. Threshold: Provide matching, thermally broken with low profile saddle sill
 3. Hinges: Zinc die cast. Finish: Closest match to finish of frame and panels. Provide stainless steel security hinge pins with set screws.
 4. Adjustment: Provide folding/sliding hardware capable of specified amount of compensation and adjustments without needing to remove panels from tracks, in width, 1/8" (3 mm) per hinge and in height, 3/16" (4 mm) up and down.
- F. Other Components:
1. Weather stripping: Provide manufacturer's standard double layer EPDM 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.
 2. Provide tapered pins or stainless steel screws for connecting frame components.

2.4 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.
- B. See CUSD construction documents for selected number of panels and configuration. Interior wall is an outward opening unit and exterior wall is inward opening

2.5 ACCESSORIES

- A. Provide transoms, corner posts, or single doors as per drawings provided.

PART 3 – EXECUTION

3.1 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 the live load is limited to the lesser of $L/720$ of the span and $\frac{1}{8}$ ".
- B. Examine surfaces of openings and verify dimensions; verify rough openings are level, plumb, and square, with no unevenness, bowing, or bumps on floor.
- C. Installation of units constitutes acceptance of existing conditions.

3.2 INSTALLATION

- A. Install frame in accordance with manufacturer's recommendations and installation instructions. Properly flash and waterproof around the perimeter of the opening.
- B. Installer to provide appropriate anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.
- C. If necessary, provide drain connections from lower track.
- D. Install panels, handles and lock set in accordance with manufacturer's recommendations and installation instructions.
- E. If necessary, adjust hardware for proper operation.
- F. Accessories: Screens; install in accordance with screen manufacturer's recommendations and installation instructions.

END OF SECTION 08 35 13

Performance of the SL70 NanaWall - Testing Results

RAISED SILL		
Type of Test	Inward Opening Units	Outward Opening Units
* Air Infiltration: ASTM E-283, ft. ³ /min/ft.	@ 1.57 psf (25 mph): 0.08 @ 6.24 psf (50 mph): 0.18	@ 1.57 psf (25 mph): 0.06 @ 6.24 psf (50 mph): 0.12
* Water Penetration: ASTM E-547-86	No uncontrolled water entry @ 12 psf (68 mph)	No uncontrolled water entry @ 8.25 psf (56 mph)
* Structural Load Deflection ASTM E-330-90: pass See design windload charts for other sized panels. Note that the structural test pressures were 50% higher than the design pressures.	<u>Standard Unit</u> Design Pressure Positive @ 40 psf (125 mph) Design Pressure Negative @ 45 psf (132 mph) <u>Top and bottom reinforced locking point unit</u> Design Pressure Positive @ 55 psf (146 mph) Design Pressure Negative @ 90 psf (187 mph)	<u>Standard Unit</u> Design Pressure Positive @ 45 psf (132 mph) Design Pressure Negative @ 40 psf (125 mph) <u>Top and bottom reinforced locking point unit</u> Design Pressure Positive @ 90 psf (187 mph) Design Pressure Negative @ 55 psf (146 mph)
Thermal Performance: Rated, certified and labeled in accordance with NFRC 100	With .94" (24 mm) Thick Insulated Glass: Glass thickness of .157" (4 mm) and gap thickness of .623" (16 mm) <u>U-Factor</u> <u>Solar Heat Gain Coefficient</u>	With .94" (24 mm) Thick Insulated Glass: Glass thickness of .157" (4 mm) and gap thickness of .623" (16 mm) <u>U-Factor</u> <u>Solar Heat Gain Coefficient</u>
	Clear (air filled) .52 .57	.52 .58
	Standard Low E (argon filled) .37 .42	.38 .42
	Cardinal Low E ² (argon filled) 3/16" glass, super spacer .35 .30	.36 .30
	1.5" thick insulated glass, 2 pieces of Low E, 1/4" glass 2 layers of Heat Mirror™ TC88 film, (air filled) .31 .37	.32 .37
	1.5" thick insulated glass, 2 pieces of Low E, 1/4" glass 2 layers of Heat Mirror™ TC88 film, (krypton filled) .21 .21	.22 .21
	(Ask for simulations of other glass options)	
* Forced Entry Resistance	In accordance with AAMA-1303.5 and CAWM 300-96 requirements.	

* Excerpts of results of a 10'9" W x 7'10" H three panel unit with Raised Sill tested by Architectural Testing, Inc., Fresno, CA, an independent testing laboratory in March 1997. **Standard Unit tested to AAMA HGD-C40 and unit with reinforced locking points tested to AAMA HGD-C55.**

Performance of the SL70 NanaWall - Testing Results (continued)

LOW PROFILE SADDLE SILL, LOW PROFILE STEPPED SILL, STANDARD FLUSH SILL		
Type of Test	Inward Opening Units	Outward Opening Units
Water Penetration: ASTM E-547-86 Internally Tested Not applicable for standard flush sill	No uncontrolled water entry @ 3.75 psf (38 mph) subject to the following adaptations in the field by others: 1. Remove the gaskets covering the inner channel. 2. Drill weep holes through the bottom of this channel (about one 1" x 1/4" weep hole per panel.) 3. Drill weep holes through the bottom of the sill or lower front face of the sill to drain water collected to a lower point (about one 1" x 1/4" weep hole per panel.) Please note that due to varying site requirements and conditions, these sills will not be prepared for drainage by Nana Wall Systems, Inc. If this drainage system is desired, we recommend that a qualified professional construct this system on the project site strictly in accordance with instructions provided by Nana Wall Systems, Inc. and in accordance with good waterproofing techniques. Note that in some applications drain connections may not be possible.	
Structural Load Deflection ASTM E-330-90: pass Per engineering letter based on raised sill testing. See design windload charts for other sized panels. Note that the structural test pressures were 50% higher than the design pressures.	<u>Standard Unit</u> Design Pressure Positive @ 40 psf (125 mph) Design Pressure Negative @ 45 psf (132 mph) <u>Top and bottom reinforced locking point unit</u> Design Pressure Positive @ 55 psf (146mph) Design Pressure Negative @ 90 psf (187 mph)	<u>Standard Unit</u> Design Pressure Positive @ 45 psf (132 mph) Design Pressure Negative @ 40 psf (125 mph) <u>Top and bottom reinforced locking point unit</u> Design Pressure Positive @ 90 psf (187 mph) Design Pressure Negative @ 55 psf (146 mph)
Thermal Performance: Rated, certified and labeled in accordance with NFRC 100	With .94" (24 mm) Thick Insulated Glass: Glass thickness of .157" (4 mm) and gap thickness of .623" (16 mm) <u>U-Factor</u> <u>Solar Heat Gain Coefficient</u>	With .94" (24 mm) Thick Insulated Glass: Glass thickness of .157" (4 mm) and gap thickness of .623" (16 mm) <u>U-Factor</u> <u>Solar Heat Gain Coefficient</u>
Clear (air filled)	.53 .58	.54 .58
Standard Low E (argon filled)	.38 .43	.39 .43
Cardinal Low E ² (argon filled) 3/16" glass, super spacer	.36 .31	.37 .31
1.5" thick insulated glass, 2 pieces of Low E, 1/4" glass 2 layers of Heat Mirror™ TC88 film, (air filled)	.32 .37	.32 .37
1.5" thick insulated glass, 2 pieces of Low E, 1/4" glass 2 layers of Heat Mirror™ TC88 film, (krypton filled)	.22 .21	.23 .21
(Ask for simulations of other glass options)		
* Forced Entry Resistance	In accordance with AAMA-1303.5 and CAWM 300-96 requirements.	
Acoustical Performance	The SL70 system has been tested by an independent acoustic lab for acoustical performance. The SL70 with insulated tempered glass achieved STC and Rw values of 32. The SL70 with STC 43 laminated glass achieved STC and Rw values of 41.	

The SL70 NanaWall has been partially tested to meet European standards set by the Window Technology Institute (RAL) of Rosenheim, Germany. Please note that in contrast to AAMA testing, the Rosenheim test procedures are stricter. The Rosenheim test procedure consists of an initial test of different test criteria, which is followed by a comprehensive mechanical test which includes, among other things, the simulation of 10,000 opening and closing cycles. Then, on the same testing system, the initial test is repeated in a final test. Only then does a classification take place. In combined air infiltration, water penetration and structural performance tests, the inward opening SL70 system with the raised sill meet the requirements for "Stress Classification Group C". Excerpts of test results of a nominal 8'11" x 6'10" three panel unit with raised sill performed by the Institute Hochbau & Industriebau, Austria, an independent testing laboratory:

Air Infiltration – ASTM E-283, cfm per linear foot of crack

Inward opening: @ 1.57 psf (25 mph): 0.09 and @ 6.24 psf (50 mph): 0.27.

Water Penetration – ASTM E-547-86 with water spray of 3.1 gallons/ square foot/ minute instead of US standard 5 gallons/ square foot/ minute.

Inward opening: no uncontrolled water entry @ 12.48 psf (70 mph).

SECTION 08 52 00

WOOD WINDOWS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Wood clad casement windows
 - 2. Window components:
 - a. Primed wood frame
 - b. sliding/folding and locking hardware
 - c. weather stripping
 - d. glass and glazing

1.01 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.

1.02 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to job site in sealed, unopened cartons or crates. Protect units from damage. Store material under cover, protected from weather and construction activities.

1.03 WARRANTY

- A. Provide manufacturer's standard warranty against defects in materials and workmanship.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. JELD-WEN, inc.
 - PO Box 1329
 - Klamath Falls, OR 97601
 - Phone: 1-800-JELD-WEN

2.2 PRODUCTS

- A. TWC2040 Primed Exterior Casement Window
 - 1. Quantity 3
- B. TWC2040-2 Primed Exterior Double Casement Window
 - 1. Quantity 2

3.1 INSTALLATION

- A. Install frame in accordance with manufacturer's recommendations and installation instructions. Properly flash and waterproof around the perimeter of the opening.
- B. Installer to provide appropriate anchorage devices and to securely and rigidly fit frame in place, absolutely level, straight, plumb and square. Install frame in proper elevation, plane and location, and in proper alignment with other work.
- C. If necessary, adjust hardware for proper operation.

END OF SECTION 08 52 00

PRODUCT SPECIFICATIONS

EXTERIOR FINISH

The standard exterior is factory-applied latex primer with an option for unfinished (stain grade) natural pine exterior available.

AURALAST® WOOD

AuraLast® wood is fundamentally different from wood treated in traditional millwork preservation processes in that it uses a proprietary vacuum/pressure process to provide protection throughout the wood parts used to make windows and doors. AuraLast® wood is distinguished from wood using traditional preservation methods by its unique ability to achieve greater penetration of the active ingredients into the wood parts, with a minimum treatment penetration of 92%.

INTERIOR FINISH

Interior surfaces are unfinished clear pine ready for on-site finishing. Optional prefinished pine interiors include four acrylic colors (Moderate White, Extra White, Natural Choice, Pure White), four stains (Wheat, Cherry, Fruitwood, Cordovan) and a clear lacquer topcoat. Primed interior is also available.

FRAME

Frame is assembled from select kiln-dried pine AuraLast® wood on all exterior parts. Standard jamb width is 4-9/16".

SASH

2-3/32" thick select kiln-dried pine AuraLast® wood. Corner joints are mortised-and-tenoned, with the glass mounted into the sash using a silicone-glazing compound on the exterior and acrylic sealant on the interior, then secured with interior applied profiled wood stops. To accommodate the new nesting crank hardware, the height of the bottom rail has been increased to 2-3/32".

GLAZING

Insulating glass is constructed from two panes of glass, utilizing a continuous roll formed stainless steel spacer with dual seal sealant. The glass is mounted into the sash using a silicone-glazing compound and secured with interior applied profiled wood stops. All insulating glass units comply with the performance requirements of IGCC in accordance with either ASTM E774 or E2190.

GLAZING OPTIONS

Insulating glass available in Low-E with Argon, Low-E, Clear, tinted, or obscure, tempered or other specialty glass as specified. Preserve® film is a 0.003" thick polyethylene film with a low tack acrylic adhesive applied to the glass for protection during shipping and installation. Installations at 4,000 foot elevations and higher require a capillary tube to equalize environmental stress (otherwise known as High Altitude glazing). High Altitude glazing does not allow the use of Argon as listed under glazing options.

WEATHER-STRIPPING

Engineered system combines foam lined bulb seal compressed between the interior of the sash and the frame in a continuous plane on all four sides with a secondary bulb seal compressed between the edge of the sash and the frame.

HARDWARE

Operating sash are mounted to the frame with corrosion resistant steel hinges. The operating hardware consists of hardened steel worm gears and dual action heavy gauge steel operating arms. The sash is secured with concealed type locking hardware. The interior operator cover, nesting crank handle, and locking handle standard finish options are White, Chestnut Bronze, and Desert Sand, with optional finishes in plated Polished Brass, Antique Brass, Polished Chrome, Brushed Chrome and Oil Rubbed Bronze.

INTERIOR INSECT SCREENS

Charcoal fiberglass screen cloth (18x16 mesh) set in painted roll formed aluminum frame fitted to the inside of the window with all necessary hardware, in White, Chestnut Bronze or Desert Sand finishes. Wood veneer screen frames are available in Ponderosa Pine. Insect screens are intended to allow air and light in and to keep insects out. They are not intended to keep anyone or anything from falling through an open window. For safety screens or other security devices contact your local building supply retailer.

GRILLES

SDL (Simulated Divided Lites) - extruded pre-primed aluminum muntins permanently applied to the exterior of the insulating glass unit (not available on textured glass) in 7/8", 1-1/8", or 1-3/8" widths. Profiles are bead stop in all widths, and a putty profile in the 7/8" and 1-1/8" widths only. SDL is standard with a light bronze internal shadow bar to give a true divided lite appearance. As an option, SDL may be ordered with a silver shadow bar or without a shadow bar. Clear wood interior muntin bars match the exterior muntin width and are permanently bonded to the interior of the glass. Also available is a 2-5/16" SDL bar, which simulates a double-hung checkrail.

PDL (Precise Divided Lites) - Wood or extruded aluminum muntins permanently applied to the exterior of the insulating unit (not available on textured glass) in 3/4" and 1-1/2" widths without a shadow bar. Clear wood interior muntin bars match the exterior muntin width and are permanently bonded to the interior of the glass.

Full Surround Removable Wood Grilles - Rectangular, unfinished interior clear pine wood grilles in 7/8", 1-1/8", and 1-3/8" are available in patterns selected by the owner.

GBG (Grilles between the Glass) - 5/8" (15.9mm) flat and 23/32" or 1" contour mounted between the glass panes suspended within the air cavity.

EXTERIOR TRIM

Brickmould standard with optional 3-1/2", 4-1/2", 5-1/2" flat trim, 3-1/2" Adams and 1 x 4 Backband trim. Optional mull covers to accommodate 1" (spread only), 2", 3-1/2" and 6" spread and stud pocket mull.

EXTENSION JAMBS

Extensions are applied to the interior on all four sides of the frame in wall depths up to 9-1/8" for 4/4 and up to 13-11/16" for 5/4, factory applied.

Continued on next page

PRODUCT SPECIFICATIONS

INSTALLATION

Installation per JELD-WEN Installation Method for Wood Windows.
See www.jeld-wen.com/resources for instructions.

PERFORMANCE

NFRC Certified - (rated and labeled in accordance with NFRC 100 and 200 procedures)

ANSI/AAMA/NWDA/101/I.S.2-97
AMMA/WDMA/CSA 101/I.S.2/A440-05
WDMA Hallmark Certified

See www.jeld-wen.com for architectural and performance information.

QUICK SPEC GUIDE

SPECIFICATION	STANDARD FEATURES	OPTIONAL FEATURES <i>Some options may require additional lead times. Consult your JELD-WEN Sales Representative.</i>
EXTERIOR FINISH	<ul style="list-style-type: none"> Primed 	<ul style="list-style-type: none"> Natural Sash Only: <ul style="list-style-type: none"> Bright Copper* Speckled Patina Copper Hand Rubbed Patina Copper (sash only) <i>*Copper is only available when ordered with a clad sash</i>
EXTERIOR TRIM	<ul style="list-style-type: none"> Brickmould & Subsill 	<ul style="list-style-type: none"> Adams Casing 3-1/2" Flat Casing 4-1/2" Flat Casing Extended Sill Nose 1x4 Backband Extended Sill Nose
INTERIOR WOOD	<ul style="list-style-type: none"> Western Pine 	
INTERIOR FINISH	<ul style="list-style-type: none"> Natural 	<ul style="list-style-type: none"> Priming Available Pre-finished Interior Options are: <ul style="list-style-type: none"> Paint - Pure White, Extra White, Natural Choice, Moderate White Stain - Wheat, Fruitwood, Cherry, Cordovan Clear Lacquer
SIZE	<ul style="list-style-type: none"> Width: 18, 20, 24, 28, 30, 32, 36 Height: 18, 20, 24, 30, 32, 36, 40, 42, 48, 54, 56, 60, 64, 66, 72, 78, 84 	<ul style="list-style-type: none"> Any Width: 14 to 36 Any Height: 16 to 84
GLAZING	<ul style="list-style-type: none"> Low-E Insulating Glass (with Argon) Preserve® Protective Film 	<ul style="list-style-type: none"> Clear Obscure Tints: Bronze, Gray, Solex Glue Chip Safety Laminate in Clear, Bronze or Gray Rain Narrow Reed Tempered Impact Resistant
GRILLES		SDL Bead Profile: <ul style="list-style-type: none"> 7/8", 1-1/8", 1-3/8", 2-5/16" with Light Bronze Shadow Bar SDL Putty Profile: <ul style="list-style-type: none"> 7/8" and 1-1/8" with Light Bronze Shadow Bar 7/8" and 1-1/8" with Silver Shadow Bar 7/8" and 1-1/8" with No Shadow Bar <ul style="list-style-type: none"> 1" Copper SDL PDL: <ul style="list-style-type: none"> 3/4" or 1-1/2" Precise Divided Lite GBG (Grilles between the Glass): <ul style="list-style-type: none"> 5/8" Flat, 23/32" Contour, 1" Contour GBG Full Surround: <ul style="list-style-type: none"> 7/8", 1-1/8", 1-3/8" Full Surround Wood Grilles 7/8", 1-1/8", 1-3/8", 2-5/16" with Silver Shadow Bar 7/8", 1-1/8", 1-3/8", 2-5/16" with No Shadow Bar
HARDWARE	<ul style="list-style-type: none"> Nesting Handle Concealed Locking System 	<ul style="list-style-type: none"> Round Knob, T-Handle
HARDWARE COLOR	<ul style="list-style-type: none"> White Chestnut Bronze Desert Sand 	<ul style="list-style-type: none"> Polished Brass Antique Brass Polished Chrome Brushed Chrome Oil Rubbed Bronze

Continued on next page

GYPSUM BOARD

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Interior Gypsum Panels for varying applications
 - 2. Joint Compound
 - 3. Drywall Screws
 - 4. Joint Tape
 - 5. Drywall Adhesive
- B. Related Sections:
 - 1. 06 11 00: Wood Framing
 - 2. 06 12 00: Structural Insulated Panels
 - 3. 07 26 13: Above-Grade Vapor Barrier
 - 4. 08 14 00: Wood Doors
 - 5. 08 35 13: Folding Doors
 - 6. 08 52 00: Wood Windows
 - 7. 08 95 00: Vents
 - 8. 09 62 29: Cork Flooring
 - 9. 09 69 00: Access Flooring
 - 10. 09 90 00: Painting and Coating

1.01 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. C 79 – 2001 Standard Specification for Treated Core and Nontreated Core Gypsum Sheathing Board
 - 2. C 954 – 2004 Specification for Steel Drill Screws for the Application of Gypsum Panel Products
 - 3. C 1280 – 2004 Standard Specification for Application of Gypsum Sheathing
 - 4. C 1396 – 2006 Standard Specification for Gypsum Board
 - 5. E 84 – 2005 Standard Test Method for Surface Burning Characteristics of Building Materials
 - 6. E 119 – 2000 Test Method for Fire Tests of Building Construction and Materials
 - 7. E 1677 – 2005 Standard Specification for an Air Retarder (AR) Material or System for Low-Rise Framed Building Walls
- B. Gypsum Association (GA)
 - 1. 253 - Recommended Specification for the Application of Gypsum Sheathing

1.02 SYSTEM DESCRIPTION

- A. The following components are required for complete installation and finishing of gypsum sheathing:
1. 1 ¼ inch Type W bugle head screws, screw gun or electric drill with a special bit
 2. Panel adhesive
 3. Caulk gun
 4. 4' straightedge or wallboard T square
 5. Utility knife and extra blades
 6. Metal tape measure
 7. Marking pencil
 8. Keyhole saw or saber saw
 9. Tin snips
 10. 5", 8" and 10" wide joint finishing knives
 11. Wallboard hammer
 12. Mud pan to hold compound
 13. Mud mixer
 14. 150 grit sandpaper or 220 grit mesh cloth
 15. Dust mask
 16. Safety glasses
 17. Sponge (small-celled polyurethane)
 18. Stepladder

1.03 SUBMITTALS

- A. Product Data: detail sheets, for each proposed product type, which provide necessary information to describe the product and its performance.
- B. Manufacturer's installation instructions and guidelines, located in the CUSD Operations and Maintenance Manual
- C. Manufacturer's Owner Manual outlining recommended care and maintenance procedures, located in the CUSD Operations and Maintenance Manual.
- D. Design Data: Construction document detail drawings. Drawings shall be read before beginning installation and referenced during the installation process.

1.04 QUALITY ASSURANCE

- A. Fire Resistance Rated Assembly Characteristics: Provide materials and construction identical to those tested in accordance to ASTM E 119 by an independent testing and inspection agency acceptable to authorities having jurisdiction.
1. Fire Resistance Ratings: Indicated by design designations from UL "Fire Resistance Directory."

1.05 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading:
1. Materials shall be delivered to site in manufacturer's unopened bundles, fully identified with name, brand, type and grade.
- B. Acceptance at Site:
1. Inspect bundles upon arrival to site, immediately report any damaged or missing materials directly to the manufacturer.

C. Storage and Protection:

1. All materials shall be delivered in their original unopened packages and stored in the High Voltage Lab (HVL) in a location designated by the Construction Coordinator.
2. All gypsum board should be stored flat.
3. Panels are heavy and can fall over, causing serious injury or death. Do not move unless authorized by the Construction Coordinator.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. USG Corporation
c/o Corporate Secretary
125 South Franklin
Chicago, IL 60606-4678
Phone: (312) 606-4000
Technical Questions:
Phone: 800-874-4968
Email: usg4you@usg.com
Website: www.usg.com

2.2 SIP WALL SHEATHING

- A. Sheetrock® Brand Regular Gypsum Panels:
gypsum sheathing with water-resistant-treated core and with water repellent paper bonded to core's face, back, and long edges.
1. Type and Thickness: Regular, ½ inch
 2. Edge and End Configuration: Long edges tapered on face side
 3. Size: 48 by 108 inches (for wall height of 102 inches)
 4. Installation: Vertical
 5. Frame Spacing: 24 inches o.c. for parallel application
- B. Additional Products
1. Application
 - a. 1-1/4 inch Type W Bugle Head Screws
 - b. Galvanized Steel Corner Bead (external corners)
 - c. L-shaped metal trim for ½ inch panels (around windows and doors)
 - d. Paper faced metal bead and trim
 2. Finishing
 - a. Joint tape
 - b. All Purpose Ready Mixed Joint compound
- C. Sheathing, Joint, and Penetration Treatment Materials
1. Apply elastomeric sealant to joints and fasteners. Seal all penetrations and openings with sealant specified in Section 07 92 00 – Joint Sealants

2.3 INTERIOR STUD WALL SHEATHING

- A. Sheetrock® Brand Abuse-Resistant Interior Gypsum Panels
 1. Type and Thickness: Regular, 5/8 inch
 2. Edge and End Configuration: Square
 3. Size: 48 by 108 inches (for wall height of 102 inches)
 4. Installation: Vertical (stud walls)
 5. Frame Spacing: 24 inches o.c. for parallel application
 6. Space screws a maximum of 16 inches apart and at least 3/8 inches from ends and edges of panels.
- B. Additional Products
 11. Application
 - a. 1-1/4 inch Type W Bugle Head Screws
 - b. Galvanized Steel Corner Bead (external corners)
 - c. L-shaped metal trim for 1/2 inch panels (around windows and doors)
 - d. Paper faced metal bead and trim
 12. Finishing
 - a. Joint tape
 - b. All Purpose Ready Mixed Joint compound
- C. Sheathing, Joint, and Penetration Treatment Materials
 1. Apply elastomeric sealant to joints and fasteners. Seal all penetrations and openings with sealant specified in Section 07 92 00 – Joint Sealants

2.4 FLOOR SHEATHING

- A. Sheetrock® Brand Abuse-Resistant Interior Gypsum Panels
 1. Type and Thickness: Regular, 5/8 inch
 2. Edge and End Configuration: Square
 3. Size: 48 by 108 inches
 4. Installation: Horizontal 24 inches o.c. for parallel application
 5. Frame Spacing: 24 inches for parallel application.
 6. Space screws a maximum of 16 inches apart and at least 3/8 inches from ends and edges of panels.
- B. Additional Products
 1. Application
 - a. 1-1/4 inch Type W Bugle Head Screws
 - b. Paper faced metal bead and trim
 2. Finishing
 - a. Joint tape
 - b. All Purpose Ready Mixed Joint compound
- C. Sheathing, Joint, and Penetration Treatment Materials
 1. Apply elastomeric sealant to joints and fasteners. Seal all penetrations and openings with sealant specified in Section 07 92 00 – Joint Sealants

2.5 CEILING SHEATHING

- A. Sheetrock® Brand Interior Ceiling Panels
 1. Type and Thickness: Regular, 1/2 inch
 2. Edge and End Configuration: Square
 3. Size: 48 by 98 inches
 4. Installation: Horizontal
 5. Frame Spacing: 24" o.c. for parallel application
 6. Space screws a maximum of 12 inches apart and at least 3/8 inches from ends and edges of panels.
- B. Additional Products
 1. Application
 - a. 1-1/4 inch Type W Bugle Head Screws
 - b. Paper faced metal bead and trim
 2. Finishing
 - a. Joint tape
 - b. All Purpose Ready Mixed Joint compound
- C. Sheathing, Joint, and Penetration Treatment Materials
 1. Apply elastomeric sealant to joints and fasteners. Seal all penetrations and openings with sealant specified in Section 07 92 00 – Joint Sealants

2.6 BATHROOM SHEATHING

- A. Sheetrock® Brand Gypsum Panels - Water Resistant
 1. Type and Thickness: Regular, 5/8 inch
 2. Edge and End Configuration: Square
 3. Size: 48 by 98 inches (for wall height of 92 inches – ceiling soffit)
 4. Installation: Vertical
 5. Frame Spacing: 24" o.c. for parallel application
 6. Space screws a maximum of 16 inches apart and at least 3/8 inches from ends and edges of panels.
- B. Additional Products
 1. Application
 - a. 1-1/4 inch Type W Bugle Head Screws
 - b. Paper faced metal bead and trim
 2. Finishing
 - a. Joint tape
 - b. All Purpose Ready Mixed Joint compound
- C. Sheathing, Joint, and Penetration Treatment Materials
 1. Apply elastomeric sealant to joints and fasteners. Seal all penetrations and openings with sealant specified in Section 07 92 00 – Joint Sealants

PART 3 – EXECUTION

3.1 INSTALLATION GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- D. Do not bridge building expansion joints, cut and space edges of panels to match spacing of structural support elements.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with ASTM C 1280, GA-253 and manufacturer's written instructions located in the CUSD Operations and Maintenance Manual.
- B. Fasten sheathing to wood substrate with screws
 - 1. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 2. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
 - 3. Space screws maximum of 12 inches apart on ceilings, 16 inches apart on walls and at least 3/8 inches from ends and edges of panels.
- C. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
- D. Horizontal Installation: Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
 - 2. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards

3.3 SHEATHING JOINT AND PENETRATION TREATMENT

- A. Apply elastomeric sealant to joints and fasteners. Seal all penetrations and openings.

3.4 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
1. Prime substrates as recommended by flashing manufacturer.
 2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
 3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
 4. Lap weather-resistant building paper over flashing at heads of openings.
 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrate.

3.5 PREPARATION

- A. Protection
B. Surface Preparation

3.6 PROTECTION

- A. When applied to a structure, sheathing must not be left exposed to the elements for more than one month unless all gaps resulting from cuts, corners, joints and machine-end cuts of the sheathing are filled with an elastomeric sealant at the time of erection to protect the sheathing from water intrusion. This treatment will extend exposure time to six months. Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing barrier securely fastened to framing. Apply covering immediately after installation of sheathing.

END OF SECTION 09 29 00

SECTION 09 62 29

CORK FLOORING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Cork flooring tile
- B. Related Sections
 - 1. 06 11 00: Wood Framing
 - 2. 06 46 00: Wood Door and Window Casings
 - 3. 09 29 00: Gypsum Board
 - 4. 09 69 29: Access Flooring
 - 5. 09 90 00: Painting and Coating

1.01 REFERENCES

- A. American Standards for Testing and Materials (ASTM)
 - 1. E 492-90 – 1996: Standard Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine
 - 2. E 989-89 – 2006: Standard Classification for Determination of Impact Insulation Class

1.02 SYSTEM DESCRIPTION

- A. The following components are required to install cork flooring:
 - 1. Contact adhesive (1 can covers 180 sq feet)
 - 2. paint roller and tray
 - 3. utility knife
 - 4. straight edge
 - 5. rubber mallet
 - 6. 100 lb roller

1.03 SUBMITTALS

- A. Manufacturer's installation instructions and guidelines, located in the CUSD Operations and Maintenance Manual
- B. Submit material sample to illustrate product shade, design and finish. Samples shall be used as a standard for material to be installed.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading
 - 1. Materials shall be delivered to site in manufacturer's unopened cartons.
- B. Acceptance at Site
 - 1. Inspect cartons upon arrival to site and immediately report any damaged or missing components directly to the manufacturer.

- C. Storage and Protection
 - 1. Tiles shall be delivered in their original unopened cartons and stored in the High Voltage Lab (HVL) in a location designated by the Construction Coordinator.
 - 2. Store cartons of tile flat and directly on top of one another. Do not stand on edge.
 - 3. Protect all products from extreme temperatures (65°-80°F is ideal).
 - 4. Acclimate all products to jobsite by delivering to site 72 hours before installation.

1.05 SEQUENCING

- A. Floor coverings shall be the last finished material installed. Do not begin installing floors until all other construction has been completed.

1.06 WARRANTY

- A. Special Warranty: Manufacturer shall provide a residential or commercial warranty against manufacturing defects.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Amorim Flooring North America
7513 Connelley Drive
Suite M
Hanover, MD 21076
Phone: 410-553-6062
Fax: 410-553-6123
Email: info@amorimus.com

2.2 PRODUCTS

- A. Wicanders Cork Flooring
 - 1. 100 Series Xtreme WRT
 - 2. Dimensions per tile: 12 inch x 24 inch x 18 inch
 - 3. Color: Tea

PART 3 – EXECUTION

3.1 PREPARATION

- A. Cork flooring tiles shall be installed over substrates (Tate access flooring panels and SIPs) that are “permanently dry, clean, smooth, and structurally sound. They shall be free of dust, solvent, paint, wax, oil, grease, residual adhesive, adhesive removers, curing, sealing, hardening, or parting compounds, alkaline salts, mold, mildew, and other foreign materials that might prevent adhesive bond.”
- B. Close spaces to traffic for 12 hours before installation and for at least 24 hours after Installation.
- C. The permanent HVAC system shall be in operation for at least one week prior to the floor installation.
- D. For a 48-hour period before installation, during installation, and for a 48-perior after installation, the temperature of the flooring material, the adhesive, the spaces to receive flooring and the subfloor shall be between 65°-80°F. Thereafter, the minimum temperature shall be 55°F.

3.2 INSTALLATION

- A. For instructions of proper installation, maintenance and repairs, refer to the Cornell Solar Decathlon 2007 Operations Manual.

END OF SECTION 09 62 29

ACCESS FLOORING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Access Floor Panels
 - 2. Floor Covering
 - 3. Understructure
 - 4. Electrical Accessories
 - 5. Data Communication Accessories
- B. Related Sections
 - 1. 06 11 00: Wood Framing
 - 2. 06 12 00: Structural Insulated Framing
 - 3. 07 26 13: Above Grade Vapor Barrier
 - 4. 08 14 00: Wood Doors
 - 5. 08 35 13: Folding Doors
 - 6. 08 44 26: Glass Curtain Wall
 - 7. 08 95 00: Vents
 - 8. 09 20 00: Plaster and Gypsum Board
 - 9. 09 62 29: Cork Flooring
 - 10. 22 11 16: Domestic Water Piping
 - 11. 22 11 23: Domestic Water Pumps
 - 12. 23 31 00: HVAC Ducts and Casings
 - 13. 23 37 00: Air Outlets and Inlets
 - 14. 27 16 00: Communication Connecting Cords, Devices, and Adapters

1.01 REFERENCES

- A. Ceilings & Interior Systems Construction Association (CISCA)
 - 1. Recommended Test Procedures for Access Floors” shall be used as a guideline \ when presenting load performance product information.
- B. National Fire Protection Association (NFPA)
 - 1. NFPA 75: Requirements for Access Flooring

1.02 SYSTEM DESCRIPTION

- A. The following handbox tools are required for installation of raised access flooring:
1. 10 ft tape measure (min)
 2. 16 ft steel tape measure
 3. 20 oz claw hammer with steel handle
 4. Centerpunch
 5. Countersink
 6. Screwdrivers (2 phillips and 2 standard)
 7. 2-foot hand level
 8. Pair of pliers/channel locks
 9. Chalk line and chalk
 10. Dry line
 11. Pop rivet gun
 12. Awl
 13. Drill bit set 1/8" to 1/2"
 14. Putty knife, 3" wide
 15. Drill bits, 9/64 "
 16. Utility knife
 17. Pair tin shears (good quality)
 18. Double cup section panel lifter
 19. Marking pencils
 20. Rasp and metal files
 21. Screw gun tip bits (standard and phillips #2 & #3)
- B. The following power tools are required for installation of raised access flooring:
1. Laser with target designed for access floor installation (i.e. Spectra Precision 1485 HP with DBS)
 2. Power drill 3/8" & 1/2"
 3. Adjustable hammer drill 1/2"
 4. Power actuator (Hilti DX 350 or equivalent)
 5. Set of powder actuator pins & shots
 6. Bayonet saw and bi-metal blades
 7. 10 " electric miter box saw (optional)
 8. Metal-cutting bandsaw with cutting speed capability of 450 ft per minute.
 9. Bandsaw and reciprocating saw blades: bi-metal, 14 tooth, 1/2" wide, .034" thick to cut ConCore panels.
 10. 25" pallet jack
 11. Leveling bar 10ft.
 12. Adjustable torque-limiting screw gun
 13. Extension cords
 14. (1 each) 3", 4" and 5" metal cutting hole saws
- C. Design Requirements
1. Access floor system, where indicated on the design documents, shall consist of modular and removable cementitious filled welded steel panels supported on all four edges by structural steel members which are designed to bolt onto adjustable height pedestal assemblies forming a modular grid pattern.
 2. Panel shall be easily removed by one person with a lifting device and shall be interchangeable except where cut for special conditions.
 3. Quantities, finished floor heights (FFH) and location of accessories shall be as specified on the contract drawings.

D. Performance Requirements

1. Pedestals

- a. Axial Load: Pedestal assembly shall provide a 5000 lb. axial load without permanent deformation.
- b. Overturning Moment: Pedestal assembly shall provide an average overturning moment of 1000 in-lbs. when glued to a clean, sound, uncoated surface. ICBO number for the specific system or structural calculations shall be required attesting to the lateral stability of the system under seismic conditions.

2. Stringers

- a. Midspan Concentrated Load: Stringer shall be capable of withstanding a concentrated load of 450 lbs. placed in the midspan stringer center on a one square inch area using a round or square indenter without exceeding a permanent set of 0.010" after the load is removed.

3. Floor Panels

- a. Concentrated Load: Panel shall be capable of supporting a concentrated load of 1000 lbs. placed on a one square inch area (using a round or square indenter) at any location on the panel with a maximum top surface deflection of 0.100 inches. Panel shall not exceed a permanent set of 0.010 inches, after the load is removed. Panel shall demonstrate ductility by being loaded to a deflection of 0.100 inches without incurring damage.
- b. Uniform Load: Panel shall be capable of supporting a uniform load of 250 lbs. placed on a one square foot area at any location on the panel with a maximum top surface deflection of 0.060 inches. Panel shall not exceed a permanent set of 0.010 inches, after the load is removed.
- c. Ultimate Load: Panel shall be capable of withstanding a minimum concentrated load of 3000 lbs. applied onto a one square inch area (using a round or square indenter) at any location on the panel without failure. Failure is defined as the point at which the panel will no longer accept the load. Certified test shall be provided attesting to this ultimate load.
- d. Rolling Load: Panel and supporting understructure shall be able to withstand the following rolling loads at any location on the panel without developing a local and overall surface deformation greater than 0.040 inches.

Wheel 1: Size: 3" dia x 1 13/16" wide

Load: 800 lbs. Passes: +10

Wheel 2: Size: 6" dia x 1 1/2" wide

Load: 600 lbs. Passes: 10,000

- e. Impact Load: Panel and supporting understructure shall be capable of supporting an impact load of 150 lbs. dropped from a height of 36 inches onto a one square inch area (using a round or square indenter) at any location on the panel
- f. Panel Drop Test: Panel shall be capable of being dropped face up onto to a concrete slab from a height of 36", after which it shall continue to meet all load performance requirements as previously defined.
- g. Panel Cutout: Panel with 8" diameter cutout shall be capable of withstanding an ultimate load without failure of 1500 lbs. anywhere on the panel.
- h. Flammability: System shall meet *Class A* Flame spread requirements for flame spread and smoke development. Tests shall be performed in accordance with ASTM-E84-1998, Standard Test Method for Surface Burning Characteristics for Building Materials.
- i. Combustibility: Access floor panels shall qualify as noncombustible by demonstrating compliance with requirements of ASTM E 136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 deg C.

1.03 SUBMITTALS

- A. Detail Sheets, for each proposed product type, which provide necessary information to describe the product and its performance.
- B. Test Reports, certified by an independent testing laboratory with a minimum of five years experience testing access floor components in accordance with Cisca Recommended Test Procedures, certifying that components perform as specified.
- C. Manufacturer's installation instructions and guidelines, located in the CUSD Operations and Maintenance Manual
- D. Manufacturer's Owner Manual outlining recommended care and maintenance procedures, located in the CUSD Operations and Maintenance Manual.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading
- B. Acceptance at Site
- C. Storage and Protection

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Tate Access Floors, Inc.
7510 Montevideo Road
Jessup, MD 20794
Phone: 800-231-7788
Fax: 410-799-4207
Email: tateinfo@tateaccessfloors.com

2.2 SUPPORT COMPONENTS

- A. Pedestals:
 - 1. Pedestal assemblies shall be corrosive resistant, all steel welded construction, and shall provide an adjustment range of +/- 1" for finished floor heights 6" or greater.
 - 2. Pedestal assemblies shall provide a means of leveling and locking the assembly at a selected height, which requires deliberate action to change height setting and prevents vibration displacement.
 - 3. Hot dip galvanized steel pedestal head shall be welded to a threaded rod which includes a specially designed adjusting nut. The nut shall provide location lugs to engage the pedestal base assembly, such that deliberate action is required to change the height setting.
 - 4. Threaded rod shall provide a specially designed anti-rotation device, such that when the head assembly is engaged in the base assembly, the head cannot freely rotate (for FFH of 6" or greater). Note: This prevents the assembly from inadvertently losing its leveling adjustment when panels are removed from the installation during use.
 - 5. Hot dip galvanized pedestal base assembly shall consist of a formed steel plate with no less than 16 inches of bearing area, welded to a 7/8" square steel tube and shall be designed to engage the head assembly.

B. Stringers

1. Stringers shall support each edge of panel.
2. Steel stringers shall have conductive galvanized coating.
3. Stringers shall be individually and rigidly fastened to the pedestal with one machine screw for each foot of stringer length. Bolts shall provide positive electrical contact between the stringers and pedestals. Connections depending on gravity or spring action are unacceptable.
4. Stringer grid shall be 4'; stringers in a basketweave configuration ensuring maximum lateral stability in all directions. (Also available in 2' x 4' and 2' x 2' grid patterns.)

2.3 PANEL COMPONENTS

A. Floor Panels

1. ConCore Panels: Shall consist of a top steel sheet welded to a formed steel bottom pan filled internally by a lightweight cementitious material. Mechanical or adhesive methods for attachment of the steel top and bottom sheets are unacceptable.

2.4 FINISHES

- A. Finish the surface of floor panels with floor covering material as indicated on contract drawings. Use the cork floor tiles specified in Section 09 62 29.

PART 3 – EXECUTION

3.1 PREPARATION

A. Surface Preparation

1. Examine structural subfloor for unevenness, irregularities and dampness that would affect the quality and execution of the work. Do not proceed with installation until structural floor surfaces are level, clean, and dry as completed by others.
2. Verify dimensions on contract drawings, including level of interfaces including abutting floor, ledges and doorsills.

3.2 INSTALLATION

- A. Pedestal locations shall be established from approved shop drawings so that mechanical and electrical work can be installed without interfering with pedestal installation.
- B. Installation of access floor shall be coordinated with other trades to maintain the integrity of the installed system. All traffic on access floor shall be controlled by access floor installer. No traffic but that of access floor installers shall be permitted on any floor area for 24 hours to allow the pedestal adhesive to set. Access floor panels shall not be removed by other trades for 72 hours after their installation.
- C. Floor system and accessories shall be installed under the supervision of the manufacturer's authorized representative and according to manufacturer's recommendations.
- D. No dust or debris producing operations by other trades shall be allowed in areas where access floor is being installed to ensure proper bonding of pedestals to subfloor.
- E. Access floor installer shall keep the subfloor broom clean as installation progresses.
- F. Partially complete floors shall be braced against shifting to maintain the integrity of the installed system where required.
- G. Additional pedestals as needed shall support panels where floor is disrupted by columns, walls, and cutouts.
- H. Understructure shall be aligned such that all uncut panels are interchangeable and fit snugly but do not bind when placed in alternate positions.
- I. Finished floor shall be level, not varying more than 0.062" in 10 feet or 0.125" overall.
- J. Acceptance: General contractor shall accept floor in whole or in part prior to allowing use by other trades.

END OF SECTION 09 69 00

SECTION 09 90 00
PAINTING AND COATING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Painting and coating for new construction
 - a. Exterior surfaces and items
 - b. Interior surfaces and items
- B. Related Sections
 - 1. 05 50 00: Metal Fabrications
 - 2. 06 12 00: Structural Insulated Panels
 - 3. 06 20 00: Finish Carpentry
 - 4. 06 40 00: Architectural Woodwork
 - 5. 07 60 00: Flashing and Sheet Metal
 - 6. 08 10 00: Doors and Frames
 - 7. 08 50 00: Windows
 - 8. 08 90 00: Louvers and Vents
 - 9. 09 20 00: Plaster and Gypsum Board

1.02 REFERENCES

- A. American Society for Testing And Materials (ASTM)
 - 1. D 3960 – 2005 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
 - 3. D 6670 – 2001 Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products
 - 2. E 2129 – 2005 Standard Practice for Data Collection for Sustainability Assessment of Building Products
- B. Master Painters Institute (MPI)
 - 1. Architectural Painting Specification Manual: <http://www.specifypaint.us>
- C. Painting and Decorating Contractors of America (PDCA)
 - 1. PDCA P5

1.02 DEFINITIONS

- A. DFT – Dry Film Thickness, the thickness of the dry film of a coating, measured in mils or microns.
- B. DTM – Direction to Metal
- C. Gloss/Sheen – Measurement of light reflectance on a 60 degree or 85 degree gloss meter
- D. IMC – Industrial Maintenance Coating
- E. IWF – Interior Wood Finish

1.03 SYSTEM DESCRIPTION

- A. Use low-VOC products to minimize impact on indoor air quality.

1.04 SUBMITTALS

- A. Product Data
 - 1. Provide products sheet, including product description and use, for each product proposed for use.
 - 2. Provide Material Safety and Data Sheets (MSDS) for each product proposed for use.
- B. Samples
 - 1. Provide samples for each type of finish-coat material indicated. Comply with procedures specified in PDCA P5.

1.05 QUALITY ASSURANCE

- A. All painting work shall be performed in accordance with manufacturer's instructions.
- B. Painting shall only be performed when surface is dry and when weather conditions are satisfactory. Comply with paint manufacturer's recommendations for environmental conditions in which paint materials can be applied.
- C. Do not paint where dust is being generated or will be generated before the coatings are thoroughly dry.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver paint materials in sealed, labeled containers, indicating manufacturer's name, product name, type of paint and color.
- B. Store paint materials labeled containers in a locked storage area that maintains a minimum ambient temperature of 45 degrees F. Storage shall also be well ventilated to eliminate the build-up of fumes.
- C. Waste Management and Disposal:
 - 1. Comply with local regulations for disposal of all paint materials including paint, stain, wood preservative finishes, solvents, and other related materials.
 - 2. Recycle paint as available in jurisdiction. Separate materials by type. Where paint recycling is not available, materials shall be treated as hazardous waste and disposed in an appropriate manner.

1.07 PROJECT CONDITIONS

- A. Project Environmental Requirements
 - 1. Exterior
 - a. Obtain minimum and surface temperature above 50 degrees F prior to application of paint.
 - b. Allow frost, dew, and condensation to evaporate prior to proceeding with coating surface.
 - 2. Interior
 - a. Maintain minimum interior temperature of 65 degrees F during application and curing of paint.
 - b. Provide adequate ventilation

PART 2 – PRODUCTS

2.1 PAINT

- A. Water-based paints shall not be formulated or manufactured with chemicals listed to be hazardous including, but not limited to: formaldehyde, halogenated solvents, aromatic hydrocarbons, mercury, and mercury compounds. Paints shall not be tinted with pigments of lead, cadmium, chromium, and their oxides.
- B. Oil-based paint should not be used unless there are no acceptable acrylic alternatives. Oil-based paints shall:
 - 1. Not contain halogenated solvents
 - 2. Not be formulated or manufactured with formaldehyde, mercury, and mercury compounds.
 - 3. Not be pigmented with lead cadmium, chromium, and their oxides.
 - 4. Not be formulated or manufactured with aromatic hydrocarbons in excess of 10%.

2.1 MANUFACTURERS

- A. Benjamin Moore & Co.
51 Chestnut Ridge Road
Montvale, NJ -7645
Email: info@benhaminmoore.com
Website: www.benjaminmoore.com
or
Architectural Representative NYS
Terry Kennedy
Phone: 800-635-5147 Ext. 1894
Email: terry.kennedy@benjaminemoore.com
- B. American Pride
Southern Diversified Products, LLC
2714 Hardy Street
Hattiesburg, MS 39401
Phone: 601-2643-0442
Fax: 601-296-7351
Web: <http://americanpridepaint.com>

2.2 EXISTING PRODUCTS

- A. Benjamin Moore
 - 1. Alkyd Semi-Transparent Deck and Siding Stain 079
 - 2. Color: Solar Storm
- B. American Pride
 - 1. Interior Latex Eggshell Paint
 - 2. Color: Varies

PART 3 – EXECUTION

3.1 APPLICATION

- A. Paint or coating – Comply with manufacturer's published recommendation for application found in the operations manual.
- B. Clean surface before applying primer or first paint coat.
- C. Stir paint thoroughly before use.
- D. Apply one to two coats evenly. The finished work shall show no cloudiness, spotting, holidays, laps, brush marks, runs, curtains, sags, or other imperfections.
- E. Touch up and patch surfaces as required after completion of work by other trades.
- F. Dispose of properly. Dry, empty containers may be recycled in a can recycling program. Consult local sanitation department for disposal options.

3.2 – INDOOR AIR QUALITY

- A. Maximize ventilation during application and drying
- B. Painting should be performed prior to the installation of absorbent material such as carpeting and ceiling tile.
- C. Applicators shall wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.
- D. Painting must be completed a minimum of 48 hours prior to occupancy.

END OF SECTION 09 90 00

Features

- Provides protection and color without obscuring the grain or texture of the wood
- May be applied to new, pressure treated lumber
- A water repellent coating
- Formulated to penetrate, protect, and beautify wood decking, siding, fencing, shingles and furniture
- Scuff resistant
- Specially formulated to resist mildew growth on the stain film

General Description

A premium quality semi transparent stain formulated to penetrate and protect wood, resist abrasion, and beautify wood decking, siding, fencing, shingles and furniture. The deeply penetrating formula offers great protection from water, sun and mildew. Its colors are semi transparent, allowing the texture and grain of the wood to show through.

Recommended For:

Residential or commercial applications where a premium quality finish is desired.
For exterior use on shakes, shingles, saw textured lumber, siding, decks, fencing, furniture, rafters & beams.

Limitations:

- Do not apply when air and surface temperatures are below 50° F (10° C), nor over damp surfaces or during threatening weather.
- Not recommended for use on abraded or brushed plywood, or on previously painted wood unless previous coating has been completely removed.

Product Information

Colors: —Standard:

Not available

—Tint Bases:

Clear Tint Base

—Special Colors:

Contact your Benjamin Moore & Co. representative

Certification:

Master Painters Institute MPI #13
Formulated without lead or mercury.
Formulated with non-photochemically reactive solvents.

Federal Specifications Generic Equivalent

Meets Federal Specification TT-S-708A as a water repellent wood preservative.

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.

Technical Data

Vehicle Type		Linseed Oil	
Pigment Type [◇]		none	
Volume Solids [◇]	328 42.4%	C328	68.1 %
Theoretical Coverage At Recommended Film Thickness		300 – 400 Sq. Ft.	
<i>Depending on surface texture and porosity. Be sure to estimate the right amount of stain for the job. This will ensure color uniformity and minimize the disposal of excess stain.</i>			
Film Thickness – Wet		Penetrating	
– Dry		Minimal	
<i>Varies with porosity and texture of substrate.</i>			
Dry Time @ 77° F	— Set To Touch	6 Hours	
(25° C) @ 50% RH	— To Recoat	16 Hours	
	— To Hard Dry	24 to 48 Hours	
<i>Allow a 48 hour dry time before furniture placement on decks. High humidity or cooler temperatures may prolong drying time.</i>			
Dries By		Evaporation, Oxidation	
Viscosity [◇]		< 50 KU	
Flash Point (Seta)	Combustible @ 103° F	C328	Combustible @ 103° F
60° Specular Gloss		Flat	
Surface Temperature at application – Min.		50° F	
	– Max.	90° F	
Thin With*		Do Not Thin	
Clean Up Thinner		Mineral Spirits	
Weight Per Gallon [◇]	328 7.42 lbs.	C328	7.90 lbs.
Storage Temperature		– Min.	40° F
		– Max.	90° F
Volatile Organic Compounds (VOC)		Volatile Organic Compounds (VOC)	
328	Unthinned,	C328	Unthinned,
<i>not to exceed 550 Grams/Liter. **</i>		<i>not to exceed 250 Grams/Liter. **</i>	

*Thinning of this product may make it non-compliant under normal environmental and application conditions in VOC regulated areas. Local authorities should be consulted for updated regulations.
**Contact Benjamin Moore & Co. for actual levels, which may or may not be substantially less than stated. The specifier should be aware that a number of jurisdictions in the USA now regulate the VOC content of coatings.
[◇] Values given are for color shown; other colors may vary.

Surface Preparation

Surfaces to be stained must be clean, dry, and free of dirt, mildew, oil, or grease. Remove contaminants or chalky residue from weathered stained surfaces by washing with BENJAMIN MOORE® CLEAN Multi-Purpose Cleaner (318). Previously painted, stained, or sealed wood can be restored by sanding or using BENJAMIN MOORE® REMOVE Finish Remover (315). For best results, completely remove previous stain or coating.

Smooth planed lumber, clapboards, or siding must be sanded thoroughly or treated with BENJAMIN MOORE® BRIGHTEN Brightener & Neutralizer (317) to break the "mill glaze" to allow proper penetration and adhesion.

Weathered Wood and Mildew: Prior to staining, weathered wood must be sanded or treated with BENJAMIN MOORE® RESTORE for Gray & Weathered Wood (316), following directions, until a sound surface is obtained (loose or damaged wood fibers removed). If mildew is evident, it must be removed by scrubbing with BENJAMIN MOORE® RESTORE for Gray & Weathered Wood (316) prior to staining or it will continue to grow through the fresh coating. If mildew is widespread, the use of power wash spray equipment is suggested. Particular attention should be paid to overhead surfaces such as eaves and porch ceilings.

Unweathered areas such as eaves, ceilings, or overhangs must be washed with BENJAMIN MOORE® CLEAN Multi-Purpose Cleaner (318) and/or rinsed with a strong stream from a garden hose to remove surface salts that can interfere with proper adhesion.

NOTICE: Removal of old paint by sanding, scraping or other means may generate dust or fumes which contain lead. Exposure to lead dust or fumes may cause adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (NIOSH approved) and proper containment and cleanup. For additional information, contact the USEPA/Lead Information Hotline at 1-800-424-LEAD.

Application

Mixing of Stain: Stain pigments do not remain in suspension as in most other types of coatings. It is important that immediately prior to use, the stain be thoroughly mixed even though it has been given a mechanical shaking by the retailer. During use, stir periodically to retain uniformity of color. Prior to staining, ensure having enough stain boxed or mixed to complete an entire section.

Preferred method on siding and deck is by brushing. For premium performance, use a BENJAMIN MOORE® custom-blended bristle/polyester brush, BENJAMIN MOORE® roller, or a similar product. This product can also be sprayed. Roller application should be done only on rough or textured surfaces. Back-brushing is recommended with roller or spray application.

On smooth siding and deck only 1 coat is recommended. On rough siding 2 coats, wet on wet, are recommended. To minimize lapping, always maintain a wet edge. On horizontal siding apply the stain on a section of 2 or 3 boards completely across the house. Lower the ladder and continue in the same manner until the side is completed. Vertical siding is coated using the same principle from top to bottom. Never stop staining in mid-wall; continue until a natural break is reached, such as a window. On decks apply stain only a few boards at a time keeping the leading edge "wet."

Refrain from staining in direct hot sun. Do not apply when air and surface temperatures are below 50° F (10° C), nor over damp surfaces or during threatening weather.

Spray, Airless: Fluid Pressure—1,500 to 2,000 PSI;
Tip—.013 Orifice; Filter—100 mesh

Thinning/Cleanup

Do not thin. Clean up with mineral spirits.

Storage: Store in original container. Close container after each use.

Disposal: Do not reuse empty container. Rinse container thoroughly, securely wrap in several layers of newspaper, and discard in trash.

DANGER: RAGS, STEEL WOOL, OR WASTE SOAKED WITH THIS PRODUCT MAY SPONTANEOUSLY CATCH FIRE IF IMPROPERLY DISCARDED. IMMEDIATELY AFTER USE, PLACE RAGS, STEEL WOOL, OR WASTE IN A SEALED WATER-FILLED METAL CONTAINER.

USE COMPLETELY OR DISPOSE OF PROPERLY. This product contains organic solvents which may cause adverse effects to the environment if handled improperly. Save unused product for touch-up purposes or household hazardous waste collection program. Dry, empty containers may be recycled in a can recycling program. **Local disposal requirements vary; consult your sanitation department or state-designated environmental agency for information on disposal options.**

Environmental & Safety Information

WARNING! COMBUSTIBLE LIQUID AND VAPOR!

Contains: Stoddard Solvent and linseed oil. VAPOR HARMFUL. CAUSES EYE, SKIN, NOSE AND THROAT IRRITATION

NOTICE: Repeated and prolonged exposure to solvents may lead to permanent brain and nervous system damage. Eye watering, headaches, nausea, dizziness and loss of coordination are signs that solvent levels are too high. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

Keep away from heat and flame. **Use only with adequate ventilation.** Do not breathe vapors, spray mist or sanding dust. Avoid contact with eyes and prolonged or repeated contact with skin. Wear eye protection and gloves. To avoid breathing vapors or spray mist, open window and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches or dizziness, increase fresh air or wear a properly fitted vapor/particulate respirator approved by NIOSH for use with paints or leave the area. In all cases follow respirator manufacturer's directions for respirator use. Close container after each use.

FIRST AID: If affected by inhalation of vapors or spray mist, remove to fresh air. In case of eye contact, flush immediately with plenty of water for at least 15 minutes and call a physician. For skin, wash thoroughly with soap and water. In case of ingestion, DO NOT induce vomiting. Get medical help immediately.

IN CASE OF: **FIRE** – Use foam, CO₂, dry chemical, or water fog.
SPILL – Absorb with inert material and dispose of as specified under **Thinning/Cleanup**.

KEEP OUT OF REACH OF CHILDREN

**Material Safety Data Sheets available
on request from your servicing retailer.**

BOIL RANGE: 313.0 to 388.0 WT/GL: 7.4 to 7.9 %VOL/VOL: 31.6 to 56.8
EVAPORATION RATE: SLOWER THAN ETHER VAPOR DENSITY: HEAVIER THAN AIR

SECTION IV FIRE AND EXPLOSION HAZARD DATA

D.O.T. FLAMMABILITY CLASS.: COMBUSTIBLE FLASH POINT: 107 F PMCC
LEL %: 1.0
EXTINGUISHING MEDIA: FOAM CO2 DRY CHEMICAL WATER FOG
UNUSUAL FIRE AND EXPLOSION HAZARDS:
Toxic gases may form when product burns.
Closed containers may burst if exposed to extreme heat or fire.
SPECIAL FIRE FIGHTING PROCEDURES:
Cool exposed containers with water. Use self-contained breathing apparatus.
Do not use water stream on burning liquid. Use self-contained breathing apparatus.

SECTION V HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE - ACUTE:
Inhalation - Harmful if inhaled. May affect the brain or nervous system causing dizziness, headache or nausea.
Contact - Causes eye irritation.
Contact - Causes skin irritation.
Skin Absorption - Hazardous ingredients contained in this product have the capacity to be absorbed through the skin in sufficient quantities to cause systemic toxicity. See Safe Handling and Use Information (Section VIII).
Ingestion - Irritation of the digestive tract and nervous system depression (drowsiness, dizziness, loss of coordination and fatigue). Aspiration Hazard - This material can enter lungs during swallowing or vomiting and cause lung inflammation and damage.
EFFECTS OF OVEREXPOSURE - CHRONIC:
Skin Contact - Prolonged or repeated exposure may cause dermatitis.
Chronic lung conditions may be aggravated by exposure to high dust levels.
NOTICE: Reports have associated permanent brain and nervous system damage with repeated, prolonged overexposure to solvents among persons engaged in the painting trade. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.
IARC has classified Ethyl Benzene as possibly carcinogenic for humans (2B). May cause allergic skin reaction.
MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE:
None expected when used in accordance with Safe Handling and Use Information (Section VIII).
PRIMARY ROUTE(S) OF ENTRY: DERMAL INHALATION INGESTION
EMERGENCY AND FIRST AID PROCEDURES :
Inhalation - Remove from hazard area, maintain breathing, call physician.
Skin Contact - Remove with soap and water.
Eye Contact - Flush immediately with large amounts of water. Call physician
Ingestion - Drink 1 or 2 glasses of water to dilute.
DO NOT induce vomiting. Call physician.

SECTION VI REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION WILL NOT OCCUR
HAZARDOUS DECOMPOSITION PRODUCTS:
Burning may produce carbon dioxide and carbon monoxide.
CONDITIONS TO AVOID: Elevated temperatures and build up of vapors
INCOMPATIBILITY (MATERIALS TO AVOID): None reasonably foreseeable.

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Remove all sources of ignition. Avoid breathing vapors. Use non-sparking tools to return materials to container. Absorb residue with Fullers earth.

WASTE DISPOSAL METHOD:

Conventional procedures in compliance with local, state and federal regulations. Do not incinerate sealed containers.

SECTION VIII SAFE HANDLING AND USE INFORMATION

RESPIRATORY PROTECTION:

Wear a properly fitted vapor/particulate respirator approved by NIOSH for use with paints during application or sanding and until all vapors and spray mist are exhausted. In confined spaces or in situations where continuous spray operations are typical, or if proper respirator fit is not possible, wear a positive-pressure, supplied air respirator approved by NIOSH.

VENTILATION:

Adequate to maintain working atmosphere below T.L.V. and L.E.L.

(See Sect. II for ingredient data and concentrations). Mechanical exhaust may be required in confined areas.

Discharge exhaust only in area away from ignition sources.

PROTECTIVE GLOVES: Solvent impermeable gloves are required.

EYE PROTECTION : Splash goggles or safety glasses with side shields.

OTHER PROTECTIVE EQUIPMENT: Clothing adequate to protect skin.

HYGIENIC PRACTICES:

Remove and wash clothing before reuse. Wash hands before eating, smoking or using the washroom.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:

Combustible - Keep away from heat and flame

OTHER PRECAUTIONS :

Use only with adequate ventilation. Avoid prolonged contact with skin and breathing of vapor spray mist or sanding dust.

Close container after each use. Keep out of reach of children. Do not take internally.

DANGER - Rags, steel wool or waste soaked with this product may catch fire spontaneously if improperly discarded. Immediately after use, place rags, steel wool or waste in a sealed water-filled metal container.

SECTION XX

HMIS (Hazardous Materials Identification System) (R) NPCA

HMIS is a recognized workplace Hazard Communications System as required by OSHA (29 CFR 1910.1200). Information on establishing a compliant hazardous communication program using HMIS is available from:

American Labelmark Co., Inc., Labelmaster Division
5724 N. Pulaski Rd., Chicago, IL 60646
1-800-621-5808

The ratings assigned by Benjamin Moore & Co. are only suggested ratings; the contractor/employer has ultimate responsibility for HMIS rating where this system is used.

PERSONAL PROTECTION: This code is left blank on Benjamin Moore & Co. MSDS's

as it depends on application technique and the workplace ventilation. Please read Sections II through IX of this MSDS before deciding on appropriate protective equipment and beginning work. There are codes available for this section which can be obtained from Labelmaster.

Note: There are no SARA reportable materials in this product.

DISCLAIMER

The information contained herein is presented in good faith and believed to be accurate as of the effective date shown above. This information is furnished without warranty of any kind. Employers should use this information only as a supplement to other information gathered by them and must make independent determination of suitability and completeness of information from all sources to assure proper use of these materials and the safety and health of employees. Any use of this data and information must be determined by the user to be in accordance with applicable federal, state and local laws and regulations.

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. Clean up carefully 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.

AMERICAN PRIDE® PAINT

INTERIOR EGGSHELL LATEX PAINT (101 LINE)

American Pride® paints are high performance interior coatings which are low in odor during application and drying. These products are ideal for use in occupied areas because of their low odor and VOCs (Volatile Organic Compounds).

RECOMMENDED USE

For properly prepared interior walls of plaster, wallboard, masonry and tightly adhered wallpaper. Ideal for office buildings, hotel rooms and corridors, nursing homes, schools, hospitals, department stores, apartments, and residences.

This product can be used in occupied areas without typical odor complaints because of the very low odor during application and drying.

SURFACE PREPARATION

See surface Preparation Section on Paint Label

New Surfaces:

Non-Bleeding Wood, Plaster:

Prime with American Pride® Interior Latex Primer (AP 801)

Drywall:

Prime with American Pride® Interior Latex Primer (AP 801)

Metal:

Recommended only for use on incidental metal trim and non-contact metal surfaces.

Prime with:

Ferrous: Anti-Rust Primer

Non-Ferrous: Galvanized & Aluminum Primer

EQUIPMENT

Conv. Spray:	40 PSI TIP: 704/FX
Airless Spray:	1800 - 2400 PSI TIP: .015" - .021"
Brush:	Polyester or Nylon
Roller:	3/8" Nap Cover
Pad:	Standard

*VOC level as determined on untinted paint within the precision of ASTM D3960



This product meets Green Seal environmental standards for volatile organic compounds (VOCs) and other ingredients.

THINNER & CLEAN-UP

Thinning is not recommended, but if necessary, use clean water sparingly. Soap and water clean-up.

LIMITATIONS

- Do not apply when air, surface, or product temperature is below 50°F (10°C) or if temperature might drop to this level within 4 hours of application.
- Do not apply in temperatures above 90°F (32°C).

PACKAGING

Quarts, Gallons, 5 Gallons

COLORS

- 940 palette colors
- Computer color matching available

SPECIFICATION DATA **

Type:	Acrylic Latex
Finish:	Eggshell
» Sheen:	23 Max @ 85°
% Solids (varies with color):	
» By Weight:	55 ±2%
» By Volume:	38 ±2%
Wt./Gallon: (White only):	11.48 lbs.
Flashpoint:	212°F (PMCC)
VOC lbs./gal (max):	0*
VOC gm/ltr (max):	0*
Thinner:	Water
Clean-up:	Soap and Water
Dry Time:	
» To Touch:	2 hours
» By Volume:	4-8 hours
» To Service:	Overnight
Note: Adding large amounts of zero VOC colorant can dramatically slow dry/cure time.	
Thickness:	
» Dry:	1.5 mil
» Wet:	4.0 mil
Coverage:	400 sq.ft./gal (on smooth surfaces)
Flame Spread Rate:	Class A (0-25 on non-combustible surfaces)

****Product Data is based on AP 101-W**

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: American Pride Interior Latex Eggshell Toned White

Product Code Identification Number: AP101-W

MSDS Number:

GENERAL USE: Protective Coating

PRODUCT DESCRIPTION: Vinyl Acrylic latex coating



MANUFACTURER'S NAME

Southern Diversified Products

DATE PREPARED: June 28, 2005

SUPERSEDES: September 7, 2002

Page 1 of 4

ADDRESS (NUMBER, STREET, P.O. BOX)

2714 Hardy St.

TELEPHONE NUMBER FOR INFORMATION

(601) 271-2588

(CITY, STATE AND ZIP CODE)

Hattiesburg, MS 39401

COUNTRY

USA

EMERGENCY TELEPHONE NUMBER

Infotrac (800) 535-5053 Outside USA (352) 323-3500

DISTRIBUTOR'S NAME

Same

ADDRESS (NUMBER, STREET, P.O. BOX)

TELEPHONE NUMBER FOR INFORMATION

(CITY, STATE AND ZIP CODE)

COUNTRY

EMERGENCY TELEPHONE NUMBER

SECTION 2 - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS

CAS #

%

(by weight)

OSHA PEL

PPM

MG/M3

ACGIH TWA

PPM

MG/M3

SARA

TITLE III

RQ

LBS

No hazardous materials present as defined by OSHA - 29 CFR 1910.1000; EPA - 40 CFR 260 - 281, 302, 355, 370, 372; DOT - 49 CFR 172; WHMIS or EC Directive 91 / 155 / EEC.

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Mild liquid, prolonged contact may cause skin & eye irritation. Ingestion may cause gastric distress. Hazard symbols for this product - None
Risk Phrases - Not classified

POTENTIAL HEALTH EFFECTS

INHALATION: None expected, however, certain individuals may experience minor nausea or headaches. Breathing airborne particles or dust from mixing, spraying, sanding, grinding, etc. may cause irritation to respiratory tract.

SKIN: None expected, however, prolonged contact may cause irritation.

EYES: Contact with eyes may cause irritation.

INGESTION: May cause gastric distress, vomiting and diarrhea.

CARCINOGENICITY

NTP?

No

IARC MONOGRAPHS?

No

OSHA REGULATED?

No

MATERIAL SAFETY DATA SHEET			
PRODUCT NAME: American Pride Interior Latex Eggshell Toned White June 28, 2005			Page 2 of 4
SECTION 4 - FIRST AID MEASURES			
INHALATION: Remove affected person to fresh air; if symptoms persist seek medical attention.			
SKIN: Remove contaminated clothing; wash affected area with soap and water; launder contaminated clothing before reuse; if irritation persists, seek medical attention.			
EYES: Remove contact lenses. Flush eyes with water for 15 minutes; if irritation persists, seek medical attention.			
INGESTION: Give two glasses of water for dilution; DO NOT induce vomiting; seek medical attention.			
SECTION 5 - FIRE FIGHTING MEASURES			
FLASH POINT (METHOD USED) Non-flammable	FLAMMABLE LIMITS AUTOIGNITION TEMPERATURE:	LEL: Not applicable Not determined	UEL: Not applicable NFPA CLASS: None
GENERAL HAZARDS: Product is not considered flammable or combustible. Products of combustion include compounds of carbon, hydrogen and oxygen, including carbon monoxide.			
EXTINGUISHING MEDIA Carbon dioxide, water, water fog, dry chemical, chemical foam			
FIRE FIGHTING PROCEDURES Keep containers cool with water spray to prevent container rupture due to steam buildup; floor will become slippery if material is released.			
UNUSUAL FIRE AND EXPLOSION HAZARDS None			
HAZARDOUS COMBUSTION PRODUCTS Smoke, fumes, oxides of carbon.			
SECTION 6 - ENVIRONMENTAL RELEASE MEASURES			
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Small spills - wash to sanitary sewer with plenty of water. Large spills - soak up with approved absorbent, shovel product into approved container for disposal. Wash area with plenty of water.			
SECTION 7 - HANDLING AND STORAGE			
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Keep container closed when not in use; protect containers from abuse; protect from extreme temperatures.			
SECTION 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION			
ENGINEERING CONTROLS			
The use of local exhaust ventilation is recommended. No other special controls are indicated.			
PERSONAL PROTECTION:			
RESPIRATORY PROTECTION (SPECIFY TYPE): NIOSH approved respirator designed to remove airborne particulate present in excess of maximum allowable concentrations due to secondary operations such as mixing, spraying, sanding, buffing, etc. Refer to 29 CFR 1910.134 or European Standard EN 149 for regulations.			
PROTECTIVE GLOVES: Recommended for general protection			
EYE PROTECTION: Recommended for general protection			
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Safety eyebath nearby			
WORK / HYGIENIC PRACTICES: Practice safe workplace habits. Minimize body contact with this, as well as all chemicals in general.			

MATERIAL SAFETY DATA SHEET				
PRODUCT NAME: American Pride Interior Latex Eggshell Toned White June 28, 2005				Page 3 of 4
SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES				
VAPOR PRESSURE (MM Hg) 17 mm Hg @ 20° C		VAPOR DENSITY (AIR = 1) > 1		
SPECIFIC GRAVITY (WATER = 1) 1.378		EVAPORATION RATE (WATER = 1) < 1		
SOLUBILITY IN WATER Dispersible		FREEZING POINT 32° F (0° C)		
pH 8.5 - 9.0		APPEARANCE AND ODOR White viscous liquid, practically odorless		
BOILING POINT 214°F (101° C)		PHYSICAL STATE Liquid		
VISCOSITY (KREBS) 100 - 105				
SECTION 10 - STABILITY AND REACTIVITY				
STABILITY UNSTABLE: STABLE: XXX		CONDITIONS TO AVOID: Extreme temperatures, keep from freezing		
INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizers, strong acids				
HAZARDOUS DECOMPOSITION OR BYPRODUCTS: Decomposition will not occur if handled and stored properly. In case of a fire, oxides of carbon, hydrocarbons, fumes, and smoke may be produced.				
HAZARDOUS POLYMERIZATION MAY OCCUR: WILL NOT OCCUR: XXX		CONDITIONS TO AVOID: None		
SECTION 11 - TOXICOLOGICAL INFORMATION				
Hazardous Ingredients	CAS #	EINECS #	LD50 of Ingredient (Specify Species and Route)	LC50 of Ingredient (Specify Species)
No hazardous materials present as defined by OSHA - 29 CFR 1910.1000; EPA - 40 CFR 260 - 281, 302, 355, 370, 372; DOT - 49 CFR 172; WHMIS or EC Directive 91 / 155 / EEC.				
SECTION 12 - ECOLOGICAL INFORMATION				
No data are available on the adverse effects of this material on the environment. Neither COD nor BOD data are available. Based on the chemical composition of this product it is assumed that the mixture can be treated in an acclimatized biological waste treatment plant system in limited quantities. However, such treatment should be evaluated and approved for each specific biological system. None of the ingredients in this mixture are classified as a Marine Pollutant.				
SECTION 13 - DISPOSAL CONSIDERATIONS				
WASTE DISPOSAL METHOD: Dispose of in accordance with Local, State, and Federal Regulations. Products classified as non - hazardous may become hazardous waste upon contact with other products. Refer to "40 CFR Protection of Environment Parts 260 - 299" for complete waste disposal regulations. Consult your local, state, or Federal Environmental Protection Agency before disposing of any chemicals.				
SECTION 14 - TRANSPORT INFORMATION				
PROPER SHIPPING NAME: Not Regulated				
HAZARD CLASS / Pack Group: None / None REFERENCE: Not Applicable IDENTIFICATION NUMBER: None LABEL: None Required		IATA HAZARD CLASS / Pack Group: None IMDG HAZARD CLASS: None RID/ADR Dangerous Goods Code: None Canadian TDG Class / Division: None HAZARD SYMBOLS: None		
Note: Transportation information provided is for reference only. Client is urged to consult CFR 49 parts 100 - 177, IMDG, IATA, EC, Canadian TDG, and United Nations TDG information manuals for detailed regulations and exceptions covering specific container sizes, packaging materials and methods of shipping.				

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: American Pride Interior Latex Eggshell Toned White
June 28, 2005

Page 4 of 4

SECTION 15 - REGULATORY INFORMATION

TSCA (Toxic substance Control Act)

All components of this product are listed on the U.S. Toxic Substances Control Act Chemical Inventory (TSCA Inventory) or are exempted from listing because a Low Volume Exemption has been granted in accordance with 40 CFR 723.50.

SARA TITLE III (Superfund Amendments and Reauthorization Act)

311/312 Hazard Categories

None

313 Reportable Ingredients:

None

CERCLA (Comprehensive Response Compensation and Liability Act)

None

CPR (Canadian Controlled Products Regulations)

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations. WHMIS Classification: Not controlled

IDL (Canadian Ingredient Disclosure List)

Components of this product identified by CAS number and listed on the Canadian Ingredient Disclosure List are shown in Section 2.

DSL / NDSL (Canadian Domestic Substances List / Non-Domestic Substances List)

Components of this product identified by CAS number are listed on the DSL or NDSL, or are otherwise in compliance with the New Substances Notification (NSN) regulations. Only ingredients classified as "hazardous" are listed in Section 2 unless otherwise indicated.

EINECS (European Inventory of Existing Commercial Chemical Substances)

Components of this product identified by CAS numbers are on the European Inventory of Existing Commercial Chemical Substances.

EC Risk Phrases

Not classified

SYMBOL(S) REQUIRED FOR LABEL

Not classified

EC Safety Phrases

S2 Keep out of the reach of children.
S24/25 Avoid contact with skin and eyes.

SECTION 16 - OTHER INFORMATION

No specific notes.

HMIS HAZARD RATINGS

HEALTH

1

* = Chronic Health Hazard

2 = MODERATE

FLAMMABILITY

0

0 = INSIGNIFICANT

3 = HIGH

PHYSICAL HAZARD

0

1 = SLIGHT

4 = EXTREME

PERSONAL PROTECTIVE EQUIPMENT

A

Safety Glasses

REVISION SUMMARY:

This MSDS has been revised in the following sections:
Text update, various

MSDS Prepared by:

Comprehensive Data Base, Inc.

P.O. Box 5604

Lakeland, FL 33807 USA

(863) 644 - 3298 www.compdatabase.com

The information contained herein is believed to be accurate but is not warranted to be so. Data and calculations are based on information furnished by the manufacturer of the product and manufacturers of the components of the product. Users are advised to confirm in advance of need that information is current, applicable and suited to the circumstances of use. Vendor assumes no responsibility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Furthermore, vendor assumes no responsibility for injury caused by abnormal use of this material even if reasonable safety procedures are followed. Any questions regarding this product should be directed to the manufacturer of the product as described in Section 1.

SECTION 10 82 13

EXTERIOR GRILLES AND SCREENS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Modular exterior wall panels
 - 2. Panel support hardware
- B. Related Sections:
 - 1. 05 12 00: Structural Steel Framing
 - 2. 06 15 00: Wood Decking
 - 3. 07 27 00: Air Barriers
 - 4. 07 46 23: Wood Siding
 - 5. 07 62 00: Sheet Metal Flashing and Trim
 - 6. 07 71 23: Manufactured Gutters and Downspouts
 - 7. 07 71 33: Manufactured Scuppers
 - 8. 32 93 00: Plants
 - 9. 32 94 00: Planting Accessories

1.01 REFERENCES

- A. American Society for Testing of Materials (ASTM)
 - 1. A 500 - 2003 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
 - 2. A 82 – 2001 Mechanical, Physical and Performance Properties of Carbon Steel Wire
 - 3. A 641 – 2003 Zinc-Coated (Galvanized) Carbon Steel Wire
 - 4. A 879 – 2000 Steel Sheet, Zinc Coated by the Electrolytic Process for Applications Requiring Designation of the Coating Mass on Each Surface

1.02 SYSTEM DESCRIPTION

- A. Design Requirements
- B. Performance Requirements

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, standard details, and installation instructions located in the CUSD Operations and Maintenance Manual.
- B. Shop Drawings: Submit showing sizes, critical dimensions, panel layout, and details and locations of standard and custom accessories.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site
 - 1. Inspect panels upon arrival on site. Immediately report damaged or missing parts directly to the manufacturer.
- B. Storage and Protection
 - 1. Protect materials from damage. Store panels flat in a location in the High Voltage Lab (HVL) designated by the Construction Coordinator. Provide edge protection where strapping is used. Do not apply loads to panel edges.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. GREENscreen®
1743 S. Cienega Blvd.
Los Angeles, CA 90035
Phone: 800-450-3494
Fax: 310 8370523
Email: sales@greenscreen.com

2.2 PANELS

- A. GreenScreen Modular, Wall Hung Trellis Panel Construction
 - 1. Panels shall be rigid, three dimensional welded wire grid fabricated or 14 gage ASTM A641 galvanized steel wire.
 - 2. Face Grid: Wores shall be welded at each intersection to form a 2 inch x 2 inch face grid on the front and back of panels
 - 3. Trusses: Face grids shall be separated by bent wire trusses spaced at 2 inch centers and welded to front and back face grids at each truss apex.
 - 4. Thickness: 2 inches as shown on drawings
 - 5. Tolerance: 1/8 inch in width and _ inch in length.
- B. Panel Dimensions
 - 1. North Elevation (W x H):
 - a. Three 42" x 104" panels
 - b. Three 42" x 66" panels
 - c. Four 44" x 32" panels
 - 2. South Elevation (W x H)
 - a. Five 42" x 104"
 - 3. West Elevation (W x H)
 - a. Three 42" x 104"
 - 4. East Elevation (W x H)
 - a.

2.3 ACCESSORIES

- A. Trim
 - 1. Fabricated from 20 gage ASTM A879 galvanized steel
 - 2. Types:
 - a. Channel Trim: Thickness of panel x _ inch legs
 - b. Angle Trim: _ inch x _ inch legs
 - 3. Locations:

- a. Corners formed by intersections of panels: Angle
- b. Top of Treillage where exposed to pedestrians: Edge
- c. Side of Treillage where exposed to pedestrians: Edge
- d. Bottom of Treillage where exposed to pedestrians: Edge

- B. Clips and Straps: Provide manufacturer's standard types of clips and straps suitable for mounting conditions. Fabricate from ASTM A879 galvanized steel. Adjustable clips shall have _ inch diameter 18-8 stainless steel bolt, washer, and nut.
- C. Plastic Spacers: Use when mounting panels directly to wall. Provide _ inch thick black Ultra High Molecular Weight polyethylene (UHMW) washers to hold clips away from the mounting surface.
- D. Fasteners for mounting clips to steel canopy structure: use custom fabricated fasteners as indicated in drawings.

2.4 FINISHES

- A. Metal components (except fasteners) shall be factory finished after fabrication.
- B. Finish System: pretreat with general purpose, alkaline, water-based cleaner or degreaser applied at 240°F. Prime with zinc rich epoxy powder coat. Topcoat with polyester-urethane powder coat.
- C. Color: Gloss Silver
- D. Touch-Up Paint: Provide high quality , exterior-grade spray paint suitable for conditions of use.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Inspect substrates and conditions affecting work of Section. Do not process until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Structural Steel Posts: Complete installation of structural steel scaffolding as shown on drawing prior to installation of screens.

3.3 INSTALLATION

- A. Install panels plumb and square, centered within area designated for panels and aligned to maintain modular grid. Refer to drawings for specific location of each grid.
- B. Avoid cutting panels in field. Where field cutting is essential, apply touch-up paint to cut edges.
- C. Install securely with fasteners in locations indicated by drawings to meet manufacturer's requirements.
- D. Repair bent or damaged panels. If panels cannot be repaired to satisfaction of Construction Coordinator, contact the manufacturer and remove damaged panels from job site.

END OF SECTION 10 82 13

SECTION 11 28 13

COMPUTERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and methods necessary to install a computer
- B. Related Sections
 - 1. 11 28 00: Office Equipment
 - 2. 12 50 00: Furniture
 - 3. 25 10 00: Integrated Automation Network Equipment
 - 4. 26 09 00: Instrumentation and Control for Electrical Systems

1.02 SYSTEM DESCRIPTION

- A. Personal computer system for data communications.

1.03 SUBMITTALS

- A. Manufacturer's published data sheet, including:
 - 1. Model number
 - 2. Rough Dimensions
 - 3. Storage and handling requirement and recommendations.
 - 4. Installation methods
 - 5. List of included components
- B. Manufacturer's Instructions
 - 1. Installation and set up instructions.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Store product in manufacturer's unopened packaging until ready for installation.

1.06 WARRANTY

- A. Provide a copy of manufacturer's warranty, with manufacturer's instructions, in the CUSD Operations and Maintenance Manual.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Apple
 - 1 Infinite Loop
 - Cupertino, CA 95014
 - Phone: 1-800-692-7753
 - Website: <http://www.apple.com>

2.2 PRODUCTS

A. Apple Mac Mini: 1.66GHz Model number MA206LL/A

1. Dimensions: 6.5 x 6.5 x 2
2. Weight: 2.9 lbs
3. Hard Drive: 80GB 5400-rpm Serial ATA
4. Line Voltage: 100-240V AC
5. Maximum Continuous Power: 110 W
6. Meets ENERGY STAR requirements.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine computer immediately after removal from manufacturer's packaging. Report any damaged or missing components directly to the manufacturer.

3.2 INSTALLATION

- A. The computer shall be installed in accordance with manufacturer's published instructions.
- B. Manufacturer's installation instructions shall be located in the CUSD Operations and Maintenance Manual.

END OF SECTION 11 28 13

SECTION 11 31 13

RESIDENTIAL KITCHEN APPLIANCES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Combination washer and dryer front loading unit
- B. Related Sections
 - 1. 06 11 00: Wood Framing
 - 2. 06 12 00: Structural Insulated Panels
 - 3. 07 42 00: Wall Panels
 - 4. 09 2 00: Plaster and Gypsum Board
 - 5. 06 69 00: Access Flooring
 - 6. 09 90 00: Painting and Coating
 - 7. 10 82 00: Exterior Grilles and Screens
 - 8. 22 11 16: Domestic Water Piping
 - 9. 22 11 23: Domestic Water Pumps
 - 10. 23 31 00: HVAC Ducts and Casings
 - 11. 23 33 00: Air Duct Accessories

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. A117.1 Guidelines for Accessible and Useable Buildings and Facilities.
- B. Environmental Protection Agency (EPA)
 - 1. Energy Star Appliances
- C. Americans with Disabilities Act of 1990 – Public Law
 - 1. 101-336 Americans with Disabilities Act.

1.03 SUBMITTALS

- A. Manufacturer's published data sheets, including:
 - 1. Model Number
 - 2. Preparation instructions and recommendations.
 - 3. Rough dimensions and utility connections
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation tools and methods
 - 6. List of maintenance parts
- B. Manufacture's Warranty

1.04 QUALITY ASSURANCE

- A. Comply with applicable local codes and regulations.
- B. Provide appliances with the EPA Energy Star label where specified.
- C. Coordinate rough-in requirements with adjacent construction. Coordinate components and fittings to ensure compatible parts are installed.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site
 - 1. Inspect appliances upon delivery. Report any damaged or missing components.
- B. Packing, Shipping, Handling and Unloading
 - 1. Store appliance in manufacturer's packaging until ready for installation.
- C. Storage and Protection
 - 1. Store packed appliances in a fully enclosed structure that will provide protection from exposure to wind, rain, moisture, and ultraviolet light. Be sure the storage surface is level and sound.

1.06 PROJECT CONDITIONS

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

1.07 WARRANTY

- A. Provide manufacturer's warranty, with manufacturer's installation instructions, in the CUSD Operations Manual.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Fischer & Paykel Appliances
5900 Sylab Road
Huntington Beach, CA 92647
Phone: 1-888-936-7872
Fax: 949-790-8913
Web: <http://usa.fischerpaykel.com>
- B. Diva de Provence
207-885 Don Mills Road
Toronto, ON, Canada
M3C 1 V9
Phone: 1-888-852-8604
Fax: 416-256-7121
Email: agirgis@divainduction.com
Web: www.divainduction.com
- C. GE Consumer & Industrial Appliances
General Electric Company
Louisville, KY 40225
Web: www.geappliances.com

- D. Sub Zero Freezer Company
Customer Service Department
P.O. Box 44130
Madison, WI 53744 – 4130
Phone: 800-222-7820
Email: customerservice@subzero.com

2.2 PRODUCTS

- A. Fischer & Paykel Dishdrawer, model number: DS603FC – Single Dishdrawer
- B. Diva Induction Cooktop, model number: DDP-2
- C. GE Advantium 120 Above-the-Cooktop-Oven, model number: SCA1001KSS
- D. Sub-Zero Freezer Drawers, model number: 700BF(1)
Quantity: 3

PART 3 – EXECUTION

3.2 INSTALLATION

- A. Refer to manufacturer's data and installation sheets located in the CUSD Operations Manual for additional instruction.

END OF SECTION 11 31 13

SERVICES SPECIFICATIONS

WATER CONNECTION

Recommended HOT (Maximum 140°F/60°C).
Supplied hose to suit 3/8" male
compression fitting.

WATER SOFTENER MODELS

Refer to your DishDrawer® User Guide
for how to set up your water softener.

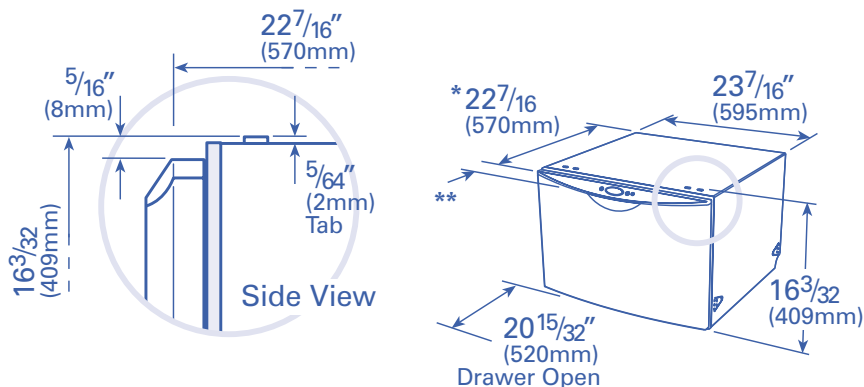
WATER PRESSURE

	Maximum	Minimum
Water Softener Models	145 p.s.i. (1000kPa)	14.5 p.s.i. (100kPa)
Other Models	145 p.s.i. (1000kPa)	4.3 p.s.i. (30kPa)

Prefinished model shown

*For an Integrated DishDrawer® the product depth is specified with an 1 1/16" (18mm) Integrated Panel thickness.

** Depth of product excludes Curvature 1 3/16" (30mm) - prefinished only, or Handle.



DRAIN CONNECTION

Drain Hose Joiner to suit Ø3/4" ± 5/64" and Ø5/8" ± 5/64" waste tees.

ELECTRICAL CONNECTION

110-120 VAC power outlet, 4.5 Amps Minimum.

WEIGHT

Full 93 lb (42kg) Prefinished
Empty 62 lb (28kg) Prefinished

LENGTH OF SERVICES (FROM PRODUCT EXIT POINT)

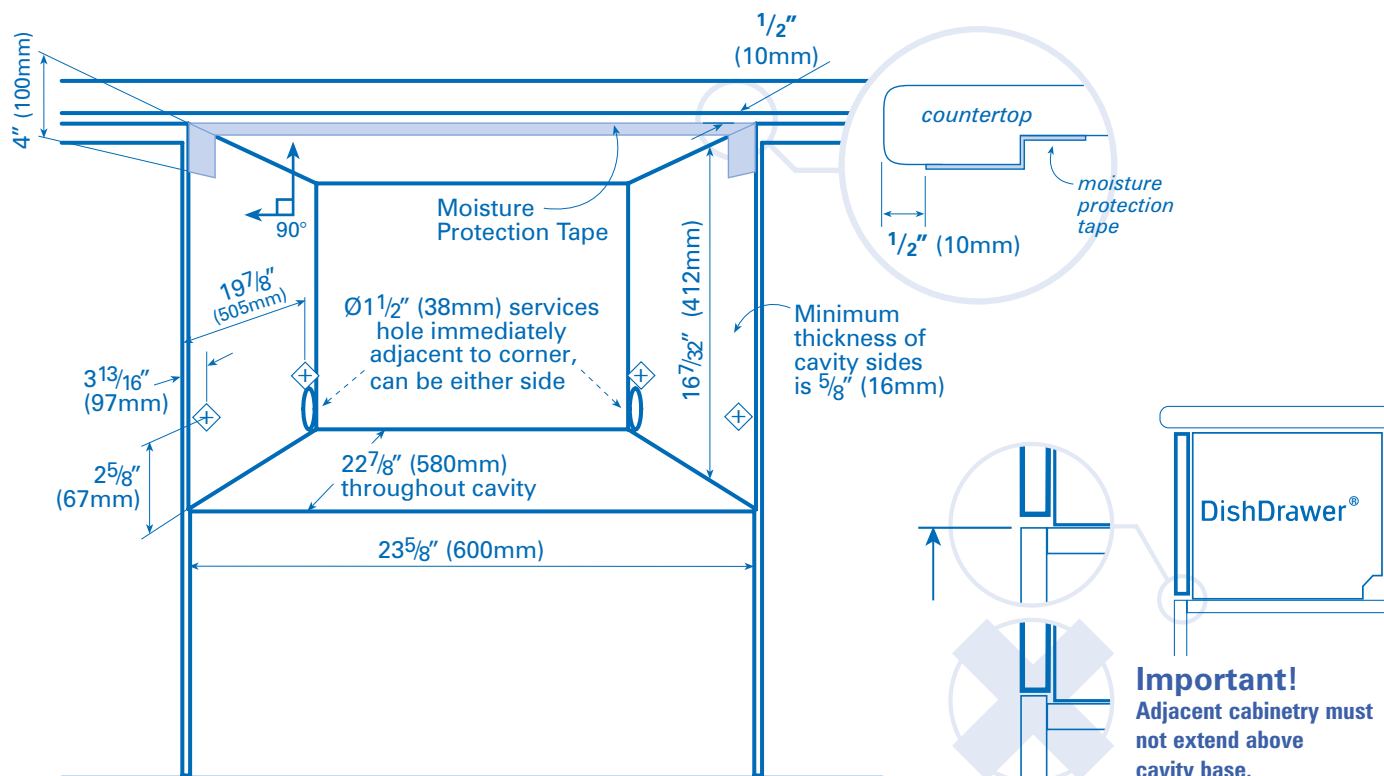
Drain hose - 88 9/16" (2250mm)

Inlet hose - 68 7/8" (1750mm)

Power supply cord - 44" (1965mm)

NOTE: Services approximately exit product 7 7/16" (189mm) from left;
21 5/8" (550mm) from front; 15 1/2" (393mm) from top.

THE CAVITY



◆ These marks indicate mounting
tab screw locations (refer to step 1
page 7)

NOTE: All depth measurements are taken
from the front face of the adjacent cabinetry.

NOTE: To align drawer front to adjacent
cabinetry, the product to countertop
clearance can be increased from 1/8" (3mm).

⚠ WARNING!

Be sure the edges of the services hole
are smooth or covered. If the services
hole is through a metal partition the
hole must be protected with the Edge
Protector provided to prevent damage to
the power cord or hoses.



Approved by:



Diva de Provence
885 Don Mills Road, Ste 207
Toronto, Ontario
M3C 1V9
Canada
Tel: (416) 256-2646
Fax: (416) 256-7121

Quick Installation Guide - DDP-2

To install the unit, create a cut-out in your countertop following the dimensions given on the drawing and the table below.

This cooktop must be installed in accordance with pertaining local building, trade, fire protection and electrical codes. If local codes do not exist, then installation must be done in accordance with federal codes.

The cooktop is to be connected - hard-wired - to the electrical power supply inside a client-supplied junction box which should be installed inside the cabinet below the unit. **The unit must be properly grounded.**

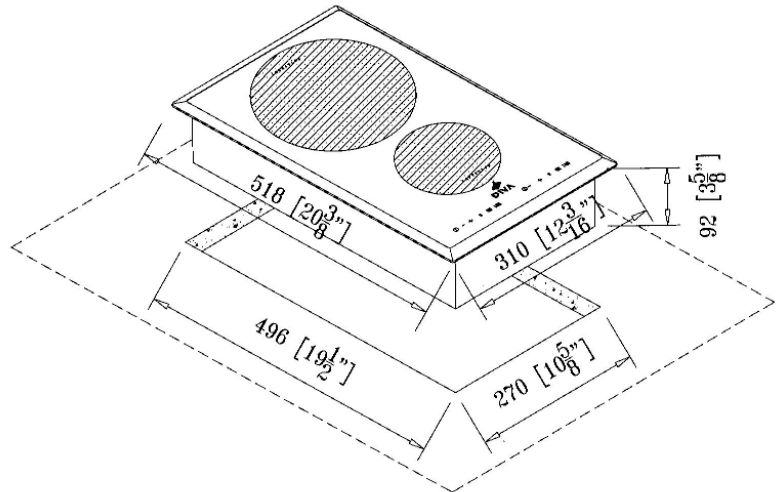
This cooktop is to be installed under a ventilation hood or a downdraft ventilation system.

DDP-2 Electrical Characteristics are:

Operating Voltage ... 240 V~ 60 Hz

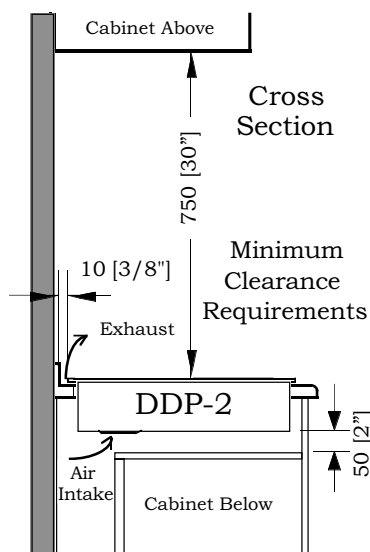
Max. Power Output ... 3600 W

**Connect to ... 240 V, 60 Hz, 2 Pole+G,
 20 A supply
 (3-wire #12 AWG)**



Cooktop and Cut-out Sizes	Width	Depth	Thickness
Cut-out Size	270 mm [10 5/8"]	496 mm [19 1/2"]	142 mm* [5 5/8"]*
Cooktop Box Size	263 mm [10 3/8"]	490 mm [19 1/4"]	92 mm [3 5/8"]
Cooktop Rim Size	310 mm [12 3/16"]	518 mm [20 3/8"]	10 mm [25/64"]

*This dimension includes clearance underneath the unit of 50 mm [2"]



Clearance

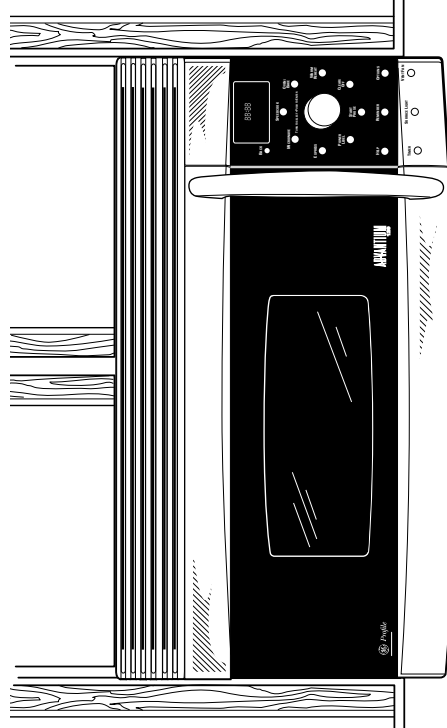
You should keep:

- **In the back of your unit** - between the unit and any vertical surface: minimum clearance of **10 mm (3/8")**;
- **If a downdraft ventilation system is used** - between the unit and the downdraft snorkel: minimum clearance of **6 mm (1/4")**;
- **Above the unit to any combustible surface** - e.g. cabinet above the unit: minimum clearance of **750 mm (30")**;
- **Below the unit** - between the bottom of the unit and any horizontal partition inside your cabinet: minimum clearance of **50 mm (2")**.



Profile™

SCA1001KSS – Advantium® 120 Above-the-Cooktop Oven



Page 117 of 209

Features and Benefits

- Speedcook technology – Delivers oven-quality food up to four times faster than a conventional oven
- Multiple cooking modes – Combine four ovens in one with speedcook, traditional, sensor microwave and warming options for a perfect second oven!
- Installation – Allows placement over a countertop, range or cooktop and plugs into any standard 120-volt/15-amp outlet
- Stainless steel interior – Durable surface that cleans quickly with a simply wipe of a towel
- Halogen Cooktop Lighting – Brilliant, natural-looking lighting illuminates every inch of the cooking surface
- Two-Speed, 300-CFM Venting System – Quickly removes smoke and steam from the cooktop
- Sensor cooking controls – Automatically adjust the time and power for perfect cooking results
- Auto/Time Defrost – Automatically defrosts for a specified amount of time
- Help mode – Offers useful cooking tips
- Model SCA1001KSS – Stainless steel



SCA1001KSS – Advantium® 120 Above-the-Cooktop Oven

Hood Exhaust Duct

Outside ventilation requires a HOOD EXHAUST DUCT. Read the following carefully.

EXHAUST CONNECTION:

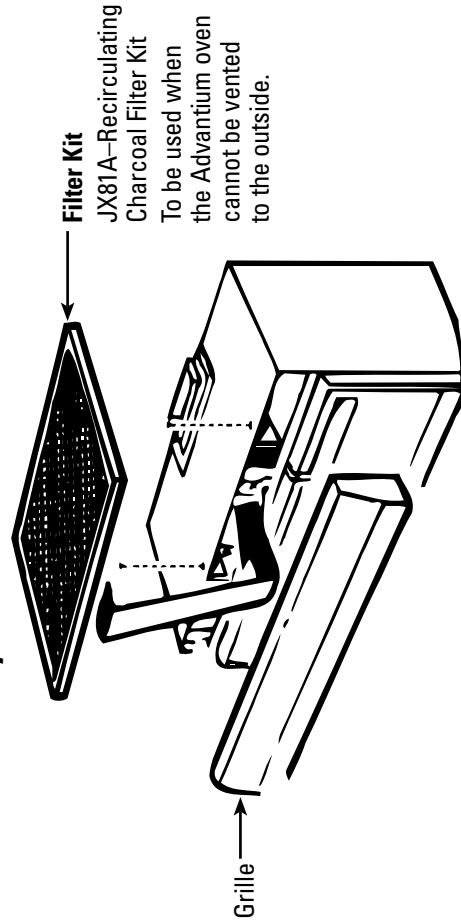
The hood exhaust has been designed to mate with a standard 3-1/4" x 10" rectangular duct.

If a round duct is required, a rectangular-to-round transition adaptor must be used. Do not use less than a 6" diameter duct.

REAR EXHAUST:

If a rear or horizontal exhaust is to be used, care should be taken to align exhaust with the space between studs, or wall should be prepared at the time it is constructed by leaving enough space between the wall studs to accommodate exhaust.

Filter Kit Accessory



MAXIMUM DUCT LENGTH:

For satisfactory air movement, the total duct length of 3-1/4" x 10" rectangular or 6" diameter round duct should not exceed 140 equivalent feet.

ELBOWS, TRANSITIONS, WALL AND ROOF CAPS, etc., present additional resistance to airflow and are equivalent to a section of straight duct which is longer than their actual physical size. When calculating the total duct length, add the equivalent length of all transitions and adaptors plus the length of all straight duct sections. The chart below shows the approximate feet of equivalent length of some typical ducts.

Duct	Equivalent
A. Rectangular-To-Round Transition Adaptor	5 Ft.
B. Wall Cap	40 Ft.
C. 90° Elbow	10 Ft.
D. 45° Elbow	5 Ft.
E. 90° Elbow	25 Ft.
F. 45° Elbow	5 Ft.
G. Roof Cap	24 Ft.

For answers to your Monogram® GE Profile™ or GE® appliance questions, visit our website at GEAppliances.com or call GE Answer Center® service, 800.626.2000.

Integrated Model 700BF(I) Freezer Drawers



INTEGRATED



Model 700BF



Model 700BFI
with Ice Maker

Seamless molding

Location of serial
number

Magnetic drawer
gaskets

Front venting with
removable kickplate

Electronic digital
control panel

Upper freezer
storage drawer

Automatic ice maker
(Model 700BFI)

Lower freezer
storage drawer



These appliances are Star-K certified from the factory to meet strict religious regulations in conjunction with specific instructions found on star-k.org. No extra wiring harness is required.

► The Sub-Zero Model 700BF and 700BFI integrated design accepts custom wood or stainless steel drawer panels. Stainless steel panels and handles are available as sales accessories in three finishes—classic, platinum and carbon.

Consider using this two drawer unit in conjunction with a Model 601R, all refrigerator. Many customers do not have the need for lots of freezer storage in their home. With the emphasis on fresh food, customers need more refrigerator space. Now you can satisfy this need with the combination outlined above.

There is one temperature for the entire unit and the range you have is from -5°F (-20°C) to +5°F (-15°C).

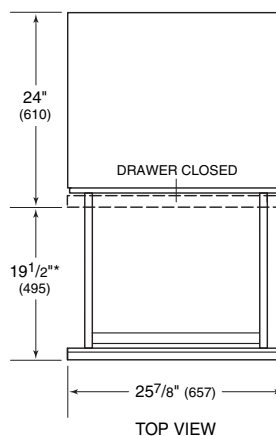
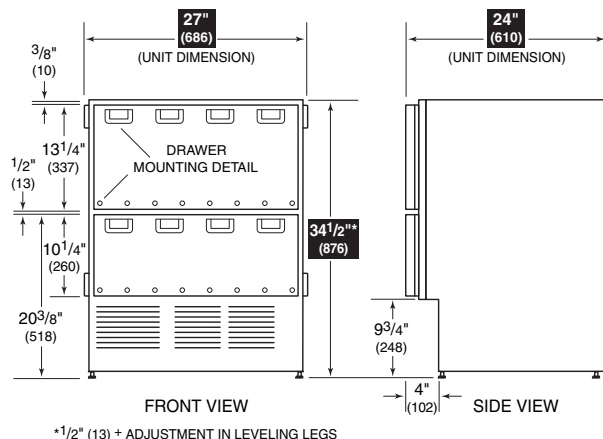
Also keep in mind that this unit can be ordered with and without an ice maker.

Integrated Model 700BF(I)

FEATURES

- ▶ Drawer unit with freezer storage drawers
- ▶ Model 700BFI has automatic ice maker
- ▶ Integrated design for "point-of-use" refrigeration anywhere in the home
- ▶ Refrigeration system ensures the best food storage and energy efficiency
- ▶ Microprocessor offers precise temperature control
- ▶ Electronic digital controls are easily accessed in the top storage drawer
- ▶ Flat to the ceiling bright lighting in storage drawers
- ▶ Alarm will let you know with an audible beeping if a drawer is left open
- ▶ Top drawer has a removable divider
- ▶ Meets strict Department of Energy requirements
- ▶ UL approved for US and Canada
- ▶ Two, five and twelve year residential warranty – exclusions apply; warranty information can be found on our website, subzero.com

OVERALL DIMENSIONS



*DRAWER PANEL THICKNESS NOT INCLUDED



Dimensions may vary by $\pm 1/8"$ (3).

Dimensions in parentheses are in millimeters unless otherwise specified.



Integrated Model 700BF(I)



INTEGRATED

MODEL OPTIONS ▼

Drawer Freezer Unit	700BF
Drawer Freezer Unit with Automatic Ice Maker	700BFI

PANEL OPTIONS ▼

Integrated (custom panels)	
Classic Stainless Steel Finish	/S
Platinum Stainless Steel Finish	/P
Carbon Stainless Steel Finish	/B

Stainless steel drawer front panels are ordered and shipped as sales accessories and include tubular handles.

ACCESSORIES

- ▶ Drawer front panels with tubular handles in classic, platinum and carbon stainless steel
- ▶ Tubular handles in classic, platinum and carbon stainless steel and polished chrome
- ▶ Dual installation heater kit

Accessories are available through your Sub-Zero dealer. To obtain local dealer information, visit the Locator section of our website, subzero.com.

SPECIFICATIONS ▼

Model 700BF(I)	Drawer Freezer Unit
Overall Width	27" (686)
Overall Height	34 1/2" (876)
Overall Depth	24" (610)
Freezer Capacity	5.1 cu ft (144 L)
Minimum Height (levelers in)	34" (864)
Drawer Clearance	19 1/2" (495)
Electrical Requirements	115 V AC, 60 Hz, 15 amp circuit
Plumbing Requirements	1/4" copper line
Water Supply	20–100 psi
Annual Energy Usage (based on 9.06 cents per kilowatt hour)	488 kWh / \$45
Shipping Weight	190 lbs (86 kg)
Special Note	Drawer panels and handles are available in three stainless steel finishes

Specifications are subject to change without notice.

SECTION 11 31 23

RESIDENTIAL LAUNDRY APPLIANCES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Combination washer and dryer front loading unit
- B. Related Sections
 - 1. 06 11 00: Wood Framing
 - 2. 06 12 00: Structural Insulated Panels
 - 3. 07 42 00: Wall Panels
 - 4. 09 2 00: Plaster and Gypsum Board
 - 5. 06 69 00: Access Flooring
 - 6. 09 90 00: Painting and Coating
 - 7. 10 82 00: Exterior Grilles and Screens
 - 8. 22 11 16: Domestic Water Piping
 - 9. 22 11 23: Domestic Water Pumps
 - 10. 23 31 00: HVAC Ducts and Casings
 - 11. 23 33 00: Air Duct Accessories

1.02 REFERENCES

- A. American National Standards Institute (ANSI)
 - 1. A117.1 Guidelines for Accessible and Useable Buildings and Facilities.
- B. Environmental Protection Agency (EPA)
 - 1. Energy Star Appliances
- C. Americans with Disabilities Act of 1990 – Public Law
 - 1. 101-336 Americans with Disabilities Act.

1.03 SUBMITTALS

- A. Manufacturer's published data sheets, including:
 - 1. Model Number
 - 2. Preparation instructions and recommendations.
 - 3. Rough dimensions and utility connections
 - 4. Storage and handling requirements and recommendations.
 - 5. Installation tools and methods
 - 6. List of maintenance parts
- B. Manufacture's Warranty

1.04 QUALITY ASSURANCE

- A. Comply with applicable local codes and regulations.
- B. Provide appliances with the EPA Energy Star label where specified.
- C. Coordinate rough-in requirements with adjacent construction. Coordinate components and fittings to ensure compatible parts are installed.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site
 - 1. Inspect appliances upon delivery. Report any damaged or missing components.
- B. Packing, Shipping, Handling and Unloading
 - 1. Store appliance in manufacturer's packaging until ready for installation.
- C. Storage and Protection
 - 1. Store packed appliances in a fully enclosed structure that will provide protection from exposure to wind, rain, moisture, and ultraviolet light. Be sure the storage surface is level and sound.

1.06 PROJECT CONDITIONS

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

1.07 SEQUENCING

1.08 SCHEDULING

1.09 WARRANTY

- A. Provide manufacturer's warranty, with manufacturer's installation instructions, in the CUSD Operations Manual.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. LG
LG Customer Interactive Center
P.O. Box 240007
201 James Record Road
Huntsville, Alabama 35824
Phone: 1-800-243-0000
Website: <http://www.LGservice.com>
Email: <http://www.LGEservice.com/techsup.html>

2.2 PRODUCTS

- A. LG WM3431HS: Combination Washing and Drying Machine
 - 1. Dimensions: 23-3/8 inches W x 33-1/4 inches H x 25-3/8 inches D
 - 2. Power Supply: 120 V, 60Hz
 - 3. Weight: 147 pounds
 - 4. Capacity: 2.11 cu ft and 8-13/16 pounds
 - 5. Energy Star Rated
 - 6. Ventless
 - 7. Titanium Finish (Model has both white and titanium finish)
- B. Provided Installation Accessories
 - 1. Hose
 - a. Hot Water Hose
 - b. Cold Water Hose
 - 2. Wrench
 - 3. Tie strap
 - a. Use to secure drain hose to standpipe, inlet hose, or laundry tub.
- C. Required Connections
 - 1. Electrical Connection
 - a. Connect the supply cord to a grounded outlet.
 - 2. Water Supply Connection
 - a. Connect hot and cold water supply hoses to hot and cold water taps. Use provided sealing washers to prevent leaks.
 - b. Water supply pressure must be between 4.5 and 145 PSI
 - 3. Water Drainage Connection
 - a. Install the drain hose in accordance with manufacturer's installation instructions.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Inspect appliances upon delivery. Report any damaged or missing components.
- B. Do not begin installation until substrates have been properly prepared. Coordinate rough-in with appliance sizes and utility requirements.
- C. 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.

3.3 INSTALLATION

- A. Remove all packing and shipping bolts before beginning installation. Use the provided wrench to remove the four packing bolts and keep both the wrench and bolts for future use.
- B. Close the holes left by the packing bolts with the supplied caps.
- C. Assemble appliances and trim and install in accordance with manufacturer's instructions and the following:
 - 1. Securely mount to substrate. Spacing of 1 inch on all sides of the washer is recommended to reduce noise transfer.
 - 2. Install appliances plumb and level in proper relationship to adjacent construction. Allowable slope under the entire washer is 1 inch
 - 3. Connect appliances to building utility, supply and waste systems as applicable.
 - 4. Test for proper operation and drainage. Adjust until proper operation is achieved.
- D. Refer to manufacturer's data and installation sheets located in the CUSD Operations Manual for additional instruction.

END OF SECTION 11 31 23



WASHER/DRYER COMBO

WM3431HW WM3431HS

All-In-One Washer and Dryer

Performance

- NeveRust Stainless Steel Drum
- 2.44 Cu.Ft. Capacity (IEC)
- Direct Drive Motor is Highly Reliable, Durable and Quiet
- 1400 RPM Maximum Spin Speed
- Ventless Condensing Drying System
- 115V Power Source

Intelligent Fabric Care

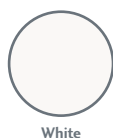
- SenseClean System Automatically Adjusts Water and Wash Time for Optimal Care
- Sensor Dry System Measures Moisture in the Drum and Automatically Adjusts Drying Time and Temperature for Optimal Care
- Flexibility of Wash to Dry, Wash Only or Dry Only
- 9 Wash Programs
- 5 Rinse Temperatures
- Sanitary Cycle
- Delay Wash up to 19 hours

Style and Design

- 24" Installation Under Counter
- Premium Finishes in Titanium and White
- Upfront Electronic Controls with Dial-A-Cycle
- Chrome Trimmed Door with Clear Glass

Environmentally Friendly

- Energy Star Rated
- LoDecibel Quiet Operation



White



Titanium



LG front load washers exceed Energy Star® classifications by a minimum of 39%.



WASHER/DRYER COMBO



All-in-One Washer and Dryer

This laundry dream washes and dries all in one machine.

Who Is It for?

People who want to be able to do laundry at home but don't have an external venting source which conventional dryers require. It's great for busy people who want to start a load and return to clean clothes. The Delay Start feature allows convenient completion of laundry to fit your schedule. Homes, apartments, businesses and vacation homes where there may be space constraints.

What Are The Advantages?

No outside venting is required because it is ventless condensing. It runs on a standard 115V electricity and not gas. No need to wait to transfer from the washer to the dryer.

What Else Should I Know?

Ventless condensing dries from within the drum so the water that is extracted from the clothes drains through the drum and out the water pump. This drying process takes longer than conventional drying.

It requires installation where a water hook-up is available.

WM3431HW
WM3431HS

TYPE	
Front Loader	•
Design Look	Front Panel
Intelligent Electronic Controls with Dial-A-Cycle	•
Drying System	Ventless Condensing
CAPACITY	
Total Capacity	2.44 cu.ft. (IEC)
Maximum Dry Capacity	8.8 lbs.
ENERGY	
Energy Star Compliant	•
PROGRAMS	
9 Wash Programs	Sanitary, Cotton/Towels, Normal, Permanent Press, Delicates, Wool/Silk, Hand Wash, Speed Wash, Drain & Spin
5 Wash/Rinse Temperature Levels	Extra Hot/Cold, Hot/Cold, Warm/Warm, Warm/Cold, Cold/Cold
Spin Speeds	1400 RPM, Extra High, High, Medium, Low, No Spin
5 Dry Times	150 min, 120 min, 90 min, 60 min, 30 min
Temperature Options	Normal, Low Temperature
Water Level	Automatic
No. of Soil Levels	5
Options	Extra Rinse, Rinse & Spin, Soak, Extra Wash, Spin Only, Dry Only, Delay Wash up to 19 Hours
FABRIC CARE FEATURES	
SenseClean	•
Sensor Dry	•
CONVENIENCE FEATURES	
3 Tray Dispenser (Main Wash, Bleach, Softener)	•
End of Cycle Beeper	•
Child Lock	•
Self Diagnosis	•
Auto-Balancing	•
Auto Suds Removal	•
Forced Drain System	•
Remaining Time Display/Status Indicator	•
Water Heater	•
Leveling Legs	4 Adjustable
LoDecibel Quiet Operation	•
MOTOR AND AGITATOR	
Motor Type / Motor Speed	Direct Drive / Variable
Agitator Type	Horizontal Axis
MATERIALS AND FINISHES	
NeveRust Stainless Steel Drum	•
Transparent Glass Window Door	•
Door Rim	Chrome
Cabinet	Painted Steel
Cabinet Top	Premium Plastic
Control Panel	Plastic
Colors	White, Titanium
POWER SOURCE	
Ratings/Requirements	UL Listed/120V, 60Hz, 10 Amps
Type	Electric
DIMENSIONS	
Product (WxHxD)	23 5/8" x 33 1/4" x 23 13/16" (25"D including door)
Weight (lbs): Net / Gross	147 / 163
WARRANTY	
	1 year parts and labor 2 years on the control board 7 years on the motor Lifetime on the drum
UPC CODE	
White	048231 008594
Titanium	048231 008600

All trademarks are property of their respective owners.
Design and specifications are subject to change without notice.

LG ELECTRONICS INC.

1000 Sylvan Ave., Englewood Cliffs, NJ 07632

800.243.0000 | LGappliances.com

SECTION 12 24 13

ROLLER WINDOW SHADES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Electrically operated double-roller sunscreen and room darkening shades
 - 2. Electrically operated sunscreen roller shades
 - 3. Local group and master control system for shade operation
- B. Related Sections
 - 1. 06 10 00: Rough Carpentry
 - 2. 08 14 00: Wood Doors
 - 3. 08 35 13: Folding Doors
 - 4. 08 44 26: Glass Curtain Wall
 - 5. 08 52 00: Wood Windows
 - 6. 09 29 00: Gypsum Board Assemblies
 - 7. 23 06 13: Sensors and Transmitters
 - 8. 33 71 00: Wiring

1.01 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. G21 – 1996: Standard Practice for Determining Resistance of Synthetic Polymetric Materials to Fungi
- B. National Fire Protection Association (NFPA)
 - 1. 70 – 2005: National Electric Code
 - 2. 701-99 – 2004: Fire Tests for Flame Resistant Textiles and Films

1.02 SUBMITTALS

- A. Submit under provisions of Section 01 33 00
- B. Submit Environmental Certification and Third Party Evaluation per Section 1.5 Qualifications
- C. Product Data: Manufacturer's data sheet on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.
 - 3. Storage and handling requirements and recommendations.
 - 4. Mounting details and installation methods.
 - 5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable.
- D. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.
- E. Window Treatment Schedule: For all roller shades: Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

- F. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.
- G. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.
- H. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.
- C. Fire-Test Response Characteristics: Passes NFPA 701-99 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.
- D. Electrical Components: NFPA Article 100 listed and labeled by either UL or ETL or other testing agency acceptable to authorities having jurisdiction, marked for intended use, and tested as a system. Individual testing of components will not be accepted in lieu of system testing.
- E. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- F. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristic, and perpetual use certification as specified below. Initial submittals, which do not include the Environmental Certification, below will be rejected. Materials that are simply 'PVC-free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.
- G. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.
- H. Recycling Characteristics: Provide documentation that the shade cloth can and is part of a closed loop of perpetual use and not be required to be down cycles, incinerated or otherwise thrown away. Scrap metal can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.05 PROJECT CONDITIONS

- A. Environmental Limitations: Install roller shades after finish work including painting is completed and ambient temperature and humidity conditions are maintained at the level indicated for Project when occupied for its intended use.

1.06 WARRANTY

- A. Roller Shade Hardware, China and Shadecloth (except EcoVeil): Manufacturers non-depreciating twenty-five year limited warranty.
 - 1. EcoVeil standard non-depreciating 10-year limited warranty.
- B. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five-year warranty.
- C. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. MechoShade Systems, Inc.
42-03 35th Street
Long Island City, NY 11101
Phone: 718-729-2020
Fax: 718-729-2941
Email: info@mechoshade.com
Website: www.mechoshade.com
- B. MechoShade Contact
Judy Berman
Phone: 203-762-0067
Email: judyb@mechoshade.com

2.2 EXISTING PRODUCTS

- A. Roller Shade Type 6: Motorized interior “double,” solar and room darkening blackout roller shades, operating independently of each other, in all exterior windows of rooms and spaces shown on Drawings, and related motor control systems.

2.3 MATERIALS

- A. Shade Cloth
 - 1. Room darkening (PVC Free) Shadecloth with opaque backing: Mechoshade Systems Inc., “Equinox 0100 series,” .008 inches thick blackout material and weighting 94 lbs per square yard, comprising of 53% fiberglass, 45% acrylic, 2% poly finish.
 - a. Color: Selected from manufacturer's standard colors.
 - 2. Environmentally Certified Shadecloth: Mechoshade Systems, Inc., EcoVeil group, 1350 Series, fabricated from TPO for both core yarn and jacket, single thickness, non-raveling .03 inch thick fabric.
- B. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
 - 1. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of

appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.

2. Shade band and Shade Roller Attachment:

- a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inches in diameter for manual shades, and less than 2.55 inches for motorized shades are not acceptable.
- b. Provide for positive mechanical engagement with drive / brake mechanism.
- c. Provide for positive mechanical attachment of shade band to roller-tube; shade band shall be made removable / replaceable with a "snap-on" "snap-off" spline mounting, without having to remove shade roller from shade brackets.
- d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
- e. Any method of attaching shade band to rolled tube that required the use of adhesive, adhesive tape, staples, and/or rivets are not acceptable.

2.4 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
- B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:
 1. Concealed hemtube
- C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.
- E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.
- F. Blackout shadebands, when used in side channels, shall have horizontally mounted, roll-formed stainless steel or tempered-steel battens not more than 3 feet (115 mm) on center extending fully into the side channels. Battens shall be concealed in a integrally-colored fabric to match the inside and outside colors of the shadeband, in accordance with manufacturer's published standards for spacing and requirements.
 1. Battens shall be roll formed of stainless steel or tempered steel and concave to match the contour of the roller tube.

2. Batten pockets shall be self-colored fabric front and back RF welded into the shadecloth. A self-color opaque liner shall be provided front and back to eliminate any see through of the batten pocket that shall not exceed 1-1/2 inches (38.1 mm) high and be totally opaque. A see-through moiré effect, which occurs with multiple layers of transparent fabrics, shall not be acceptable.

2.5 COMPONENTS

- A. Access and Material Requirements:
 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer's design criteria).
- B. Motorized Shade Hardware and Shade Brackets
 1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade.
 2. Provide shade hardware system that allows for field adjustment of motor or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
 3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the motor axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade motor (multi-banded shade, subject to manufacturer's design criteria).
- C. Manual Operated Chain Drive Hardware and Brackets:
 1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
 2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
 3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
 4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
 5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
 6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable
 7. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
 8. Drive Bracket / Brake Assembly:

- a. MechoShade Drive Bracket model M5 shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
 - b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
 - c. The brake shall be an over -unning clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. (22 kg) in the stopped position.
 - d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
 - e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
- D. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.6 SHADE MOTOR DRIVE SYSTEM

- A. Shade Motors:
- 1. Tubular, asynchronous (non-synchronous) motors, with built-in reversible capacitor operating at 110v AC (60hz), single phase, temperature Class A, thermally protected, totally enclosed, maintenance free with line voltage power supply equipped with locking disconnect plug assembly furnished with each motor.
 - 2. Conceal motors inside shade roller tube.
 - 3. Maximum current draw for each shade motor of 2.3 amps.
 - 4. Use motors rated at the same nominal speed for all shades in the same room.
- B. Total hanging weight of shade band shall not exceed 80 percent of the rated lifting capacity of the shade motor and tube assembly.

2.7 MOTOR CONTROL SYSTEMS

- A. IQ/MLC: Specifications and design of shade motors and motor control system are based on the IQ/MLC motor logic control system manufactured by MechoShade Systems, Inc. Other systems may be acceptable provide that all of the following performance capabilities are provided. Motor logic control systems not in complete compliance with these performance criteria shall not be accepted as equal systems.
- 1. Motor Control System:
 - a. Provide power to each shade motor via individual 3 conductor line voltage circuits connecting each motor to the relay based motor logic controllers (IQ/MLC).
 - b. Control system components shall provide appropriate (spike and brown out) over-current protection (+/- 10 percent of line voltage) for each of the four individual motor circuits and shall be rated by UL or ETL as a recognized component of this system and tested as an integrated system.
 - c. Motor control system shall allow each group of four shade motors in any combination to be controlled by each of four local switch ports, with up to fourteen possible "sub-group" combinations via local 3 button wall switches and all at once via a master 3 button switch. System shall allow for overlapping switch combinations from two or more local switches.

- d. Multiple "sub-groups" from different IQ/MLC control components shall be capable of being combined to form "groups" operated by a single 3 button wall switch, from either the master port or in series from a local switch port.
 - e. Each shade motor shall be accessible (for control purposes) from up to four local switches and one master switch.
 - f. Control system shall allow for automatic alignment of shade hem bars in stopped position at 25 percent, 50 percent, and 75 percent of opening heights, and up to three user-defined intermediate stopping positions in addition to all up / all down, regardless of shade height, for a total of five positions. Control system shall allow shades to be stopped at any point in the opening height noting that shades may not be in alignment at these non-defined positions).
 - g. Control system shall have two standard operating modes: Normal mode allowing the shades to be stopped anywhere in the window's opening height and uniform mode, allowing the shades to only be stopped at the predefined intermediate stop positions. Both modes shall allow for all up / all down positioning.
 - h. Control system components shall allow for interface with both audiovisual system components and building fire and life safety system via a dry contact terminal block.
 - i. Control system components shall allow for interface with external analog input control devices such as solar activated controllers, 24 hour timers, and similar items; via a dry contact terminal block.
 - j. Reconfiguration of switch groups shall not require rewiring of the hardwired line voltage motor power supply wiring, or the low voltage control wiring. Reconfiguration of switch groups shall be accomplished within the motor control device (IQ/MLC).
2. Wall Switches:
- a. Three-button architectural flush mounted switches with metal cover plate and no exposed fasteners.
 - b. Connect local wall switches to control system components via low voltage (12V DC) 4-conductor modular cable equipped with RJ-11 type connectors supplied, installed and certified under Division 16 - Electrical.
 - c. Connect master wall switches to control system components via low voltage (12V DC) 6-conductor modular cable equipped with RJ-12 type connectors supplied, installed and certified under Division 16 - Electrical.
- 2.8 FABRICATION
- A. Shop Assembly
 - B. Fabrication Tolerances
- 2.9 FINISHES
- A. Shop Priming
 - B. Shop Finishing
- 2.10 SOURCE QUALITY CONTROL
- A. Tests
 - B. Inspection
 - C. Verification of Performance

PART 3 – EXECUTION

- 3.1 INSTALLERS
- 3.2 EXAMINATION
 - A. Site Verification of Conditions
- 3.3 PREPARATION
 - A. Protection
 - B. Surface Preparation
- 3.4 ERECTION
- 3.5 INSTALLATION
- 3.6 APPLICATION
- 3.7 CONSTRUCTION
 - A. Special Techniques
 - B. Interface with Other Work
 - C. Sequences of Operation
 - D. Site Tolerances
- 3.8 REPAIR/ RESTORATION
- 3.9 REINSTALLATION
- 3.10 FIELD QUALITY CONTROL
 - A. Site Tests
 - B. Inspection
 - C. Manufacturer's Field Services
- 3.11 ADJUSTING
- 3.12 CLEANING
- 3.13 DEMONSTRATION
- 3.14 PROTECTION
- 3.15 SCHEDULES

END OF SECTION 12 43 13

SECTION 12 36 00

COUNTERTOPS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Solid surface kitchen countertop with sink
 - 2. Solid surface lavatory countertop with sink
- B. Related Sections:
 - 1. 06 11 00: Wood Framing
 - 2. 06 16 00: Sheathing
 - 3. 12 35 30: Residential Casework
 - 4. 22 41 16: Residential Lavatories and Sinks
 - 5. 22 41 39: Residential Faucets, Supplies, and Trim

1.01 DEFINITIONS

- A. Solid Surface: Nonporous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

1.02 SUBMITTALS

- A. 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.
- B. Samples
 - 1. For each type of product indicated submit a sample.
- C. Manufacturer's Instructions
 - 1. Submit manufacturer's installation manual.
 - 2. Submit manufacturer's care and maintenance manual.

1.03 QUALITY ASSURANCE

- A. Coordination drawings:
 - 1. Shall be prepared indicating:
 - a. Plumbing work
 - b. Electrical work
 - c. Miscellaneous steel for the general work
 - d. Indicate location of all walls (rated and non rated), clocking location and recessed wall items, etc.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver no components to project site until areas are ready for installation.
- B. Store components in the High Voltage Lab (HVL) 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.

1.05 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.

1.06 MAINTENANCE

- A. Provide maintenance requirements as specified by the manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Corian® surfaces from the DuPont Company
Maple Run
4417 Lancaster Pike
Wilmington, DE
Phone: 1-800-436-6072
Fax: 302-992-2855
Website: www.corian.com

2.2 MATERIALS

- A. Corian "White" Countertop: solid polymer components:
 - 1. Cast, nonporous, filled polymer, not coated, laminated or of composite construction with through body colors meeting ANSI Z124.3 or ANSI Z124.6, having minimum physical and performance properties specified.
- B. Integral sink:
 - 1. Color: White
 - 2. Mounting
 - a. Seamed undermount
- C. Integral vanity
 - 1. Model number:
 - 2. Color
 - 3. Mounting
 - a. Seamed undermount

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.
- C. Sink/lavatory mounting hardware:
 - 1. Manufacturer's standard bowl clips, panel inserts and fasteners for attachment of undermount sinks/lavatories.
- D. Conductive tape:
 - 1. Manufacturer's standard foil aluminum foil tape, with required thickness, for use with cutouts near heat sources.
- E. Insulating felt tape:
 - 1. Manufacturer's standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.4 FABRICATION

A. Shop Assembly

1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions and technical bulletins.
2. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints.
 - a. Reinforce with strip of solid polymer material, 2" wide.
3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on the drawings.
4. Rout and finish component edges with clean, sharp returns.
 - a. Rout cutouts, radii and contours to template.
 - b. Smooth edges.
 - c. Repair or reject defective and inaccurate work.

2.5 FINISHES

- A. Color: White
- B. Finish: Semigloss

PART 3 – EXECUTION

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. Reinforced 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 surfaces scratches and clean entire surface.
 9. Install countertops with no more than 1/8 inch 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.

- C. Coved backsplashes and sidesplashes:
 - 1. Provide coved backsplashes and sidesplashes at all walls and adjacent millwork.
 - 2. Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on the drawings.
 - 3. Adhere to countertops using manufacturer's standard color-matched Joint Adhesive.
- D. Integral sinks/vanities:
 - 1. Provide solid surface materials bowls and/or lavatories sinks with overflows in locations shown on the drawings.
 - 2. Secure sinks and lavatory bowls to tops using manufacturer's recommended sealant, adhesive and mounting hardware to maintain warranty.

3.3 CLEANING

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

END OF SECTION 12 36 00

SECTION 22 09 00

INSTRUMENTATION AND CONTROL FOR PLUMBING

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Instrumentation and Control for Plumbing
- B. Related Sections
 - 1. 22 11 13: Domestic Water Piping
 - 2. 22 32 00: Domestic Water Filtration System
 - 3. 22 41 13: Residential Water Closets, Urinals and Bidets
 - 4. 22 41 16: Residential Lavatories and Sinks
 - 5. 22 41 39: Residential Faucets, Supplies and Trim
 - 6. 23 56 13: Heating Solar Vacuum-Tube Collectors
 - 7. 23 71 00: Thermal Storage
 - 8. 33 16 00: Water Utility Storage Tanks

1.02 SUBMITTALS

- A. Manufacturer's installation and service manual, located in the CUSD Operations and Maintenance manual.
- B. Manufacturer's pump head and replacement instructions
- C. Manufacturer's technical data sheets

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Vanguard Piping System
901 N. Vanguard Street
McPherson, KS 67460
Phone: 800-775-5039

2.2 PRODUCT

- A. Manablock Modular Plumbing System

2.3 ACCESSORIES

- A. Vanguard VANEX SDR9 PEX Cross-Linked Polyethylene Tubing

PART 3 – EXECUTION

3.1 INSTALLATION

- A. For detailed installation instructions refer to the manufacturer's installation guide in the CUSD Operations and Maintenance Manual.

END OF SECTION 22 09 00

THE SYSTEM



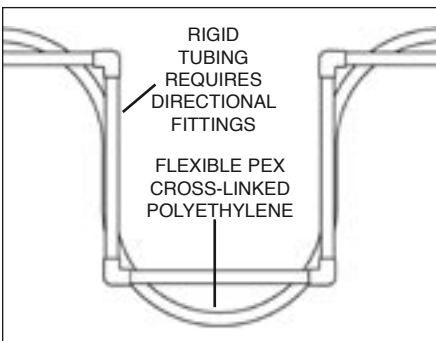
IMPORTANT

The MANABLOC plumbing system is intended for potable water distribution in residential and commercial applications. Installation of a MANABLOC plumbing system for purposes other than potable water distribution may constitute a misapplication of the product and void the warranty. Contact Vanguard Piping Systems, Inc. before applying this system for any use other than potable water distribution.

Components utilized in the MANABLOC plumbing system consist of Vanguard Vanex PEX cross-linked polyethylene tubing, fixture transition fittings, water service swivel connections, compression port connections and the MANABLOC control unit. The MANABLOC and Vanex PEX tubing are manufactured to national and international standards and are listed by recognized third-party agencies.



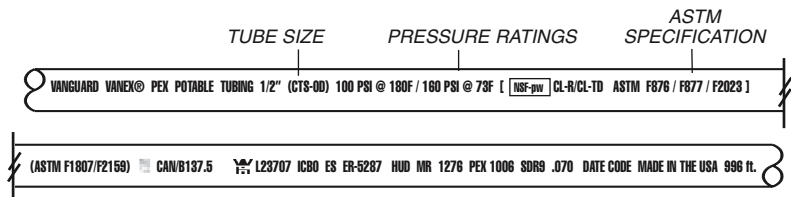
VANEX PEX TUBING



Vanex PEX tubing is flexible, reducing the need for most directional fittings in the distribution lines of a MANABLOC plumbing system.

Vanguard Vanex PEX cross-linked polyethylene tubing is produced to ASTM F876/F877 and is tested and listed by recognized agencies (such as NSF International) to the requirements of these standards. Vanex PEX tubing has a design pressure rating of 100 psi @ 180°F, and 160 psi @ 73°F. These are maximum-use ratings.

Vanex PEX tubing and the resin used in the manufacture of Vanex tubing have been tested, and listed by NSF to meet the requirements of ANSI/NSF 14/61, and NSF Protocol P171 CL-R/CL-TD, Chlorine Resistance of Plastic Piping Materials.



Maximum-use ratings are printed on the tubing.

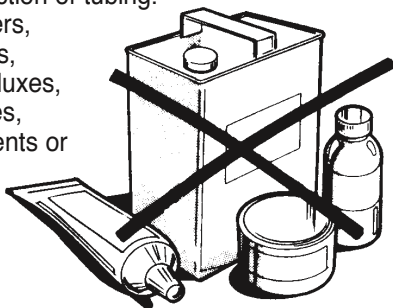


CAUTION!

Tubing that exhibits damage such as cuts, scratches, gouges, kinks, fading or discoloring, evidence of grease, tar or any chemical exposure shall not be used. PEX tubing must be stored away from direct and indirect sunlight.

A damp rag is all that should be required for cleaning the tubing. If any material (other than those allowed in this publication) has adhered itself to the tubing and cannot be removed in this manner, do not use that section of tubing.

NEVER use thinners, fuels, pipe sealants, solvent cements, fluxes, lubricants, bleaches, other oxidizing agents or petroleum based materials to seal or clean PEX tubing.



TOOLS REQUIRED

- Electric Drill
- Pencil or Pen
- Framing Square
- Tape Measure
- Tubing Cutter - Vanguard Part No. HAK6 or HAK67
- MANABLOC Wrench - Vanguard Part No. MW1
- 3/4" and 1 1/4" Wood Drill Bits
- #2 Phillips Head Screwdriver
- Permanent Marking Pen*
- PEX Crimp Tool(s)*

ADDITIONAL MATERIALS

- Wood or Drywall Screws - 1/2" or longer
- 1/2" or 3/4" Plywood - only required when not mounting between studs
- Nylon Ties - Vanguard Part No. HB14120
- PEX Distribution Line Tubing - See page 11
- 3/4" or 1" Supply Line Tubing
- MANABLOC 1" Swivel Supply Fittings
- Fixture Transition Fittings - See Pages 17 & 18 for MANABLOC water supply connections.
- Tubing Clamps and Hangers
- MANAPANEL Access Panel*
- Tubing Uncoiler*
- CLSE23 Tube Turnouts (recommended)

* Optional or may not be required for some installations

THE MANABLOC

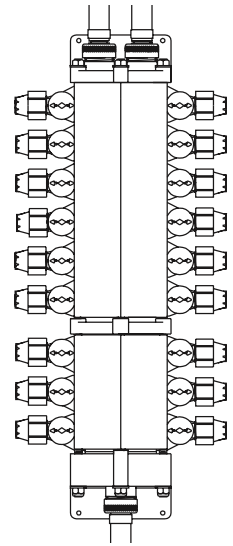
The MANABLOC control unit is tested to requirements of ASTM F877 and certified by NSF International.

The MANABLOC supply inlet connections utilize a special 1" MANABLOC gasketed swivel connection that requires MANABLOC transition fittings (not included in the MANABLOC package, must be purchased separately). Transition fittings available include NPT male thread, brass insert (PEX crimp) and compression.

Connections for the individual PEX distribution lines are a mechanical-type fitting and will not work with standard pipe fittings. Use only fittings supplied with the MANABLOC or other fittings designed for special port transitions available from Vanguard (see pages 14 and 15).

Warranty coverage applies **ONLY** if the MANABLOC is installed with Vanguard tubing and in accordance with the *Installation Instructions for the MANABLOC Modular Manifold Plumbing System*.

Protect the MANABLOC from construction debris, direct exposure to sunlight and inadvertent chemical exposure by storing it in its original shipping carton until installation.



SUPPLY AND DISTRIBUTION LINE SIZING

The general sizing information shown below may be appropriate for many MANABLOC installations. These recommendations are based on flow rates of typical fixtures that require 8 psi residual pressure. For more complete and definitive sizing information for distribution line length limitations, request the *MANABLOC Tube Size Guide* from your local supplier or from Vanguard.

Typical Supply line size:

3/4" up to 2 1/2 baths

1" up to 4 1/2 baths

Typical Distribution line size:

3/8" up to 2 1/2 GPM fixture flow requirement

(lavs, toilets, bidets, bar sinks, kitchen sinks, dishwashers, *some showers (no tub fill) and **some washing machines)

1/2" up to 4 GPM fixture flow requirement

(hose bibbs, tubs, showers, washing machines, whirlpool baths, soaking tubs, etc.)

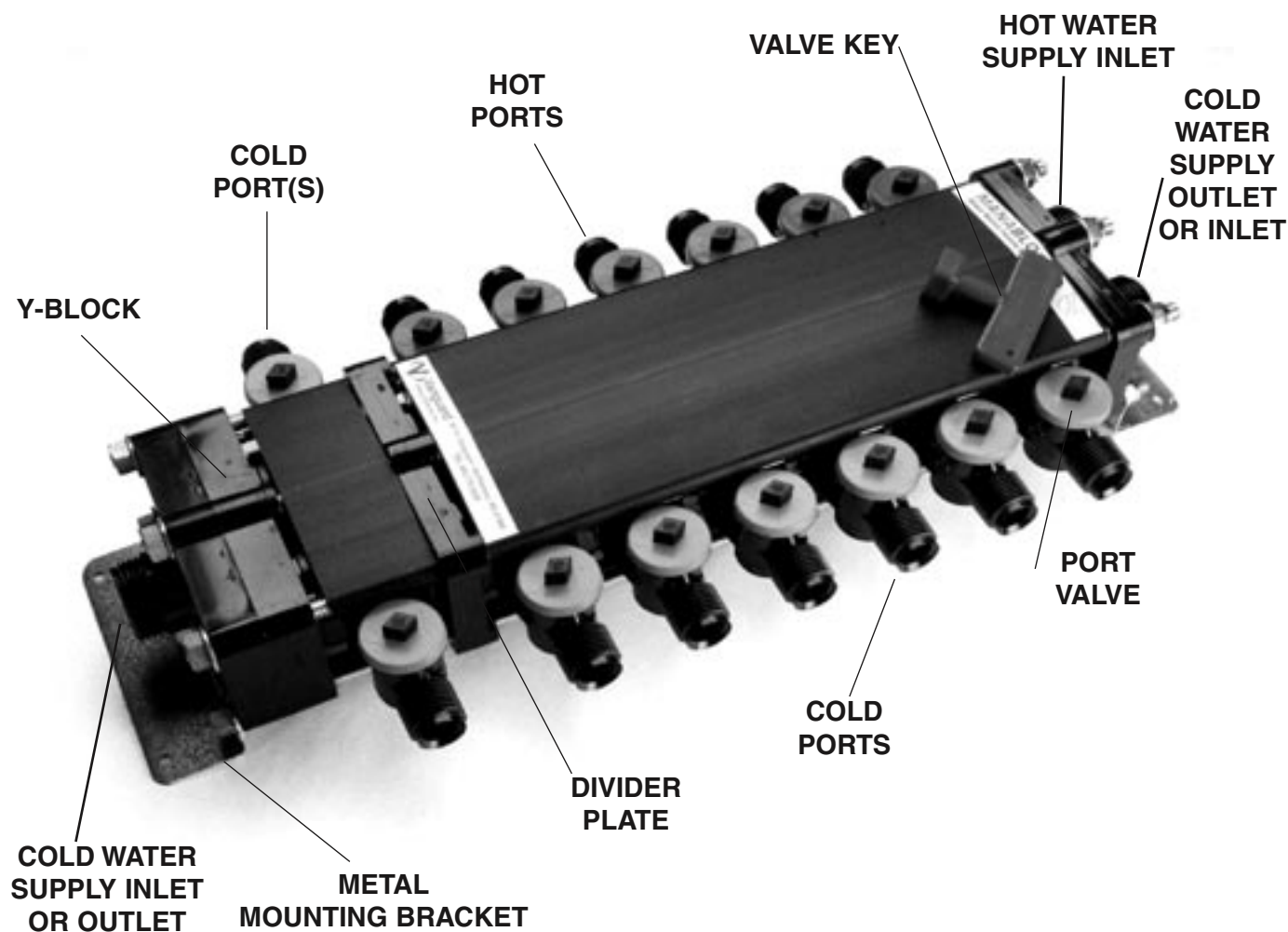
In order to realize the maximum water and energy savings of the MANABLOC system, it is advisable to use the smallest distribution line size that meets the flow and pressure demands of each individual fixture. Using a larger size line than necessary can increase hot water delivery time. Keep in mind that 1/2" PEX contains twice the amount of water that 3/8" PEX does for a given length.

There are times when 3/8" Vanex PEX tubing may not, due to long line lengths or low supply pressure, provide the necessary residual pressure to some fixtures even though the flow requirements are within those stated above. Alternatives such as: increasing line size to 1/2", relocating the MANABLOC to reduce line length(s), installation of a separate MANABLOC close to an outlying group of fixtures, or running the line(s) in a more direct (shorter) path may alleviate a potential problem.

* Due to the many types of shower valves, it is recommended that you consult the valve manufacturer's literature to determine the actual flow rate and required residual pressure demands of the fixture. Use the *MANABLOC Tube Size Guide* to determine distribution line size and length limitations.

** Some washing machines use a timer instead of a water-level sensor to determine when the machine has been filled with the proper amount of water. There are cases in which low supply pressure or excessive distribution line length may cause some machines to fill to a level less than designed. Consult the washing machine manufacturer's literature to determine the actual fill rate and residual pressure requirements for distribution line size.

MANABLOC OVERVIEW & CARTON CONTENTS



MODEL MXBD14-2 SHOWN

The MANABLOC is a manifold water distribution system that operates much like an electrical breaker box. The main water supply lines bring water into the MANABLOC and individual distribution lines move water out to each fixture. MANABLOCs have a built-in valve at each distribution line port which allows you to stop the water flow to any single fixture without shutting down the entire system.

Important Sizing Information

Additional package contents include:

- Surface/Flush Mount Spacers
- Valve T-Handle
- Instruction/Warranty Packet - to be left at installation site
- Port Labels

Port Connection Hardware:

- Lock-In Nuts
- Stainless Steel Insert Stiffeners
- Lock-In Inserts
- Plastic Ferrules

A typical residential plumbing system can not be plumbed with all 3/8" distribution lines. It is the decision of the user to choose a combination of both 3/8" and 1/2" lines or to upsize the entire system to 1/2". However, supplying fixtures with 1/2" lines when it is unnecessary for the fixture demand, will increase the wait time for hot water delivery to those fixtures. The best water and energy savings of a MANABLOC system are realized when distribution lines are sized according to the fixture demand and the length of the individual line (see the *MANABLOC Tube Size Guide* for details on sizing a typical system).

A MANABLOC with ports of all the same size, can easily have some of the ports converted to 1/2" with optional crimp adapter MXLSA33 (3/8" port to 1/2" tube). Conversely, 1/2" ports can be converted to 3/8" with optional crimp adapter MXLSA24 (1/2" port to 3/8" tube). See page 15 for detailed installation instructions for the crimp adapters. Note: Each port converted to a larger or smaller size requires one adapter and one crimp ring (crimp ring sold separately).

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SECTION 22 41 13

RESIDENTIAL WATER CLOSET

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Dual flush high efficiency toilet
- B. Related Sections:
 - 1. 06 11 00: Wood Framing
 - 2. 09 62 29: Cork Flooring
 - 3. 22 11 16: Domestic Water Piping
 - 4. 22 11 23: Domestic Water Pumps
 - 5. 33 16 00: Water Utility Storage Tanks

1.01 SUBMITTALS

- A. Manufacturer's installation instructions and guidelines, located in the CUSD Operations and Maintenance Manual

1.02 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site
 - 1. Inspect appliances upon delivery. Report any damaged or missing components directly to the manufacturer.
- B. Packing, Shipping, Handling and Unloading
 - 1. Store appliance in manufacturer's packaging until ready for installation.
- C. Storage and Protection
 - 1. Store packed appliances in a safe location in the High Voltage Lab (HVL) as designated by the construction coordinator.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. John Karas, Business Development Manager
Caroma USA, Inc.
9117 W. Lake Drive Pound
Wisc. 54161 U.S.A.
Toll Free: 1-800-605-4218 Ext. 2
Phone: (920) 897-2569
Fax: (920) 897-4730
email: jkaras@caromausa.com
Website: www.caromausa.com

2.2 PRODUCTS

- A. Caravelle One-Piece Ultra Low Flush (ULF) 1.6/.8 gpf Water Saving Dual Flush High Efficiency Toilet

1. Dimensions: 16-1/2"W x 32"H x 29-1/4" D
2. Weight: 60 lbs
3. Outlet: Floor mounted suitable for connection to soil pipe with plastic offset outlet connector for 10" and 12" rough in.
7. Water Control Valve: Standard bottom entry tank: available as left hand inlet and incorporated a super quiet water control assembly. Internal overflow only.

2.3 MATERIALS

A. Materials required for Closet Bowl Fixing Procedure:

1. Closet Flange
2. 'T' bolts
3. Nuts for securing 'T' bolts
4. Standard wax ring
5. Caroma Universal Off set adapter
6. Flange bolts
7. Finishing securing bolts and covers
8. bathroom approved caulking

B. Materials required for Tank Fixing Procedure:

1. Foam tank seal
2. Provided plastic wing nuts
3. Water supply line

PART 3 – EXECUTION

3.1 PREPARATION

- A. Clean floor and surrounding areas thoroughly prior to installation.
- B. Install waste drain pipe, roughed in 10: or 12"
- C. Install water supply line.

3.2 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 22 41 13

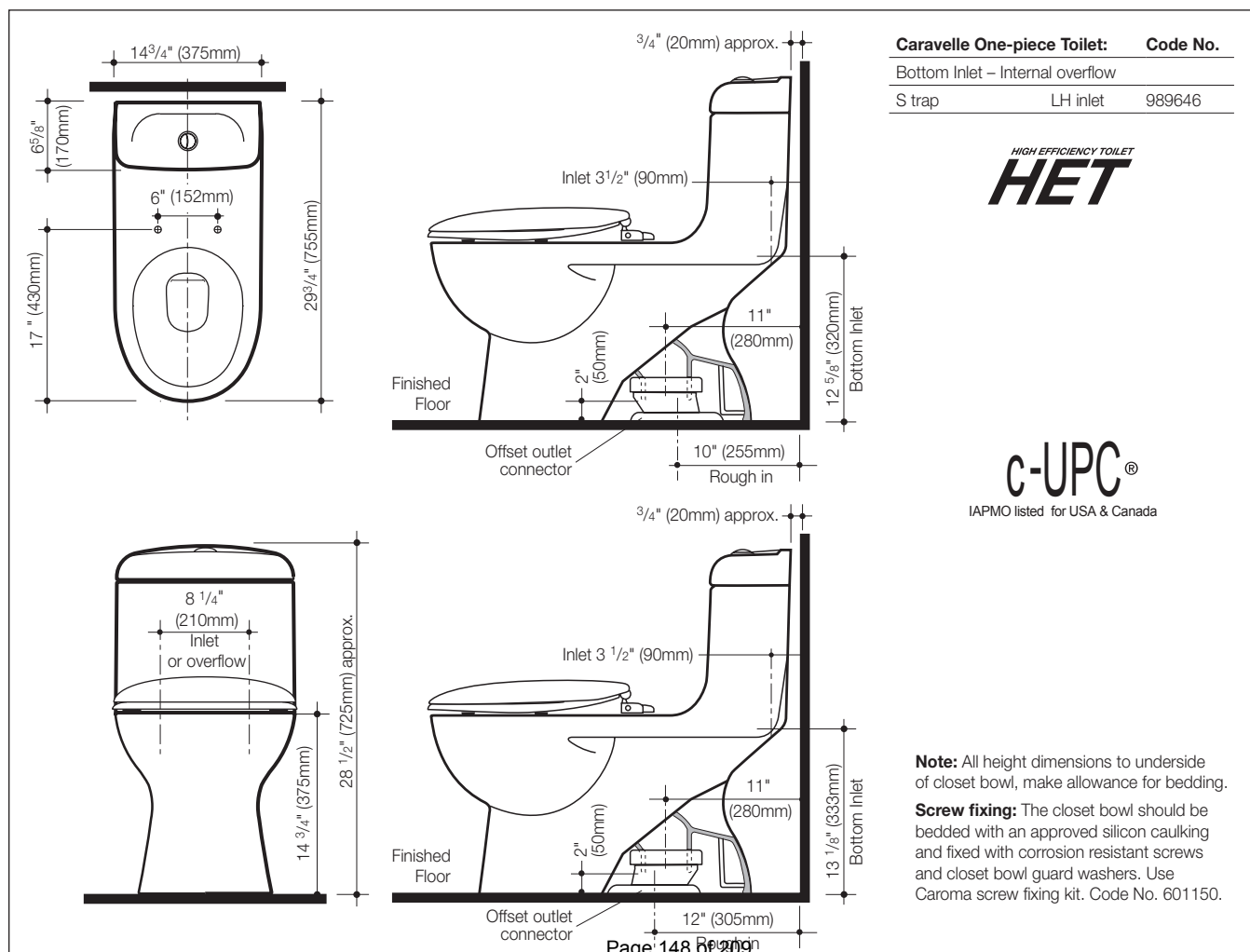
Caravelle 1.6/0.8 gpf (6/3 l) Water Saving Dual Flush High Efficiency Toilet (HET)

One-piece Ultra Low Flush (ULF) Vitreous China Washdown Toilet



A modern concept one-piece toilet featuring an integral **1.6/0.8 gpf (6/3 l)** dual flush tank featuring unique two button activation providing substantial water saving compared to standard toilets. The one-piece toilet is designed with smooth rounded contours with a concealed outlet for easy cleaning and also features low profile push buttons. The tank incorporates a dual flush mechanism that has been specially developed with the **Caravelle One-piece** toilet to ensure optimum flushing performance. Due to the substantial water saving benefits achieved by the 1.6/0.8 gpf (6/3 l) dual flush system the toilet is suitable for multi purpose applications.

- Toilet:** **Caravelle One-piece** 1.6/0.8 gpf (6/3 l) full flush box rim.
- Outlet:** Floor mounted suitable for connection to waste outlet with offset plastic outlet connector for 10" (255mm) or 12" (305mm) rough in.
- Tank:** The tank is an integral part of the toilet with a free fitting lid and is suitable for domestic and light commercial applications. Available in dual flush 1.6/0.8 gpf (6/3 l).
- Water Control Valve:** **Standard Bottom Entry** – available as left hand inlet which incorporates a super quiet water control assembly. Internal overflow only.
- Weight:**
- Fixing:** The one-piece toilet is bonded to the floor with an approved acetic-cured silicon caulking and fixed with corrosion resistant screws and closet bowl guard washers.
- Seats:** The following Caroma seats are recommended: Caravelle 2000,
- Colors:** White and colors as specified in the color selector.
- Dimensions:** All dimensions are in inches and millimetres and are subject to normal manufacturing variations. Caroma pursues a policy of continuing improvement in design and performance of its products. The right is therefore reserved to vary specifications without notice.



SECTION 22 41 16

RESIDENTIAL LAVATORIES AND SINKS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Residential Lavatories and Sinks
- B. Related Sections:
 - 1. 06 11 00: Wood Framing
 - 2. 22 11 16: Domestic Water Piping
 - 3. 22 11 23: Domestic Water Pumps
 - 4. 33 16 00: Water Utility Storage Tanks

1.01 REFERENCE STANDARDS

- A. ASME A112.19.2M for Vitreous China Fixtures
- B. CAN/CSA B45 Series
- C. A1995 National Building Code, section 3.7
- D. CAN/CSA – B651-M90 and OBC 3.7

1.02 SUBMITTALS

- A. Manufacturer's installation instructions and guidelines, located in the CUSD Operations and Maintenance Manual

1.03 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site
 - 1. Inspect appliances upon delivery. Report any damaged or missing components directly to the manufacturer.
- B. Packing, Shipping, Handling and Unloading
 - 1. Store appliance in manufacturer's packaging until ready for installation.
- C. Storage and Protection
 - 1. Store packed appliances in a safe location in the High Voltage Lab (HVL) as designated by the construction coordinator.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. American Standard
P.O. Box 6820
1 Centennial Plaza
Piscataway, NJ 08855-6820
Phone: 1-800-442-1902
Web: www.americanstandard-us.com

2.2 PRODUCTS

- A. LOFT Above-Counter Sink
 - 1. Dimensions: 14-3/4" round and 5" deep
 - 2. Quantity: 1

PART 3 - INSTALLATION

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 22 41 16

LOFT™ ABOVE-COUNTER SINK

0660.000

- Stylish above-counter sink
- Made from vitreous china
- Integral faucet deck for single-control faucet mounting
- Generous bowl depth
- Center drain outlet without overflow
- Can be mounted in Brook console table
- Supplied with cutout template and sealant

0660.312 Same as above with front overflow

Nominal Dimensions:

451mm (17-3/4") Round

Bowl sizes:

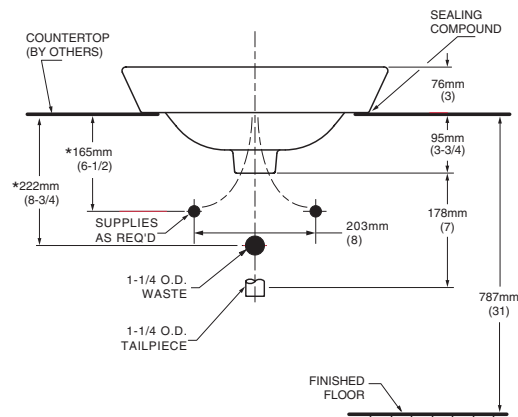
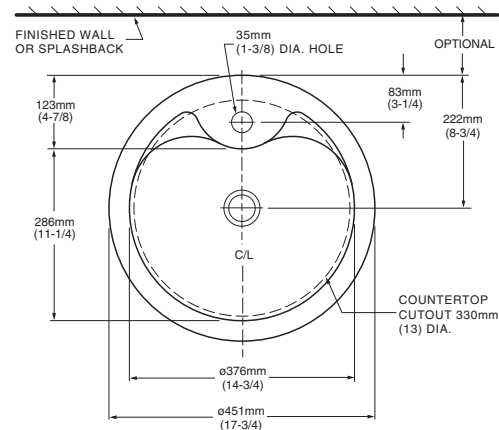
376mm (14-3/4") round

127mm (5") deep

Compliance Certifications -

Meets or Exceeds the Following Specifications:

- ASME A112.19.2M for Vitreous China Fixtures
- CAN/CSA B45 series
- A1995 National Building Code, section 3.7 and CAN/CSA - B651-M90 and OBC 3.7



To Be Specified:

- ☐ Color:
- ☐ Faucet*:
- ☐ Faucet Finish:
- ☐ Supplies:
- ☐ 1-1/4" Trap:

To Be Specified (Optional):

- ☐ Brook Console Table Frame 9373.100
 - ☐ Frame Finish
- ☐ Brook wood top 9474.670 pre-cut for Loft and Morning above counter sink
 - ☐ Wood Top Finish

* See faucet section for additional models available

NOTES:

* DIMENSIONS SHOWN FOR LOCATION OF SUPPLIES AND "P" TRAP ARE SUGGESTED. FITTINGS NOT INCLUDED WITH FIXTURE AND MUST BE ORDERED SEPARATELY. FOR COUNTERTOP CUTOUT AND INSTALLATION INSTRUCTIONS USE TEMPLATE SUPPLIED WITH SINK.

IMPORTANT: Dimensions of fixtures are nominal and may vary within the range of tolerances established by ANSI Standard A112.19.2. These measurements are subject to change or cancellation. No responsibility is assumed for use of superseded or voided pages.

SECTION 22 41 39

RESIDENTIAL FAUCETS AND SUPPLIES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Residential Lavatories and Sinks
- B. Related Sections:
 - 1. 06 11 00: Wood Framing
 - 2. 22 11 16: Domestic Water Piping
 - 3. 22 11 23: Domestic Water Pumps
 - 4. 33 16 00: Water Utility Storage Tanks

1.01 REFERENCE STANDARDS

- A. ANSI A117.1
- B. ASME A112.18.1
- C. NSF 61/Section 9
- D.

1.02 SUBMITTALS

- A. Manufacturer's installation instructions and guidelines, located in the CUSD Operations and Maintenance Manual

1.03 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site
 - 1. Inspect appliances upon delivery. Report any damaged or missing components directly to the manufacturer.
- B. Packing, Shipping, Handling and Unloading
 - 1. Store appliance in manufacturer's packaging until ready for installation.
- C. Storage and Protection
 - 1. Store packed appliances in a safe location in the High Voltage Lab (HVL) as designated by the construction coordinator.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. American Standard
P.O. Box 6820
1 Centennial Plaza
Piscataway, NJ 08855-6820
Phone: 1-800-442-1902
Web: www.americanstandard-us.com

2.2 PRODUCTS

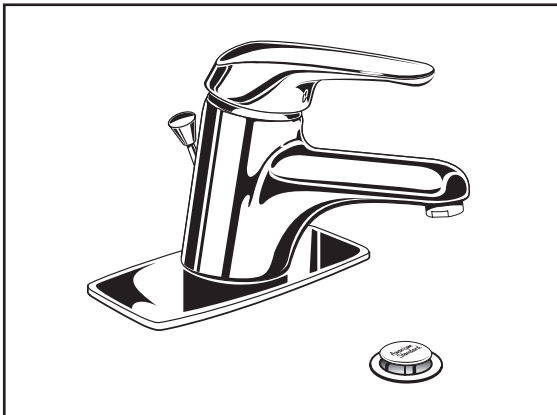
- 1. SEVA Single Control Lavatory Faucet
- 2. Quantity: 1

PART 3 - INSTALLATION

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.

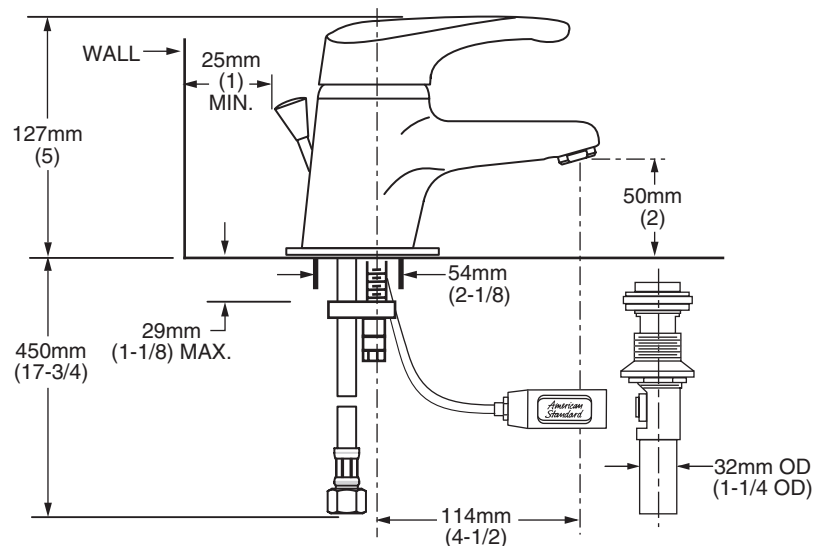
END OF SECTION 22 41 39



1480.101 Shown.

MODEL NUMBER:

- **1480.101 Lavatory Faucet**
Metal Speed Connect™ Pop-up drain. Escutcheon plate.
- **1480.100 Lavatory Faucet**
Less pop-up drain. Less pop-up hole. Escutcheon plate.



GENERAL DESCRIPTION:

Cast brass body and brass escutcheon with all metal handle. Washerless 47mm ceramic disc valve cartridge with integral hot limit safety stop. Braided flexible supply hoses with 3/8" compression connectors. 20 inch (500mm) long flexible stainless steel drain cable is pre-assembled to faucet body. Metal Speed Connect™ drain body with 1-1/4 inch (32mm) tail piece. 2.2 gpm/8.3L/min. maximum flow rate.

PRODUCT FEATURES:

Brass Construction: Durable. Easy to clean. Ideal for prolonged contact with water.

Ceramic Disc Valve Cartridge: Assures a lifetime of drip-free performance.

Adjustable Hot Limit Safety Stop: Limits the amount of hot water allowed to mix with cold. Reduces the risk of accidental scalding.

Low Lead: Meets NSF Standard 61/Section 9 & Prop 65 lead requirements.

Exclusive Speed Connect™ Metal Drain:

- Fewer parts. Installs in less time.
- No adjustments required - seals the first time, every time.
- Flexible stainless steel cable - installs effortlessly in tight spaces.

Choice of Finishes: Choice of Polished Chrome, Satin Nickel (PVD) or Polished Chrome with Brass Mixage.

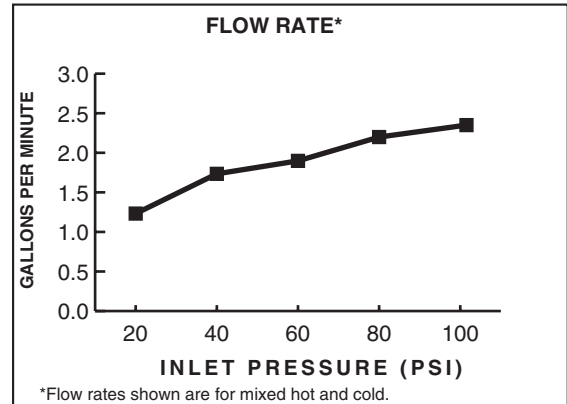
SUGGESTED SPECIFICATION:

Single control lavatory fitting shall feature a cast brass body and escutcheon with all metal handle. Shall also feature washerless ceramic disc valve cartridge with integral hot limit safety stop. Shall also feature a metal drain body with stainless steel cable actuation. Fitting shall be American Standard Model # 1480.____.

CODES AND STANDARDS

These products meet or exceed the following codes and standards:

ANSI A117.1
ASME A112.18.1
NSF 61/Section 9



Product Number	Description	Finish Options*		
		Polished Chrome	PVD Satin Nickel	PChrome /PVD Brass Mix
		002	295	299
1480.101	Lavatory Faucet. Metal Speed Connect™ Pop-up drain.			
1480.100	Lavatory Faucet. Less pop-up drain. Less pop-up hole.		N/A	N/A

N/A = NOT AVAILABLE



Meets the American Disabilities Act Guidelines and **ANSI A117.1** Requirements for the physically challenged.

*EverClean™ Finish:

- Offered on Polished Chrome (002), Satin Nickel (295), and Chrome/Brass Mix. (299).
- One wipe effortlessly removes spots.
- Eliminates the need for cleaners and scrubbing.

SECTION 23 09 13

ACTUATORS AND OPERATORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section contains controllers for control of HVAC system

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Honeywell International Inc.
101 Columbia Road
Morristown, NJ 07962
Phone: (973) 455-2000
Fax: (973) 455-4807
- B. Nico Technology
Fl.24, No.37, Sec 2nd, San Min Rd,
Panchiao City
220 TWN
Phone: 886-2-2954-5338
Fax: 886-2-2954-5308
Website: www.nico-tech.com
- C,D. Distech Controls Inc.
Phone: 800-404-0043
Website: www.distech-controls.com

2.2 EXISTING PRODUCTS

- A. XIO-8AI Universal Analog Input Module (Compact I/O Module)
 - 1. Quantity: 8
- B. 4404L Digital Dimmer
 - 1. Quantity: 1
- C. Free Programmable Controller (16 inputs) ECP-500
 - 1. Quantity: 3
- D. Free Programmable Controller (8 inputs) ECP-501
 - 1. Quantity: 2

PART 3 – EXECUTION

3.1 INSTALLATION

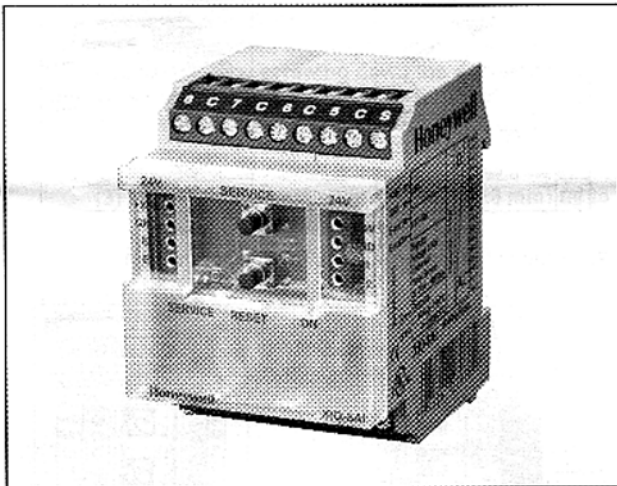
- A. Install in accordance with manufacturer's written instructions location in the CUSD Operations and Maintenance Manual

END OF SECTION 23 09 13

Compact I/O Module

XIO-8AI UNIVERSAL ANALOG INPUT MODULE

INSTALLATION INSTRUCTIONS



GENERAL

The Honeywell XIO-8AI Universal LON[®] Analog Input Module is a LON module with 8 configurable temperature or voltage inputs to record temperatures and voltages of passive and active sensors for example, electrical ventilation and mixing valves, valve positions etc. The recorded counted measurands are produced in different formats. Temperature, resistance, percentage and voltage can be read out depending on the setting for each input, and bound to other LON[®] devices. The setting of sensor characteristics and wiring ranges are done by LNS[®]-Plugin. The supply voltage for active sensors can be provided by the module.

SPECIFICATIONS

Electrical Ratings:

Supply Operating Voltage: 20 to 28 V AC/DC.
Current Consumption: 57 mA (AC) / 30 mA (DC).
Duty cycle: 100%.
Recovery time: 550 ms.
24V AC/DC GND, Class 2

Terminal Blocks:

Supply and Bus: 16 AWG (1.5 mm²).
(Terminal block and strapping plug included in packing).
Analog Inputs: 14 AWG (2.5 mm²).
Use Copper Conductors Only

LON Interface:

Transceiver: FTT10A free topology.
Neuron: 3150, 64k Flash.
Data format: standard network variables (SNVT).
Transmission rate: 78 kBit/s.
Maximum Length:
line topology 8858 ft. (2700 m) / 64 nodes.
free topology 1640 ft. (500 m) / 64 nodes.
Cabling: twisted pair.

Temperature Ratings:

Operating: 23° F to 131° F (-5° C to +55° C).
Storage: -4° F to +158° F (-20° C to +70° C).

Dimensions (W x H x D):

2.0 x 2.7 x 2.6 in. (30 x 68 x 65 mm).

Weight: 4.4 ounces (126 g).

Mounting Position: Any.

Mounting: DIN rail per EN 50022.

Input:

Temperature Range: selectable.

NOTE: Temperature input for all sensors is in the range of 40Ω up to 4 MΩ

Resolution: 0.2 K.

Error: approximately ± 0.4° F (±0.2° C).

Voltage input: 0 to 10 V DC.

Resolution: 10 mV (0.0 to 100%).

Error: approximately ±100 mV.

Construction Material:

Housing and Terminal Blocks: Polyamide 6.6 V0.
Faceplate: Polycarbonate.

Protective Circuitry:

Operating Voltage: polarity reversal protection.

Protection:

IP40 housing DIN 40050.
IP20 terminal blocks DIN 40050.

Approvals:

UL 916, Standard for Energy Management Equipment.
European Community Mark (CE) Listed.



Energy Management
Equipment 34TZ



95-7716-1

4404L DIGITAL DIMMER 数位调光器

1. 简介

1. 说明

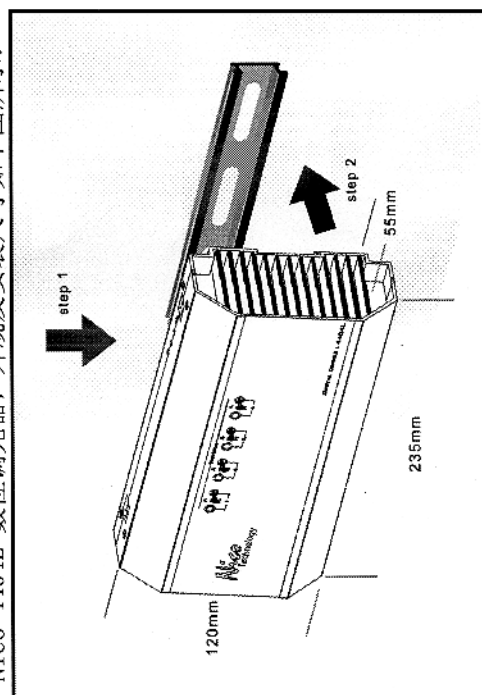
感谢您选购 Nico 4404L 数位调光器，本产品在设计上提供四组数位调光回路，并提供四组摇头开关，可以手动控制，即使在施工或是网络不通时也可以方便操作测试。大幅增进使用上的便利性及弹性。

您也可以在下面网址找到相关的信息 <http://www.nico-tech.com>

1.2 硬件规格

Function	Description
Mode	4404L
Processor	Neuron 3150 Chip
Transceiver	FTT-10/FT-X1
Channels	4-Channels 0~220Vac@10A
Power	110VAC/220VAC
Certification	LonMark / CE Mark
Temperature	-10 ~ 85 °C
Humidity	10~95% of the RH@50 °C
Connector	10A Interlocking and Plug-in connector
Dimension	L235 *W120 *H55 mm

Nico 4404L 数位调光器，外观及安装尺寸如下图所示：

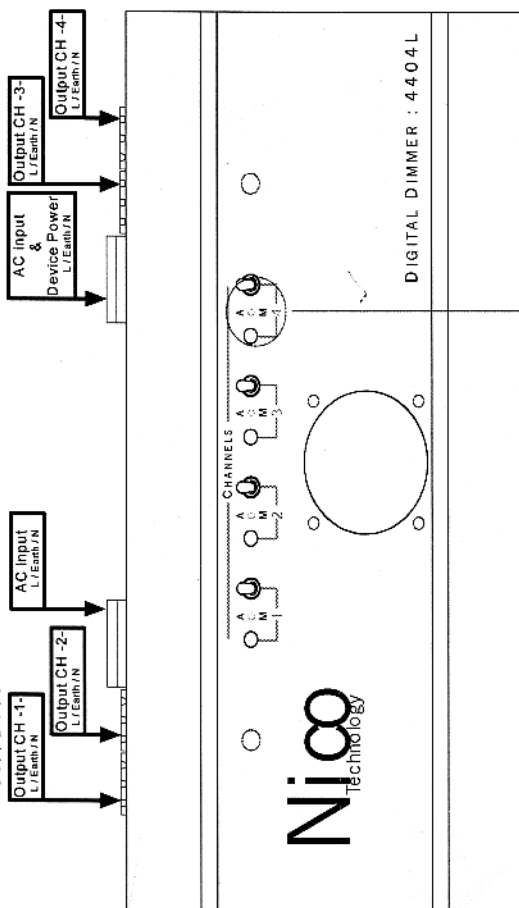


2. 系统需求

Nico 4404L 数位调光器，符合 LonWorks 网络标准，可搭配其他的 LonWorks 网络设备，例如 Nico 5006L 触控面板，方可达成控制其他设备如灯光、电源等自动化设备。

3. 安装

3.1. 硬件安装



3.2. 软件安装

Nico 4404L 软件安装设定，请使用 LonWorks 网络安装工具设定安装，详细步骤请参阅使用手册。

4. 使用说明

Nico 4404L 数位调光器，提供彼此独立运作的电源输出 4 组，功能依据网络变数设定定义，摇头开关可手动控制输出，请依据供应商设定说明使用。

5. 售后服务

请参阅产品合格保证书。



Distech Controls, Inc.
Toll-free: 1-800-404-0043
Tel. International: 450-444-9898
www.distech-controls.com
sales@distech-controls.com

Hardware Installation Guide

Application Specific Fan Coil Unit Controller
Application Specific Heat Pump Unit Controller
Application Specific Roof Top Unit Controller
Application Specific Unit Ventilator Controller

EC-FCU-L
EC-HPU-L
EC-RTU-L
EC-UV-L

Free Programmable Controller (6 Inputs, 7 Outputs)
Free Programmable Controller (10 Inputs, 8 Outputs)
Free Programmable Controller (12 Inputs, 12 Outputs)
Free Programmable Controller (16 Inputs, 12 Outputs)

EC-67
ECP-300
ECP-400/410
ECP-500/510

Remote I/O Controller (8 Inputs, 8 Outputs)
Remote I/O Controller (12 Inputs, 12 Outputs)
Remote I/O Controller (16 Inputs)

ECC-301
ECC-401
ECC-520

1. Product Description

This document describes the hardware installation procedures for the Application Specific Controller (ASC), the Free Programmable Controller (FPC) and the Remote I/O Controller (RIO).

The easyCONTROLS™ Application Specific Controller product line is designed to control and monitor HVAC equipment such as fan coil units, roof top units, heat pump units and unit ventilators. This product line includes the following controllers: EC-FCU-L, EC-HPU-L, EC-RTU-L and EC-UV-L.

The easyCONTROLS Free Programmable Controller product line is designed to control and monitor various HVAC equipment such as roof top units, air handling units as well as chillers and boilers. Moreover, it is suitable for any lighting control and power measurement applications. This product line includes the following controllers: ECP-300, ECP-400, ECP-410, ECP-500, ECP-510 and EC-67.

The easyCONTROLS Remote I/O Controller product line is designed to increase the amounts of inputs and outputs available in a network. Such devices could be easily used in combination with a free programmable controller or with an application specific controller. This product line includes the following controllers: ECC-301, ECC-401 and ECC-520.

These product lines are based on the LONWORKS® technology for peer-to-peer communication between controllers and are LONMARK® certified.



- These controllers are all built on a similar platform, but have different numbers of inputs and outputs. Moreover, each individual model has different amounts of digital and/or universal outputs. For more information on the specific layout and functionality of each controller, please refer to their individual datasheets and user guides.
- The following controllers are housed in small enclosures: EC-FCU-L, EC-HPU-L, EC-RTU-L, EC-UV-L, EC-67, ECP-300 and ECC-301.
- The following controllers are housed in large enclosures: ECP-400, ECP-410, ECP-500, ECP-510, ECC-401 and ECC-520.

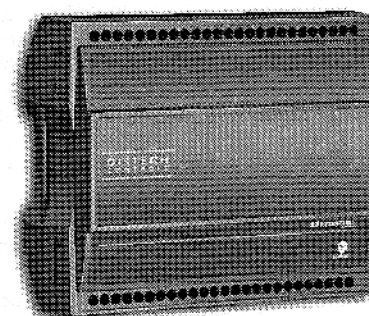
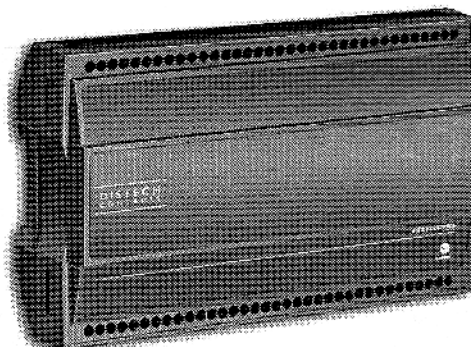
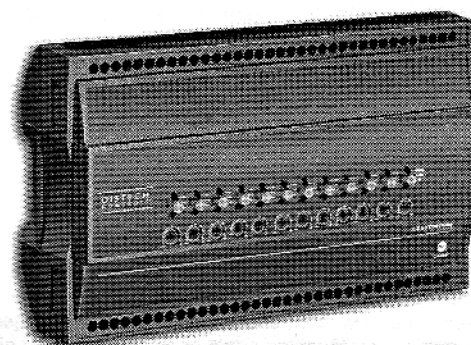


Figure 1-1: (From top to bottom) large enclosure with HOA switches, large enclosure and small enclosure

SECTION 23 09 13.23

SENSORS AND TRANSMITTERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section contains sensors for control of HVAC system

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Honeywell International Inc.
101 Columbia Road
Morristown, NJ 07962
Phone: (973) 455-2000
Fax: (973) 455-4807
- B. Siemens Corporation
Citicorp Center
153 East 53rd Street
New York, NY 10022-4611
Phone: 1-800-SIEMENS
E-mail: usa.800siemens.us@siemens.com

2.2 EXISTING PRODUCTS

- A. Honeywell Sensors
 - 1. C7041D2001/U Tank Temperature Sensor
 - 2. C7041K2005/U Duct Temperature / Humidity Sensor
 - 3. T7770A1006/U Indoor/Outdoor Temperature / Humidity Sensor
- B. Siemens Sensors
 - 1. QVM 62.1 Air Flow Sensor
 - 2. 540-258 Thermistors (Temperature Probe)
 - 3. QPA63 Air Quality Sensor
 - 4. 544-577 Immersion Temperature Sensor (Solar Thermal Collectors)

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's written instructions location in the CUSD Operations and Maintenance Manual

END OF SECTION 23 09 13.23

C7031G; C7041B,C,F Electronic Temperature Sensors

C7031G, C7041F OUTDOOR; C7041K STRAP-ON
C7041B,C DUCT; C7031D, C7041D IMMERSION

INSTALLATION INSTRUCTIONS

INSTALLATION

When Installing this Product...

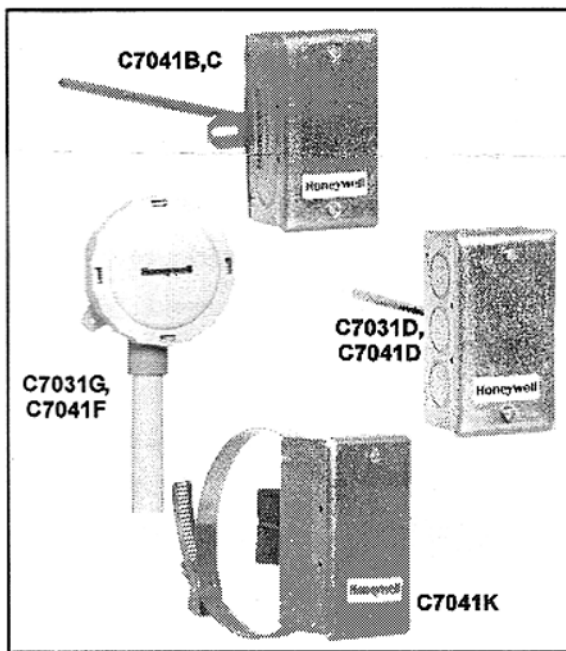
1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.

Mounting

The mounting method depends on the particular sensor application. The following procedures include:

- duct applications
- outdoor applications
- immersion well applications
- strap-on applications

NOTE: Also refer to the instructions for the electronic control.



Be sure to take advantage of the entire line of quality Honeywell C7031/C7041 Sensors

C7041K
Strap-on



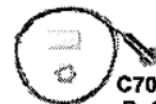
C7031G,
C7041F
Outdoor



C7041R
Duct
Rigid
Copper



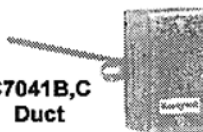
C7041P
Button
Probe



C7031D,
C7041D
Immersion

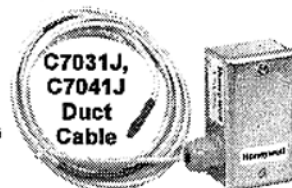


C7041B,C
Duct



AVERAGING

C7031J,
C7041J
Duct
Cable



62-0220

H7625A, H7635A

Humidity/Temperature Sensors

WALL-MOUNT MODELS

INSTALLATION INSTRUCTIONS

APPLICATION

The H7625A, H7635A Wall-Mount Humidity/Temperature Sensors are universal Relative Humidity transmitters that can be powered with either a +18 to 36 Vdc or 24 Vac supply. The sensors use a half-wave bridge rectifier to convert AC power to a usable DC voltage. The device also includes a 20K ohm temperature sensor for optional use.

The humidity sensors are designed with a field selectable 4 to 20 mA, 0 to 5 Vdc, or 0 to 10 Vdc output signal equivalent to 0 to 100% RH. All units are shipped from the factory with a default setting to accept AC power with three-wire, 0 to 10 Vdc loop-powered output.

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check ratings given in instructions and on the product to ensure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.



CAUTION

Electrical Shock or Equipment Damage Hazard.
Can shock individuals or short equipment circuitry.
Disconnect power supply before installation.



CAUTION

Equipment Damage Hazard.
Improper wiring can damage the sensor beyond repair.
Follow the wiring instructions carefully.

Location

Install the device where it cannot be affected by:

- drafts, or dead spots behind doors and in corners.
- hot or cold air from ducts.
- radiant heat from sun or appliances.
- concealed pipes and chimneys.
- unheated (uncooled) areas such as an outside wall behind the device.

Mounting

The housing base mounts over standard 2 in. x 4 in. single gang junction box or flush to the wall:

1. Install the sensor about 5 ft (1.5m) above the floor in an area with good air circulation at average humidity and temperature. (See Fig. 1.)
2. Ensure the device receives adequate airflow.
3. Wire the device. (See Fig. 4 through 3.)
4. Ensure proper DIP switch settings.
5. Apply power to the unit.
6. Snap the cover into position.
7. Turn out the 1/16 in. allen screws at the bottom of the enclosure until the cover cannot be removed.

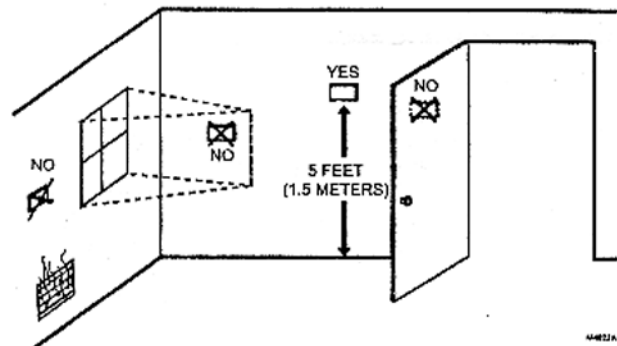


Fig. 1. Typical sensor location.



SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 – GENERAL

1.01 SUMMARY

A. Section includes the following:

1. Materials and Methods necessary for installation of an electric heat section

1.02 DELIVERY, STORAGE AND HANDLING

A. Acceptance at Site

1. Inspect tubes upon delivery to site Immediately report any damaged or missing parts directly to the U.S. distributor.

B. Packing, Shipping, Handling and Unloading

1. Store products in manufacturer's packaging until ready for installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Lennox
2100 Lake Park Blvd.
Richardson, TX 75080

PO Box 799900
Dallas, TX 75379-9900
Phone: 1-800-953-6669
Website: www.lennox.com

2.2 EXISTING PRODUCTS

- A. ECB29 Series Unit Electric Heat Sections
1. Quantity: 1

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install electric heat section in accordance with manufacturer's published installation instructions located in the CUSD Operation and Maintenance Manual.

END OF SECTION 23 33 00

SECTION 23 56 13.19

HEATING SOLAR VACUUM-TUBE COLLECTORS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Evacuated tube solar collectors
- B. Related Sections
 - 1. 05 12 00: Structural Steel Framing
 - 2. 05 52 00: Metal Railings
 - 3. 22 09 00: Instrumentation and Control for Plumbing
 - 4. 22 11 16: Domestic Water Pipes
 - 5. 22 11 23: Domestic Water Pumps
 - 6. 23 06 13.13: Actuators and Operators
 - 7. 23 09 13.23: Sensors and Transmitters
 - 8. 23 71 00: Thermal Storage

1.02 SYSTEM DESCRIPTION

- A. Installation Requirements
 - 1. Fork Wrench Size SW8, 19, 22, 24
 - 2. Allen Key: Size 8

1.03 SUBMITTALS

- A. Product Data: Submit product data, including manufacturer's installation and finishing manual.
- B. Shop Drawings: Submit shop drawings showing layout, profiles, product components and accessories.
- C. Warranty: Provide a copy of manufacturer's warranty, with manufacturer's instructions, in the CUSD Operations and Maintenance Manual.
- D. Test Reports: Submit manufacturer's Collector Test Report.

1.04 QUALITY ASSURANCE

- A. Post-Installation: Conduct a performance test after installation of the evacuated solar tubes and solar tube system.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site
 - 1. Inspect tubes upon delivery to site Immediately report any damaged or missing parts directly to the U.S. distributor.
- B. Packing, Shipping, Handling and Unloading
 - 1. 1. Store products in manufacturer's packaging until ready for installation.
- C. Storage and Protection
 - 1. Tubes are fragile. Store tubes in a safe location in the High Voltage Lab (HVL) as designated by the construction coordinator.

1.06 PROJECT CONDITIONS

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

1.07 SEQUENCING

- A. Mount tubes on vertical steel scaffolding after complete of scaffolding structure.

1.08 WARRANTY

- A. Provide manufacturer's warrant, with manufacturer's installation and care instructions, in the CUSD Operations and Maintenance Manual.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Sunda
No. 3 Hua Yuan Road, Haidian District
100083, Beijing, P.R. China
Phone: 86-10-62001008,84926238
Fax: 86-10-62374906
Email: sunda@public3.bta.net.cn
Website: www.sundasolar.com

2.2 U.S. DISTRIBUTER

- B. Sun Spot Solar and Heating, Inc.
PO Box 55
Delaware Water Gap, PA 18327
Phone: 570-422-1292
Fax: 570-476-5353
Email: info@sssolar.com
Website: www.sssolar.com

2.2 PRODUCTS

- A. Sunda Seido 2-16 Evacuated Tubes with Flow-Through
 - 1. Dimensions: 83 inches L x 76 inches W x 5 inches D
 - 2. 16 tubes per module
 - 3. Outer tube diameter: 4 inches
 - 4. Collector surface area: 43.59 sq feet
 - 5. Absorber surface area: 32.29 sq feet
 - 6. Angle of Inclination: 0°-90°
 - 7. Module weight: 220 pounds
 - 8. Absorption Coefficient: > 92%
 - 9. Emission Coefficient: < 8%
 - 10. Max Temperature: 374°F
 - 11. Typical Operating Temperature: 158-248°F
 - 12. Pipe Stagnation Temperature: 477°F
 - 13. Quantity: 2

- B. Sunda Seido 2-8 Evacuated Tubes with Flow-Through
 - 1. Dimensions: 42 inches L x 76 inches W x 5 inches D
 - 2. 8 tubes per module
 - 3. Outer tube diameter: 4 inches
 - 4. Collector surface area: 43.59 sq feet
 - 5. Absorber surface area: 32.29 sq feet
 - 6. Angle of Inclination: 0°-90°
 - 7. Module weight: 110 pounds
 - 8. Absorption Coefficient: > 92%
 - 9. Emission Coefficient: < 8%
 - 10. Max Temperature: 374°F
 - 11. Typical Operating Temperature: 158-248°F
 - 12. Pipe Stagnation Temperature: 477°F
 - 13. Quantity: 2

- C. Included Installation Accessories
 - 1. Header Box
 - 2. Roof Hooks (four per collector module)
 - 3. Perforated Plates (four per collector module – optional)
 - 4. Bolts and Washers
 - 5. Vertical Supports
 - 6. Fixing Components
 - 7. Bite Seam
 - 8. Spacer plate (optional)
 - 9. Clips
 - 10. L Profile

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Site Verification of Conditions: Examine steel canopy substructure and verify ability to support evacuated tube modules. Substrate shall be approved by the Construction Coordinator before tube module installation.

3.2 INSTALLATION

- A. Locate and install tubes in accordance to the CUSD construction documents.
- B. Install and connect tubes in accordance with manufacturer's published instructions located in the CUSD Operations and Maintenance Manual.

****Note:** Perform steps 3.3, 3.4 and 3.5 on the following page prior to operation of evacuated tube system.

3.3 FIELD QUALITY CONTROL

- A. Checking for Leaks
 - 1. Pump air into system till 6 bar and check whether there are leakages of connections in the whole system.

3.4 CLEANING

- A. Pump warm transfer medium into system with electrical pump or hand pump, clean system and outgas the air from system.

3.5 ADJUSTING

- A. Adding working medium
 - 1. After system cleaning, pump working medium into system till pressure reaches 3 bar. Adjust the controller according to the requirement of manufacturer; fix the flow rate that relies on the absorber area and adjust it in the controller, not the unit of measuring.

END OF SECTION 23 56 13.19

Seido 2 Technical Data	Seido 2-8	Seido 2-16
Design	Evacuated Tube with Flow-Through	Evacuated Tube with Flow-Through
Dimensions (LxWxH)	2110 x 960 x 125 mm 83 x 38 x 5 inches	2110 x 1920 x 125 mm 83 x 76 x 5 inches
No of Tubes	8	16
Vacuum Tube Glass Material	high quality borosilicate	high quality borosilicate
Wall Thickness	0.098 inches (2.5mm)	0.098 inches (2.5mm)
Tube Outside Diameter	4 inches (100 mm)	4 inches (100 mm)
Tube Length	78.74 inches (2000 mm)	78.74 inches (2000 mm)
Tube Weight	10 lbs (4.5 kg)	10 lbs (4.5 kg)
Hailstone Resistant to	1.378 in (35mm) dia	1.378 in (35mm) dia
Vacuum	< 75 ⁻⁷ torr (10 ⁻⁵ mbar)	< 75 ⁻⁷ torr (10 ⁻⁵ mbar)
Collector Surface Area	21.85 ft ² (2.03 m ²)	43.59 ft ² (4.05 m ²)
Absorber Surface Area	16.15 ft ² (1.5 m ²)	32.29 ft ² (3.0 m ²)
Angle of Inclination	0-90°	0-90°
Module Weight	110 lbs (50 kg)	220 lbs (100 kg)
Pressure drop per module @ 0.22 gpm (50 L/h)	< 1 ft H ₂ O (30 mbar)	< 1 ft H ₂ O (30 mbar)
Test Pressure	145 psi (10 bar)	145 psi (10 bar)
Operating Pressure to	87 psi (6 bar)	87 psi (6 bar)
Fluid Content	0.34 gal (1.3 L)	0.68 gal (2.6 L)
Absorber Material	Aluminum	Aluminum
Coating	Aluminumnitride	Aluminumnitride
Absorption Coefficient	> 92%	> 92%
Emission Coefficient	< 8%	< 8%
Max Temperature (module)	374 F (190 C)	374 F (190 C)
Typical Operating Temperature	158-248 °F (70-120 °C)	158-248 °F (70-120 °C)
Stagnation Temperature (pipe)	477 F (247 C)	477 F (247 C)

SECTION 23 71 00

THERMAL STORAGE

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and methods necessary to install a hot water tank
- B. Related Sections
 - 1. 22 11 23: Domestic Water Pumps
 - 2. 22 12 19: Facility Ground-Mounted Water Storage Tanks
 - 3. 22 33 30: Residential, Collector-to-Tank, Solar-Electric Domestic Water Heaters
 - 4. 22 41 00: Residential Plumbing Fixtures
 - 5. 23 56 00: Solar Energy Heating Equipment
 - 6. 26 09 00: Instrumentation and Control for Electrical Systems
 - 7. 48 14 00: Solar Energy Electrical Power Generation Equipment

1.02 SYSTEM DESCRIPTION

- A. SunMaxx 80 gallon Hot Water Storage Tank with 2 Internal Per-Installed Heat Exchangers
 - 1. Dimensions: 80 gallons, 86" H x 21" W
 - 2. Weight: 135lbs
 - 3. Quantity: 2

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Silicon Solar Inc.
 - Phone: 1-800-653-8540
 - Fax: 1-866-746-5508
 - Website: www.siliconsolar.com

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Hot water tank shall be installed in the mechanical closet of the Solar Decathlon House in accordance with manufacturer's published instructions, details and the drawings that are part of the contract documents for project.

END OF SECTION 23 71 00



80 Gallon Solar Hot Water Tank

The electric element assists the system only when the solar energy cannot maintain the desired temperature or during periods of peak demand. Automatic temperature control thermostat keeps stored water at desired temperature. Our 80 gallon unit has two internal heat exchangers for systems that use heat transfer fluids.

Brass drain valve

- Threaded stud located near the outlet for attachment of tank sensors
- Temperature and pressure relief valve included
- Collector feed and return fittings located at front of tank for convenient installation
- 2" thick polyurethane foam insulation reduces heat loss
- High efficiency heating element
- Cold water inlet brings cold water to tank bottom to prevent mixing with heated water
- Anode rod equalizes aggressive water action for prolonged tank life
- Automatic temperature control
- Thermostat gauge to control temperature

A typical family of four in the U.S. uses about 80 gallons of hot water each day. To heat that water with electricity takes about 16 pounds of coal. In sunny Colorado, a standard solar hot water system can supply 60% - 95% of this energy, pollution free from the sun, while saving its owners about \$250 per year.

Solar heated water may be stored in a tank that also houses an electric backup heating element (a "one-tank" system), or in a separate tank that feeds into the tank of a conventional gas or electric water heater (a "two-tank" system). The tanks are approximately the same size as modern hot water tanks, around 80 gallons or 300 liters. Solar energy preheats the household water. At night and on cloudy days, the conventional backup heater boosts the water to the desired temperature.

Contents:

- (1) SunMaxx Storage Tank
- (2) Internal Heat Exchanges (Pre-installed)



SECTION 23 72 00

AIR TO AIR ENERGY RECOVERY EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and methods necessary to install an energy recovery ventilator.
- B. Related Sections
 - 1. 23 07 00: HVAC Insulation
 - 2. 23 09 00: Instrumentation and Control for HVAC
 - 3. 23 30 00: HVAC Air Distribution
 - 4. 23 56 00: Solar Energy Heating Equipment
 - 5. 23 57 00: Heat Exchangers for HVAC
 - 6. 23 70 00: Central HVAC Equipment

1.02 SYSTEM DESCRIPTION

- A. BR70 Indoor Unit Energy Recovery Ventilator
 - 1. Dimensions: 18" wide by 27" long by 11" high
 - 2. Ventilation Type: Static Plate, Heat and Humidity Transfer
 - 3. Typical Airflow Range: 30-80CFM
 - 4. Motors: one, .08 hp
 - 5. Filters: Cleanable, spun polyester media

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. RenewAire LLC
4510 Helgesen Drive
Madison, WI 53718
Phone: 800-627-4499
Fax: 608-221-2824
Email: support@renewaire.com
Website: www.renewaire.com

PART 3 – EXECUTION

3.1 INSTALLATION

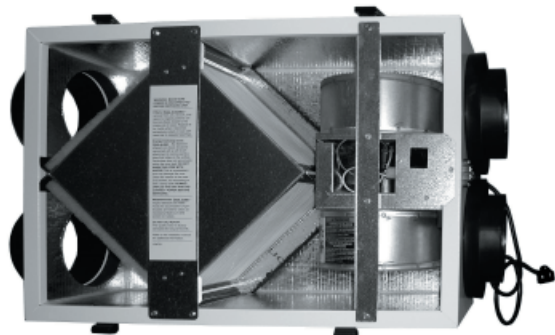
- A. Energy Recovery Ventilator shall be installed by approved manufacturer representative in accordance with manufacturer's published instructions, details and the drawings that are part of the contract documents for project.

END OF SECTION 23 72 00

EV70



Indoor Unit



Specifications

Ventilation Type: Static Plate, Heat and Humidity Transfer

Typical Airflow Range: 40-70 CFM

Unit may be mounted in any orientation.

Number Motors: One, 0.1 hp

V	HZ	Phase	Input Watts	FLA
120	60	Single	94 @ 69 CFM	1.0

Control Voltage: 24 VAC

Filters: Cleanable, spun polyester media. 7 1/2" x 10 1/2" x 1"

Weight: 44 lbs (unit), 52 lbs (in carton)

Shipping Dimensions: 21" W x 29 1/2" L x 15" H

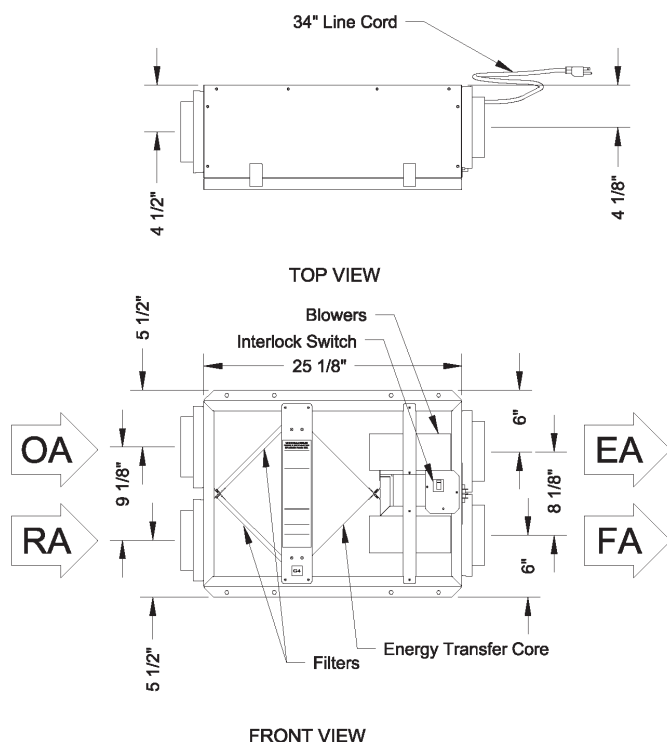
Options: PT - Percentage timer control
PB - Push Button point-of-use controls
FM - Percentage timer control with furnace interlock
DH24 - Dehumidistat control
Wall caps

G4 Performance

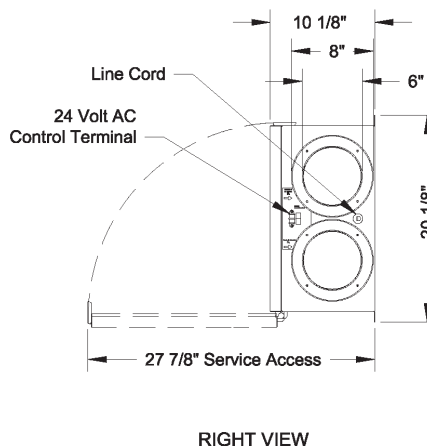
Airflow CFM	ESP in H ₂ O	Temp EFF%	Total EFF% Winter/Summer*
46	0.40	81	74/60
59	0.30	78	71/57
69	0.25	75	69/54
73	0.20	74	68/53
86	0.10	71	64/49

* (See HVI certification report on page 11 for complete certified rating).

Dimensions



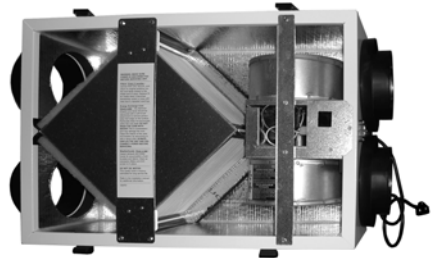
EA: Exhaust Air to outdoors
OA: Outdoor Air intake
RA: Room Air to be exhausted
FA: Fresh Air to inside



EV70

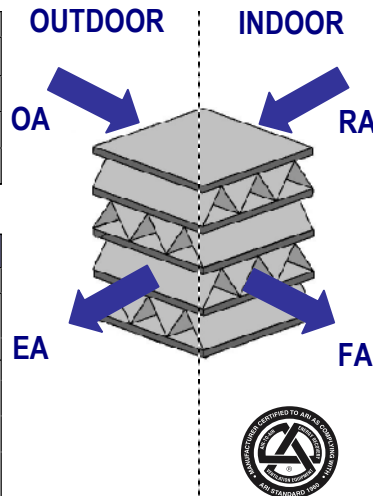
Indoor Unit

Job Name:		
Job Location:		
Job Reference Number:		
Unit Reference Number:		
Engineer:		
Distributor:		
Contractor:		
For Reference: <input checked="" type="checkbox"/>	For Approval: <input checked="" type="checkbox"/>	For Construction: <input checked="" type="checkbox"/>
Requested Delivery Date:		
Submitted by:		
Address:		
Tel:	Fax:	



Winter	Summer	Units
		DB °F
		WB °F
		RH %
		Enthalpy BTU/Lb

Design Ventilation Load		
Winter	Summer	BTU/Hr
	BTUs Tons	Without RenewAire
	BTUs Tons	With RenewAire
	BTUs Tons	RenewAire Savings



Winter	Summer	Units
		Airflow CFM
		DB °F
		WB °F
		RH %
		Enthalpy BTU/Lb

Winter	Summer	Units
		Airflow CFM
		DB °F
		WB °F
		RH %
		Enthalpy BTU/Lb

SECTION 23 73 00

INDOOR CENTRAL-STATION AIR HANDLING UNITS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and methods necessary to install a variable speed multi-position air handler
- B. Related Sections
 - 1. 23 07 00: HVAC Insulation
 - 2. 23 09 00: Instrumentation and Control for HVAC
 - 3. 23 30 00: HVAC Air Distribution
 - 4. 23 56 00: Solar Energy Heating Equipment
 - 5. 23 57 00: Heat Exchangers for HVAC
 - 6. 23 70 00: Central HVAC Equipment
 - 7. 23 81 43: Air-Source Unitary Heat Pump

1.02 SYSTEM DESCRIPTION

- A. CBX32MV Variable Speed, Multi Position Air Handler
 - 1. Dimensions: 51" by 21.25" by 22.625"
 - 2. Use with R410a refrigerant
 - 3. Available Voltages: 120 or 208/240-60-1
 - 4. 40 VA control voltage transformer

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Lennox
PO Box 799900
Dallas, TX 75379-9900
Phone: 1-800-953-6669
Website: www.lennox.com

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Air handler shall be installed by approved manufacturer representative in accordance with manufacturer's published instructions, details and the drawings that are part of the contract documents for project.

END OF SECTION 23 73 00

QUIET, EFFICIENT COMFORT—YEAR AFTER YEAR

CONTINUOUS COMFORT NETWORK

The industry's first integrated home comfort solution.

The CBX32MV air handler is designed to easily integrate with other quality Lennox® products for complete, continuous comfort.

XC21/XP19

The most quiet and efficient central air conditioner and heat pump you can buy.*

Harmony III™ Zoning System

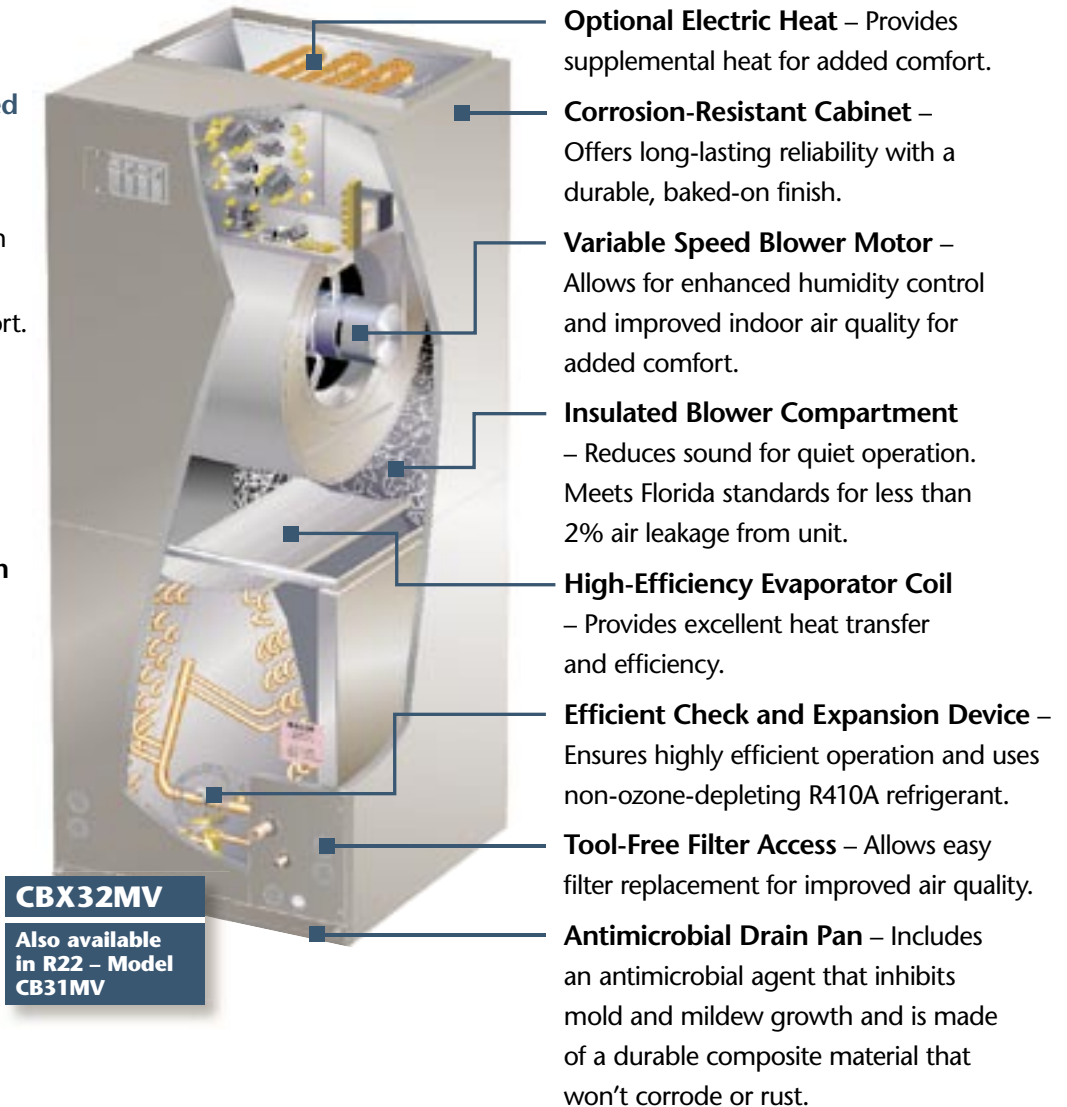
Customized temperatures for room-by-room comfort.

SignatureStat™ Home Comfort Control

Simple, one-point humidity and temperature control.

EvenHeater™

Staged supplemental heat for even greater comfort.



Optional Electric Heat – Provides supplemental heat for added comfort.

Corrosion-Resistant Cabinet – Offers long-lasting reliability with a durable, baked-on finish.

Variable Speed Blower Motor – Allows for enhanced humidity control and improved indoor air quality for added comfort.

Insulated Blower Compartment – Reduces sound for quiet operation. Meets Florida standards for less than 2% air leakage from unit.

High-Efficiency Evaporator Coil – Provides excellent heat transfer and efficiency.

Efficient Check and Expansion Device – Ensures highly efficient operation and uses non-ozone-depleting R410A refrigerant.

Tool-Free Filter Access – Allows easy filter replacement for improved air quality.

Antimicrobial Drain Pan – Includes an antimicrobial agent that inhibits mold and mildew growth and is made of a durable composite material that won't corrode or rust.



*A combination of sound ratings established per ARI's test standard: 270 and efficiency ratings established per ARI's test standard: ANSI/ARI 210/240-94.

Dave Lennox Signature™ Collection CBX32MV/CB31MV Specifications

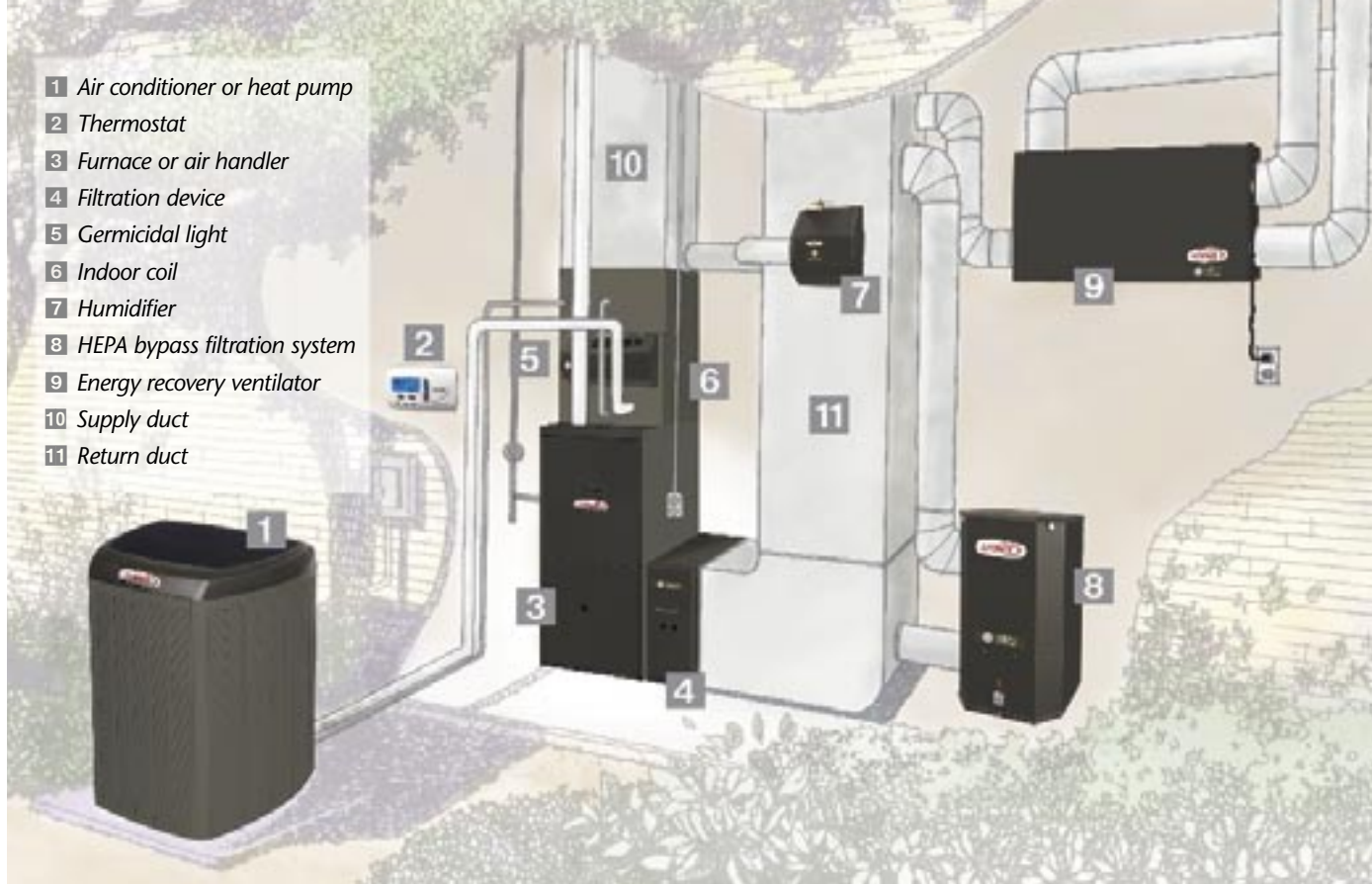
CBX32MV (R410A)		018/024	024/030	036	048	060
Dimensions	HxWxD (in.)	45-1/4 x 16-1/4 x 20-5/8	49-1/4 x 21-1/4 x 20-5/8	51 x 21-1/4 x 22-5/8	58-1/2 x 21-1/4 x 24-5/8	58-1/2 x 21-1/4 x 24-5/8
	HxWxD (mm)	1149 x 413 x 524	1251 x 540 x 524	1295 x 540 x 575	1486 x 540 x 625	1486 x 540 x 625
CB31MV (R22)				036	048	060
Dimensions	HxWxD (in.)			51 x 21-1/4 x 22-5/8	58-1/2 x 21-1/4 x 24-5/8	58-1/2 x 21-1/4 x 24-5/8
	HxWxD (mm)			1295 x 540 x 575	1486 x 540 x 625	1486 x 540 x 625

Note: Due to Lennox' ongoing commitment to quality, all specifications, ratings and dimensions are subject to change without notice. Warranties noted apply to residential applications only and are limited. Please see actual warranty for details.



Lennox is proud of the fact that these products have earned the Good Housekeeping Seal.





CONTINUOUS COMFORT NETWORK

Lennox® heating, cooling and indoor air quality products are designed to provide efficient, economical comfort—not only as individual units, but also together as an integrated system. This combined network of products delivers on every comfort count, from consistent temperatures and balanced humidity to improved indoor air quality.

DEALERS YOU CAN COUNT ON

Choosing the right dealer for your heating, cooling and indoor air quality needs is every bit as important as choosing the right brand. We think you'll agree our dealers are a big reason you can count on quality customer service when you call.



HOME COMFORT SYSTEMS
Innovation never felt so good.™

© Lennox Industries Inc. 2003

Visit us at www.lennox.com, or contact us at 1-800-9-LENNOX.

SECTION 23 81 43

AIR SOURCE UNITARY HEAT PUMP

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and methods necessary to install an Air Source Unitary Heat Pump.
- B. Related Sections
 - 1. 08 95 00: Vents
 - 2. 23 56 00: Solar Energy Heating Equipment
 - 3. 23 57 00: Heat Exchangers for HVAC
 - 4. 23 72 00: Air to Air Recovery Equipment
 - 5. 26 09 00: Instrumentation and Control for Electrical Systems
 - 6. 48 14 00: Solar Energy Electrical Power Generation Equipment

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. LENNOX
2100 Lake Park Blvd.
Richardson, TX 75080
PO Box 799800
Dallas, TX 75379-9900
Phone: 1-800-953-6669
Website: www.lennox.com

2.2 EXISTING PRODUCTS

- A. Lennox XP13 Heat Pump

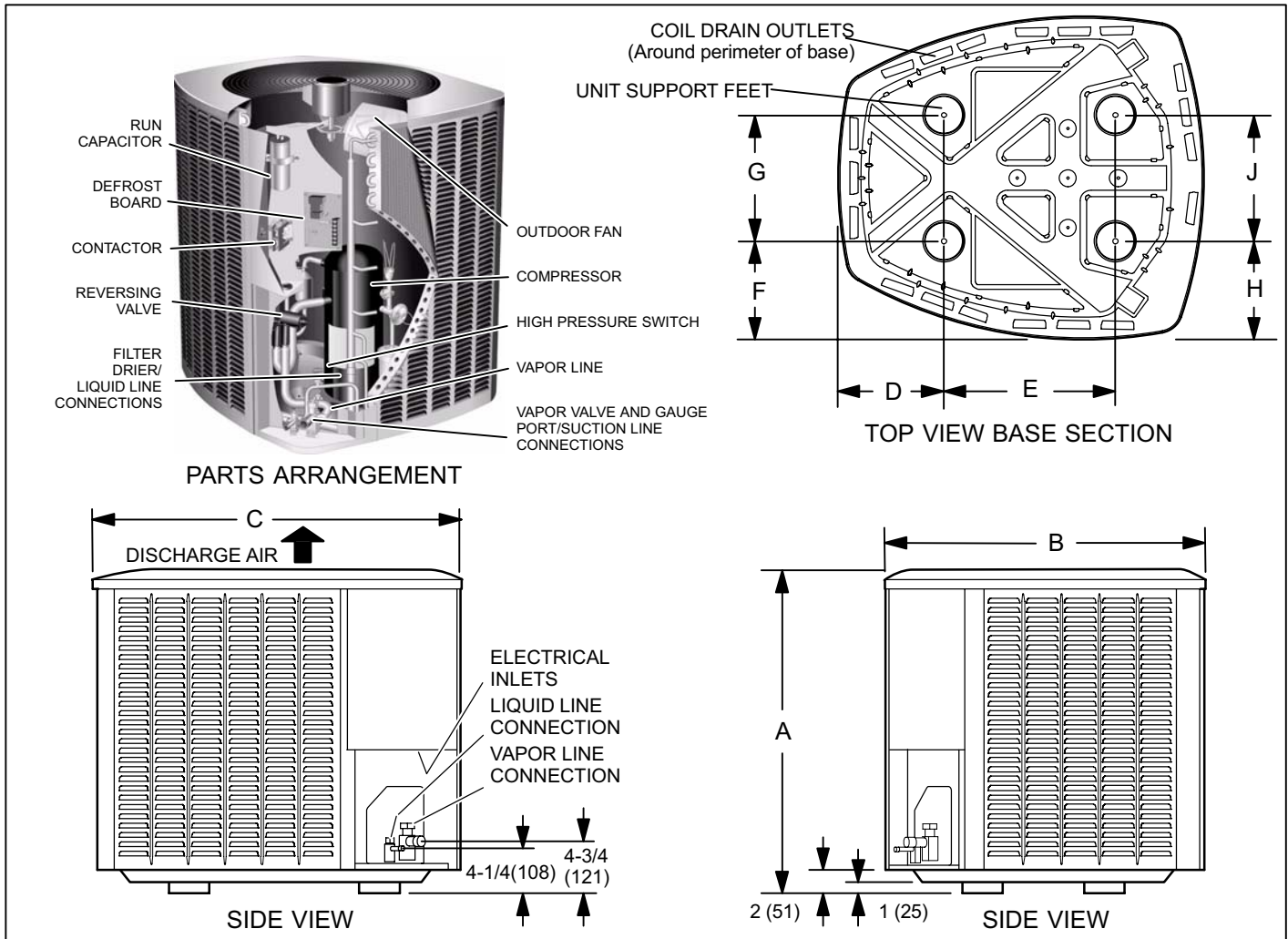
PART 3 – EXECUTION

3.1 INSTALLATION

- A. Heat Pump shall be installed on the exterior of the Solar Decathlon House in accordance with manufacturer's published instructions, details and the drawings that are part of the contract documents for project.

END OF SECTION 23 81 43

Unit Dimensions - inches (mm) & Parts Arrangement



Model No.	A	B	C	D	E	F	G	H	J
XP13-018	31 (787)	27 (686)	28 (711)	5-1/2 (140)	13-1/2 (343)	8-3/4 (222)	11-1/2 (292)	8-1/4 (210)	9-1/2 (241)
XP13-024	31 (787)	27 (686)	28 (711)	5-1/2 (140)	13-1/2 (343)	8-3/4 (222)	11-1/2 (292)	8-1/4 (210)	9-1/2 (241)
XP13-030	31 (787)	27 (686)	28 (711)	5-1/2 (140)	13-1/2 (343)	8-3/4 (222)	11-1/2 (292)	8-1/4 (210)	9-1/2 (241)
XP13-036	35 (889)	27 (686)	28 (711)	8-3/4 (222)	18 (457)	11-1/2 (292)	13-1/2 (343)	9 (229)	11-1/2 (292)
XP13-042	35 (889)	30-1/2 (775)	35 (889)	8-3/4 (222)	18 (457)	11-1/2 (292)	13-1/2 (343)	9 (229)	11-1/2 (292)
XP13-048	35 (889)	30-1/2 (775)	35 (889)	8-3/4 (222)	18 (457)	11-1/2 (292)	13-1/2 (343)	9 (229)	11-1/2 (292)
XP13-060	45 (1143)	30-1/2 (775)	35 (889)	8-3/4 (222)	18 (457)	11-1/2 (292)	13-1/2 (343)	9 (229)	11-1/2 (292)

General Information

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

When servicing or repairing HVAC components, ensure the fasteners are appropriately tightened. Table 1 shows torque values for fasteners.

Table 1

Torque Requirements		
Part	Recommended Torque	
Service valve cap	8 ft.- lb.	11 NM
Sheet metal screws	16 in.- lb.	2 NM
Machine screws #8	16 in.- lb.	2 NM
Compressor bolts	90 in.- lb.	10 NM
Gauge port seal cap	8 ft.- lb.	11 NM

SECTION 23 84 13

HUMIDIFIERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and methods necessary to install an energy recovery ventilator.
- B. Related Sections
 - 1. 23 07 00: HVAC Insulation
 - 2. 23 09 00: Instrumentation and Control for HVAC
 - 3. 23 30 00: HVAC Air Distribution
 - 4. 23 70 00: Central HVAC Equipment
 - 5. 48 14 00: Solar Energy Electrical Power Generation

1.02 SYSTEM DESCRIPTION

- A. Humidifier for application with an all forced warm-air furnace

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Lennox
2100 Lake Park Blvd.
Richardson, TX 75080

PO Box 799900
Dallas, TX 75379-9900
Phone: 1-800-953-6669
Website: www.lennox.com

2.2 EXISTING PRODUCTS

- A. Lennox WB2-12A Healthy Climate Humidifier
 - 1. Dimensions: 12-7/8 in wide by 9-1/8 in deep by 12-3/4 in high
 - 2. Evaporative Capacity: 130° F and 12 Gallons per day
 - 3. Plenum Opening: 9.5 in wide by 9.5 in high
 - 4. Bypass Duct: 6 in Diameter
 - 5. Electrical Supply: 24 V / 60 Hz, .5 AMP
 - 6. Water Feed Rate: 3 gph

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Humidifier shall be installed by approved manufacturer representative in accordance with manufacturer's published instructions, details and the drawings that are part of the contract documents for project.

END OF SECTION 23 84 13

Healthy Climate® Power and Bypass Humidifiers

Whole-home humidification helps solve problems associated with dry indoor air, providing optimal comfort and improved indoor air quality

Eliminates the hassle of constant manual adjustments required when using a standard humidifier

Works with your central heating and cooling system to enhance the air throughout your home

WARRANTY*

5-year limited warranty on covered components.

*Applies to residential applications only. See actual warranty certificate for details.

THE PERFECT SOLUTION TO DRY INDOOR AIR

Dry air is a problem that can wreak havoc on your health and your home environment. It can cause skin irritation and respiratory** problems, not to mention annoying static shocks. Dry air can damage home furnishings, making the wood in furniture and floors shrink, warp and crack. Fortunately, with a Healthy Climate® humidifier, you can easily solve those problems.

Healthy Climate whole-home humidifiers work with a *SignatureStat*™ home comfort control to accurately and reliably maintain optimal humidity levels throughout your home.*** Unlike standard humidifiers, which require constant manual adjustments, Healthy Climate humidifiers automatically respond to changes in outdoor temperature and indoor relative humidity to deliver the perfect balance of comfort and convenience.

WP2 Power Humidifier

- ◆ Equipped with a built-in fan that circulates humidified air throughout your home via the furnace duct system



WB2-17/12 Bypass Humidifier

- ◆ Utilizes the air handler or furnace fan to direct humidified air to every room in your home



**Exposure to excessively dry air (relative humidity of less than 20%) can cause respiratory irritation.

Source: American Academy of Allergy, Asthma and Immunology

***Studies show that, for optimal health and comfort, your home's relative humidity levels should range between 35% and 50%. Source: National studies and Lennox' own indoor air quality experts

Healthy Climate® Humidifier Specifications

Specifications	WATER FEED RATE gph	CAPACITY gph 120° F plenum temp.	SQ. FT. AREA Loose house (2 air changes/hr.) Average house (1 air change/hr.) Tight house (1-1/2 air changes/hr.)	ELECTRICAL DATA	ALSO INCLUDED	A. UNIT SIZE (HxWxD inches) B. PLENUM OPENING (HxW inches)
Bypass Humidifier WB2-12	3	0.50	750 1,500 3,000	24V-60Hz-.05 AMP	Saddle Valve Transformer Humidistat Adapter Plate	A. 12-3/4 x 12-7/8 x 9-1/8 6" dia. round opening B. 9-1/2 x 9-3/8
Bypass Humidifier WB2-17	6	0.70	1,000 2,000 4,000	24V-60Hz-.05 AMP	Saddle Valve Transformer Humidistat Adapter Plate	A. 15-1/2 x 13-1/8 x 9-1/8 6" dia. round opening B. 12-1/2 x 9-3/4
Power Humidifier WP2-18	6	0.75	1,050 2,100 4,200	120V-60Hz-.08 AMP	Saddle Valve	A. 15-31/32 x 15-29/32 x 10-11/32 B. 14-7/8 x 14-3/16

Note: Due to ongoing commitment to quality, all specifications, ratings and dimensions are subject to change without notice.



SECTION 25 51 13

INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS

PART 1 – GENERAL

1.01 SUMMARY

Section Includes: Materials necessary for the installation of interior electric lighting fixtures and lamps

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. GE Lighting
General Electric Company
Louisville, KY 40225
Web: www.geappliances.com
- B. Juno Lighting Group
1300 South Wolf Road
Des Plaines, IL 60017
Phone: (847) 827-9880
Website: <http://www.junolighting.com/headquarters.asp>

2.2 EXISTING PRODUCTS

- A. GE Lamps
 - 1. GE Ecolux Starcoat T8
 - a. Dimensions: 1" D x 48" L
 - b. 32 watts
 - c. 78 CRI
 - d. Color Temp: 3500 K
 - e. Quantity: 12
 - 2. GE Edison PAR20/H/SP10
 - a. Dimensions: 2.5" D x 3.1" L
 - b. 50 watts
 - c. 11 Lumens per watt
 - d. Color Temp: 2800 K
 - e. Quantity: 6
 - 3. GE 13W Quad (4-pin) CFL
 - a. Quantity: 6
 - b. Energy Star Rated

4. MR16 (#30774)
 - a. 1.3" D x 1.3" L
 - b. 35 watts
 - c. Color Temp: 2900 K
 - d. Quantity: 8
 5. Vio Hight Power White LED
 - a. 25.4mm x 25.4mm x 6.4mm
 - b. 1.2 or 3.6 watts
 - c. 70CRI
 - d. Color Temp: 3500K
 - e. Quantity: 10
 - f. Energy Star Rated
- B. Juno Fixtures
1. Juno ACULUX Recessed Downlight TC13-43
 - a. Aperature Opening: 3-1/4" D
 - b. Depth of Recess: 6"
 - c. Series: TC13-437
 - d. Quantity: 6
 2. Juno 5" Compact Flourescent Housing for 13W ICPL513E
 - a. Aperature Opening: 5" D
 - b. Depth of Recess: 7.5"
 - c. Series: ICPL513E
 - d. Quantity: 6
 - e. Energy Star Rated
 3. Juno Alfa Cable Mounted
 - a. Quantity: 8

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install all lamps and fixtures in accordance with manufacturer's installation instructions.

END OF SECTION 25 51 13

SECTION 26 31 00

PHOTOVOLTAIC COLLECTORS

PART 1 – GENERAL

1.01 SUMMARY

- A. This section contains:
 - 1. Photovoltaic panels
- B. Related Sections:
 - 1. 05 12 00: Structural Steel Framing
 - 2. 05 42 23: Cold-Formed Metal Roof Joist Framing
 - 3. 16 15 00: Equipment Wiring
 - 4. 26 24 00: Switchboard and Panelboards
 - 5. 26 33 13: Batteries
 - 6. 48 19 13: Electrical Power Generation Battery Charging Equipment
 - 7. 48 19 13: Electrical Power Generation Current Inverters

1.01 REFERENCES

- A. International Electro technical Commission (IEC/CEI)
 - 1. 61215 – 2005 Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval
- B. Underwriters Laboratory (UL)
 - 1. 1703 – 2002 Flat-Plate Photovoltaic Modules and Panels

1.02 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets for panels.
- B. Design Data: Labeled construction documents which outline installation.
- C. Certificates: Manufacturer's quality certificates and published test reports.
- D. Manufacturer's Instructions: Manufacturer's complete shipping, handling, installation and maintenance instructions.

1.03 QUALITY ASSURANCE

- A. Certifications
 - 1. GEPV-110 Module meets the following requirements:
 - a. UL-1703
 - b. IEC-61215

1.04 DELIVERY, STORAGE AND HANDLING

- A. Storage and Protection
 - 1. Store panels in manufacturer's unopened package until ready for installation.

1.05 WARRANTY

- A. Special Warranty
 - 1. 25-limited warranty on power output
 - 2. 5-year limited warranty on materials and workmanship

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. GE Energy
231 Lake Drive
Newark, DE 19702
Phone: 866-750-3150
Website: www.gepower.com/solar

2.2 EXISTING PRODUCTS

- A. GE PV-110-M Solar Panels : Quantity: 69
 - 1. 36 single-crystal cells connected in series
 - 2. Lightweight aluminum frame with pre-drilled holes
- B. Physical Characteristics:
 - 1. Dimensions (per panel): 26 inches W x 58.1 inches L x 2.2 inches D
 - 2. Weight (per panel): 26.1 pounds
- C. Structural Characteristics:
 - 1. Weight (Wind) Bearing Potential: 50lbs/ft² [125 mph equivalent]
 - 2. Hailstone Impact Resistance: 1" @ 50 mph [25mm @ 80kph]
- D. Performance Characteristics:
 - 1. Peak Power (Wp): 110 Watts
 - 2. Max. Peak Voltage (Vmp): 16.7 Volts
 - 3. Max. Peak Power Current (Imp): 6.6 Amps
 - 4. Open Circuit Voltage (Voc): 21.2 Volts
 - 5. Short Circuit Current (Isc): 7.4 Amps
 - 6. Short Circuit Temp. Coefficient: +3 mA/°C
 - 7. Open Circuit Voltage Coefficient: -0.08 V/°C
 - 8. Max. Power Temp. Coefficient: -0.5 %/°C
 - 9. Max. Series Fuse: 15 Amps
 - 10. Normal Operating Cell Temp. (NOCT): 45 °C

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrate, areas and conditions where installation of solar panels will occur. Verify that substrate and conditions are satisfactory for installation.

3.2 INSTALLATION

- A. Assemble solar panels and install in accordance with manufacturer's instructions and following:
 - 1. Securely mount to substrate
 - 2. Install solar panels plumb and level and in proper relation to adjacent construction
 - 3. Test for proper operation. Adjust until proper operation is achieved.
- B. Refer to manufacturer's published installation instruction and construction documents for detailed installation instructions.

3.2 CLEANING AND PROTECTION

- A. Protect surfaces from damage until date of substantial completion. Repair or replace damaged work.
- B. Clean installed products in accordance with manufacturer's instruction prior to competition.

END OF SECTION 26 31 00

GEPV-110 110 WATT PHOTOVOLTAIC MODULE

FEATURES

- 36 single-crystal cells connected in series
- Peak power of 110 Watts at 16.7 Volts
- Designed for optimum use in residential and commercial grid-tied, and battery charging applications
- 25-year limited warranty on power output, 5-year limited warranty on materials and workmanship*
- Junction box is available in two versions: pre-wired with MC Connectors or unwired with a user-accessible terminal strip

BENEFITS

- Output power tolerance of +/- 5%
- Robust lightweight clear anodized aluminum frame with pre-drilled holes for quick installation
- Engineered for the most rugged of locations including those which experience hail, snow, and ice storms

CERTIFICATIONS

The GEPV-110 Module meets the following requirements:

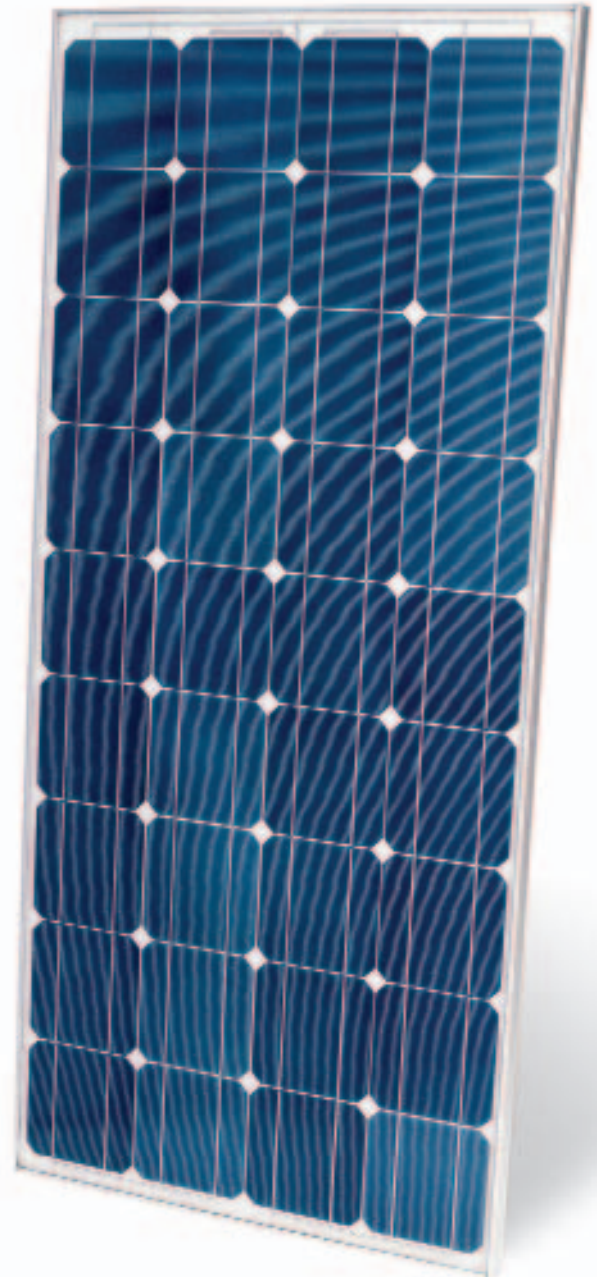


UL-1703



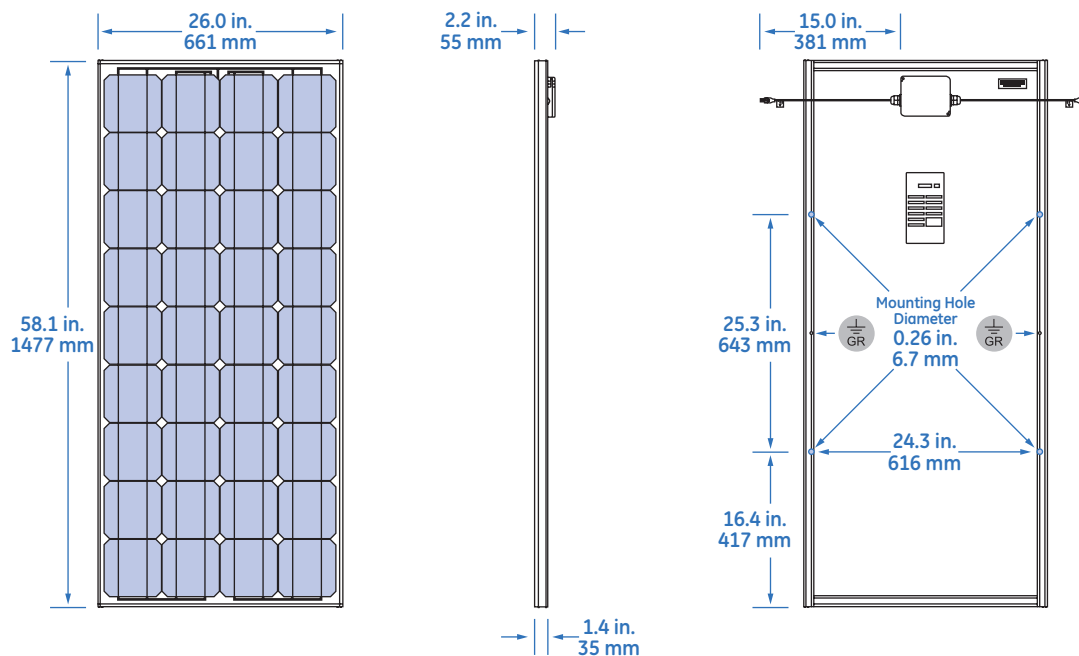
IEC-61215

*Refer to GE Energy Product Warranty for specific details



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PHYSICAL CHARACTERISTICS

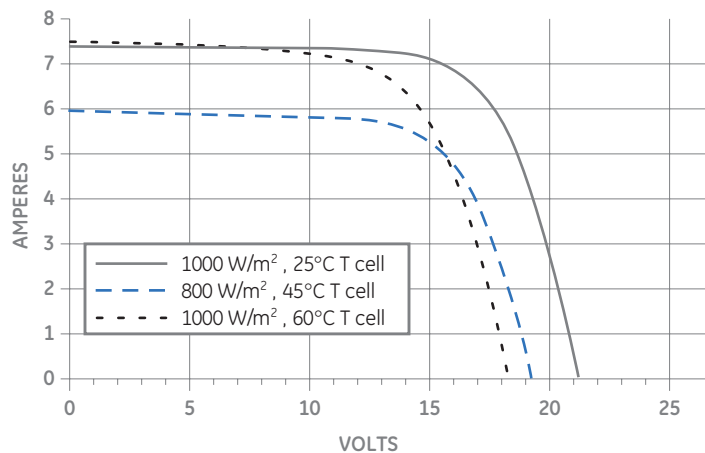


Physical Design Properties

Weight	26.1 lb [11.9 kg]
Weight (Wind) Bearing Potential	50 lbs/ft ² [125 mph equivalent]
Hailstone Impact Resistance	1" @ 50 mph [25 mm @ 80 kph]

ELECTRICAL PERFORMANCE

Typical I-V Curve for GE PV-110 Module



Typical Performance Characteristics

Peak Power (Wp)	Watts	110
Max. Power Voltage (Vmp)	Volts	16.7
Max. Power Current (Imp)	Amps	6.6
Open Circuit Voltage (Voc)	Volts	21.2
Short Circuit Current (Isc)	Amps	7.4
Short Circuit Temp. Coefficient	mA/°C	+3
Open Circuit Voltage Coefficient	V/°C	-0.08
Max. Power Temp. Coefficient	%/°C	-0.5
Max. Series Fuse	Amps	15
Normal Operating Cell Temperature [NOCT]	deg. C	45

I-V parameters are rated at Standard Test Conditions (Irradiance of 1000 W/m², AM 1.5G, cell temperature 25°C). As with all single-crystal PV Modules, during the stabilization process that occurs during the first few days in service, module power may decrease approximately 3% from typical maximum power due to a phenomenon known as Light Induced Degradation (LID). All measurements are guaranteed at the laminate leads. NOCT is defined as 800 W/m², 20 deg. C ambient, and 1 m/s windspeed.



GE Energy
231 Lake Drive
Newark, DE 19702
866-750-3150

gepower.com/solar

Solar cell specifications:

- Manufacturer's quote for cell or module area:
 - 26" x 58.1" x 2.2"
- Manufacturer's quote for performance:

Typical Performance Characteristics

Peak Power (Wp)	Watts	110
Max. Power Voltage (Vmp)	Volts	16.7
Max. Power Current (Imp)	Amps	6.6
Open Circuit Voltage (Voc)	Volts	21.2
Short Circuit Current (Isc)	Amps	7.4
Short Circuit Temp. Coefficient	mA/°C	+3
Open Circuit Voltage Coefficient	V/°C	-0.08
Max. Power Temp. Coefficient	%/°C	-0.5
Max. Series Fuse	Amps	15
Normal Operating Cell Temperature (NOCT)	deg. C	45

- Cost (US\$) per watt for each cell or module
 - \$5.60/ watt → \$616 per module → \$44,352 Total

SECTION 26 33 13

BATTERIES

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Solar Photovoltaic Batteries
- B. Related Sections:
 - 1. 16 15 00: Equipment Wiring
 - 2. 26 24 00: Switchboards and Panelboards
 - 3. 26 31 00: Photovoltaic Collectors
 - 4. 48 19 13: Electrical Power Generation Battery Charging Equipment
 - 5. 48 19 16: Electrical Power Generation Current Inverters

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Concorde Battery Corporation
2009 San Bernardino Road
West Covina, CA 91790
Phone: 626-813-1234
Fax: 626-813-1235
Website: www.concordebattery.com

2.2 MATERIALS

- A. Concorde Sun-Xtender PVX-9150T Lead Acid Batteries
 - 1. Voltage: 2 volts
 - 2. Nominal Capacity Ampere Hour: 68 at 1Hr rate
 - 3. Dimensions: 12.9 in L x 6.75 in W x 8.96 in H
 - 4. Weight: 85 lbs each
 - 5. \$210.56 each (with bulk order \$205 each)
 - 6. Quantity: 72
 - 7. Spill and damage procedures are not supplied because batteries are sealed.

2.3 ACCESSORIES

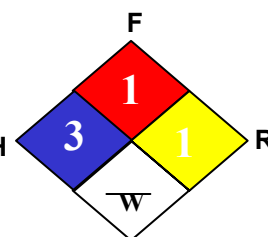
- A. Battery Enclosure
 - 1. Battery are sealed so required ventilation is passive. System will be comprised of 2 vents on the top and bottom measuring 1" H x 14"L for an area 28in² for both the top and bottom. There are no air intakes near the boxes so the 5 ft. rule is not in effect.

END OF SECTION 26 33 13



CONCORDE BATTERY VALVE REGULATED LEAD ACID BATTERY

Hazard Rating



MATERIAL SAFETY DATA SHEET

SECTION 1 - GENERAL INFORMATION

MANUFACTURER'S NAME: CONCORDE BATTERY CORPORATION	EMERGENCY TELEPHONE NO.: CHEMTEL 800-255-3924
ADDRESS: 2009 San Bernardino Rd., West Covina, CA 91790	OTHER INFORMATION CALLS: 626-813-1234
PERSON RESPONSIBLE FOR PREPARATION Gonzalo Ramos, Safety, Health & Environmental Affairs Manager	Revised Date: JUNE 30, 2006

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

C.A.S.	PRINCIPAL HAZARDOUS COMPONENT(S) (chemical & common name(s))	Hazard Category	% Weight	ACGIH TLV - mg/m ³	OSHA PEL/TWA - mg/m ³
7439-92-1	Lead/Lead Oxide (Litharge)/Lead Sulfate	Acute-Chronic	60-70	0.05 mg/m ³	0.05 mg/m ³
7440-70-2	Calcium (lead calcium alloy)	Reactive	<0.15	Not Established	Not Established
7440-31-5	Tin	Chronic	<1	2	2
7440-38-2	Arsenic (inorganic)	Acute-Chronic	<1	0.01	0.01
7664-93-9	Sulfuric Acid (Battery Electrolyte)	Reactive-Oxidizer Acute -Chronic	10-15	1.0	1.0
Not applicable	Inert Ingredients	Not applicable	<6	Not Applicable	Not Applicable

Note: PEL's for Individual states may differ from OSHA's PEL's. Check with local authorities for the applicable state PEL's.

OSHA – Occupational Safety and Health Administration; ACGIH – American Conference of Governmental Industrial Hygienists; NIOSH – National Institute for Occupational Safety and Health.

COMMON NAME: (Used on label) Valve Regulated Lead-acid Battery

(Trade Name & Synonyms) VRB, VRLA, SLAB, Recombinant lead acid: RG, GPL, AGM, PVX or FD Series, D8565 series

Chemical Family: Toxic and Corrosive Material Mixture

Chemical

Formula: Lead/Acid

Name: Battery, Storage, Lead Acid, Valve Regulated

SECTION 3 -- HAZARD IDENTIFICATION

Signs and Symptoms of Exposure	1. Acute Hazards	Do not open battery. Avoid contact with internal components. Internal components include lead and absorbed electrolyte. Electrolyte - Electrolyte is corrosive and contact may cause skin irritation and chemical burns. Electrolyte causes severe irritation and burns of eyes, nose and throat. Ingestion can cause severe burns and vomiting. Lead - Direct skin or eye contact may cause local irritation. Inhalation or ingestion of lead dust or fumes may result in headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia and leg, arm and joint pain.			
	2. Subchronic and Chronic Health Effects	Electrolyte - Repeated contact with electrolyte causes irritation and skin burns. Repeated exposure to mist may cause erosion of teeth, chronic eye irritation and/or chronic inflammation of the nose, throat and lungs. Lead - Prolonged exposure may cause central nervous system damage, gastrointestinal disturbances, anemia, irritability, metallic taste, insomnia, wrist-drop, kidney dysfunction and reproductive system disturbances. Pregnant women should be protected from excessive exposure to prevent lead from crossing the placental barrier and causing infant neurological disorders. California Proposition 65 Warning: Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm, and during charging, strong inorganic acid mists containing sulfuric acid are evolved, a chemical Known to the State of California to cause cancer. Wash hands after handling.			
Medical Conditions Generally Aggravated by Exposure	Contact with internal components if battery is broken or opened, then persons with the following medical conditions must take precautions: pulmonary edema, bronchitis, emphysema, dental erosion and tracheobronchitis.				
Routes of Entry	Inhalation - YES Ingestion – YES		Eye Contact- YES		
Chemical(s) Listed as Carcinogen or potential Carcinogen	Proposition 65 - YES		National Toxicology Program - YES	I.A.R.C. Monographs - YES	O.S.H.A. - NO

SECTION 4 - FIRST AID MEASURES

Emergency and First Aid Procedures	Contact with internal components if battery is opened/broken.
1. Inhalation	Remove to fresh air and provide medical oxygen/CPR if needed. Obtain medical attention.
2. Eyes	Immediately flush with water for at least 15 minutes, hold eyelids open. Obtain medical attention.
3. Skin	Flush contacted area with large amounts of water for at least 15 minutes. Remove contaminated clothing and obtain medical attention if necessary.
4. Ingestion	Do not induce vomiting. If conscious drink large amounts of water/milk. Obtain medical attention. Never give anything by mouth to an unconscious person.

SECTION 5 - FIREFIGHTING MEASURES

Flash Point – Not Applicable	Flammable Limits in Air % by Volume: Not Applicable	Extinguishing Media – Class ABC, CO ₂ , Halon	Auto-Ignition 675°F (polypropylene) Temperature
Special Fire Fighting Procedures	Lead/acid batteries do not burn, or burn with difficulty. Do not use water on fires where molten metal is present. Extinguish fire with agent suitable for surrounding combustible materials. Cool exterior of battery if exposed to fire to prevent rupture. The acid mist and vapors generated by heat or fire are corrosive. Use NIOSH approved self-contained breathing apparatus (SCBA) and full protective equipment operated in positive-pressure mode.		
Unusual Fire and Explosion Hazards	Sulfuric acid vapors are generated upon overcharge and polypropylene case failure. Use adequate ventilation. Avoid open flames/sparks/other sources of ignition near battery.		

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Procedures for Cleanup. Avoid contact with any spilled material. Contain spill, isolate hazard area, and deny entry. Limit site access to emergency responders. Neutralize with sodium bicarbonate, soda ash, lime or other neutralizing agent. Place battery in suitable container for disposal. Dispose of contaminated material in accordance with applicable local, state and federal regulations. Sodium bicarbonate, soda ash, sand, lime or other neutralizing agent should be kept on-site for spill remediation.

Personal Precautions: Acid resistant aprons, boots and protective clothing. ANSI approved safety glasses with side shields/face shield recommended.

Environmental Precautions: Lead and its compounds and sulfuric acid can pose a severe threat to the environment. Contamination of water, soil and air should be prevented.

SECTION 7 - HANDLING AND STORAGE

Precautions to be Taken in Handling and Storage	Store away from reactive materials, open flames and sources of ignition as defined in Section 10 – Stability and Reactivity Data. Store batteries in cool, dry, well-ventilated areas. Batteries should be stored under roof for protection against adverse weather conditions. Avoid damage to containers.
Other Precautions	GOOD PERSONAL HYGIENE AND WORK PRACTICES ARE MANDATORY. Refrain from eating, drinking or smoking in work areas. Thoroughly wash hands, face, neck and arms, before eating, drinking and smoking. Work clothes and equipment should remain in designated lead contaminated areas, and never taken home or laundered with personal clothing. Wash soiled clothing, work clothes and equipment before reuse.

SECTION 8 - EXPOSURE CONTROLS AND PERSONAL PROTECTION

Respiratory Protection (Specify Type)	None required under normal conditions. Acid/gas NIOSH approved respirator is required when the PEL is exceeded or employee experiences respiratory irritation.				
Ventilation	Store and handle in dry ventilated area.	Local Exhaust	When PEL is exceeded.	Mechanical (General)	Not Applicable
Protective Gloves	Wear rubber or plastic acid resistant gloves.		Eye Protection	ANSI approved safety glasses with side shields/face shield recommended	
Other Protective Clothing or Equipment	Safety shower and eyewash.				

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: Not Applicable	Vapor Pressure	Not Applicable	Specific Gravity	1.250-1.320 pH <2	Melting Point: >320°F (polypropylene)
Percent Volatile By Volume	Not Applicable	Vapor Density	Hydrogen: 0.069 (Air =1) Electrolyte: 3.4 @ STP (Air = 1)	Evaporation Rate	Not applicable
Solubility In water	100% soluble (electrolyte)				
Reactivity in Water	Electrolyte – Water Reactive (1)				
Appearance and Odor:	Battery: Co-polymer polypropylene, solid; may be contained within an outer casing of aluminum or steel. Case has metal terminals. Lead: Gray, metallic, solid; brown/grey oxide Electrolyte: Odorless, liquid absorbed in glass mat material. No apparent odor.				

SECTION 10 - STABILITY AND REACTIVITY

Stability: Stable	Conditions to Avoid: Avoid overcharging and smoking, or sparks near battery surface. High temperatures-cases decompose at >320°F.
Incompatibility (Materials to Avoid)	Sparks, open flames, keep battery away from strong oxidizers.
Hazardous Decomposition Products	Combustion can produce carbon dioxide and carbon monoxide.
Hazardous Polymerization	Hazardous Polymerization has not been reported.

SECTION 11 - TOXICOLOGICAL INFORMATION

GENERAL: The primary routes of exposure to lead are ingestion or inhalation of dust and fumes.

ACUTE:

INHALATION/INGESTION: Exposure to lead and its compounds may cause headache, nausea, vomiting, abdominal spasms, fatigue, sleep disturbances, weight loss, anemia, and pain in the legs, arms and joints. Kidney damage, as well as anemia, can occur from acute exposure.

CHRONIC:

INHALATION/INGESTION: Prolonged exposure to lead and its compounds may produce many of the symptoms of short-term exposure and may also cause central nervous system damage, gastrointestinal disturbances, anemia, and wrist drop. Symptoms of central nervous system damage include fatigue, headaches, tremors, hypertension, hallucination, convulsions and delirium. Kidney dysfunction and possible injury has also been associated with chronic lead poisoning. Chronic over-exposure to lead has been implicated as a causative agent for the impairment of male and female reproductive capacity, but there is at present, no substantiation of the implication. Pregnant women should be protected from excessive exposure. Lead can cross the placental barrier and unborn children may suffer neurological damage or developmental problems due to excessive lead exposure in pregnant women.

SECTION 12 - ECOLOGICAL INFORMATION

In most surface water and groundwater, lead forms compounds with anions such as hydroxides, carbonates, sulfates, and phosphates, and precipitates out of the water column. Lead may occur as sorbed ions or surface coatings on sediment mineral particles or may be carried in colloidal particles in surface water. Most lead is strongly retained in soil, resulting in little mobility. Lead may be immobilized by ion exchange with hydrous oxides or clays or by chelation with humic or fulvic acids in the soil. Lead (dissolved phase) is bioaccumulated by plants and animals, both aquatic and terrestrial.

SECTION 13 - DISPOSAL CONSIDERATIONS

Lead-acid batteries are completely recyclable. Return whole scrap batteries to distributor, manufacturer or lead smelter for recycling. For information on returning batteries to Concorde Battery for recycling call 626-813-1234. For neutralized spills, place residue in acid-resistant containers with sorbent material, sand or earth and dispose of in accordance with local, state and federal regulations for acid and lead compounds. Contact local and/or state environmental officials regarding disposal information.

SECTION 14 - TRANSPORT INFORMATION

All Concorde AGM, GPL, PVX, RG series and D8565 series are valve regulated lead acid (VRLA) batteries.

Concorde's VRLA batteries have passed vibration, pressure differential and free flowing acid tests under CFR 49 173.159(d) and meet IATA Special Provisions A48 and A67. The batteries are securely packaged, protected from short circuits and labeled "Non-Spillable." Concorde's VRLA batteries are exempt from DOT Hazardous Material Regulations and IATA Dangerous Goods Regulations.

Note: The shipper has the option of shipping the batteries Hazmat regulated under UN2800. Additional labeling and paperwork would be required. See CFR 49 and IATA Dangerous Goods Regulations for more information.

U.S. DOT PROPER SHIPPING NAME: Batteries, wet, non-spillable

U.S. DOT HAZARD CLASS: 8

U.S. DOT ID NUMBER: UN2800

U.S. DOT PACKING GROUP: III

OR

Excepted from the requirements because batteries have passed the Vibration and Pressure Differential performance tests, and ruptured case test for Nonspillable designation.

U.S. DOT LABEL: CORROSIVE

IMO PROPER SHIPPING NAME: Batteries, wet, non-spillable

IMO U.N. CLASS: 8

IMO U.N. NUMBER: UN 2800

IMO LABEL: CORROSIVE

IMO VESSEL STOWAGE: A

Ems # - F-A, S-B

IATA PROPER SHIPPING NAME: Batteries, wet, non-spillable

IATA U.N. CLASS: 8

when

IATA U.N. NUMBER: UN 2800

IATA LABEL: CORROSIVE

ERG Code - 8L

OR

Excepted from the requirements because batteries have passed the vibration and pressure differential performance tests, and ruptured case test for nonspillable designation. And,

packaged for transport, the terminals are protected from short circuit.

SECTION 15 - REGULATORY INFORMATION

U.S. HAZARDOUS UNDER HAZARD COMMUNICATION STANDARD:

LEAD - YES

ARSENIC - YES

SULFURIC ACID - YES

INGREDIENTS LISTED ON TSCA INVENTORY:

YES

CERCLA SECTION 304 HAZARDOUS SUBSTANCES:

LEAD - YES

ARSENIC - YES

SULFURIC ACID - YES

RQ: N/A*

RQ: 1 POUND

RQ: 1000 POUNDS

* RQ: REPORTING NOT REQUIRED WHEN DIAMETER OF THE PIECES OF SOLID METAL RELEASED IS EQUAL TO OR EXCEEDS 100 µm (micrometers).

EPCRA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE:

SULFURIC ACID - YES

EPCRA SECTION 313 TOXIC RELEASE INVENTORY:

LEAD - CAS NO: 7439-92-1

ARSENIC - CAS NO: 7440-38-2

SULFURIC ACID - CAS NO: 7664-93-9

SECTION 16 - OTHER INFORMATION

THE INFORMATION ABOVE IS BELIEVED TO BE ACCURATE AND REPRESENTS THE BEST INFORMATION CURRENTLY AVAILABLE TO US. HOWEVER, CONCORDE BATTERY MAKES NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESSED OR IMPLIED, WITH RESPECT TO SUCH INFORMATION, AND WE ASSUME NO LIABILITY RESULTING FROM ITS USE. USERS SHOULD MAKE THEIR OWN INVESTIGATIONS TO DETERMINE THE SUITABILITY OF THE INFORMATION FOR THEIR PARTICULAR PURPOSES. ALTHOUGH REASONABLE PRECAUTIONS HAVE BEEN TAKEN IN THE PREPARATION OF THE DATA CONTAINED HEREIN, IT IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION. THIS MATERIAL SAFETY DATA SHEET PROVIDES GUIDELINES FOR THE SAFE HANDLING AND USE OF THIS PRODUCT; IT DOES NOT AND CANNOT ADVISE ON ALL POSSIBLE SITUATIONS, THEREFORE, YOUR SPECIFIC USE OF THIS PRODUCT SHOULD BE EVALUATED TO DETERMINE IF ADDITIONAL PRECAUTIONS ARE REQUIRED.

The data/information contained herein has been reviewed and approved for general release on the basis that this document contains no export-controlled information.

SECTION 33 16 13

ABOVEGROUND WATER UTILITY STORAGE TANKS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and Methods necessary to install an Above Ground Rainwater Storage Tank
- B. Related Sections
 - 1. 05 12 00: Structural Steel Framing
 - 2. 06 11 00: Wood Framing
 - 3. 06 15 00: Wood Decking
 - 4. 22 11 16: Domestic Water Piping
 - 5. 22 11 23: Domestic Water Pumps
 - 6. 22 32 00: Domestic Water Filtration Equipment

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Hog Works (A)
14 South St
Edgecliff 2027, Australia
Phone: 0405 551 812
Website: <http://waterhog.com.au>
- B. Reused Tanks from 2005 CUSD House (C and D)

2.2 EXISTING PRODUCT

- A. waterHOG multi-directional water storage tank
 - 1. Materials: Rotomoulded Virgin Polyethylene (Recyclable)
 - 2. Dimension: 5.9ft L by 1.64ft W by .72ft D
 - 3. Volume: 47.5 Gallons
 - 4. Weight (when empty): 39.7 pounds
 - 5. Quantity: 1
- B. Grey Water Tank
 - 1. 2' x 3' x 1.5'
- C. Black Water Tank
 - 1. Rigid Steel Rectangular Tank
 - 2. 5' H x 5' W x 5' D
- D. Potable Water Tanks
 - 1. 9'-10" H x 6'-9" W x 9" H

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Check components. A WaterHOG installation package contains three HOG tanks, two tank connectors and a tank outlet.
- B. Lay HOG tanks side by side. A slight fall from inlet to outlet tank will aid drainage when tanks are emptying. The location of the inlet hole depends on the orientation of the HOG. Refer to Installation Manual for manufacture's installation instructions.
- C. Use a 20mm router bit to drill holes between tanks and for outlet. Push one end of connector into the shoulder hold and tighten. Join tanks together with connectors.
- D. Push the black end of the outlet into the outlet hole in the tank and tighten the connection.
- E. Make the inlet hole to match the shape of the downpipe
- F. To install WaterHOG on a wall refer to Manufacturer's Installation Manual # 2.

END OF SECTION 33 16 13

Optional Kits

HOG3 On the Wall Kit

1 x C unistrut 1500mm long
1 x D leafguard/overflow

3 x E bolt
3 x F spring nut
3 x G steel plate

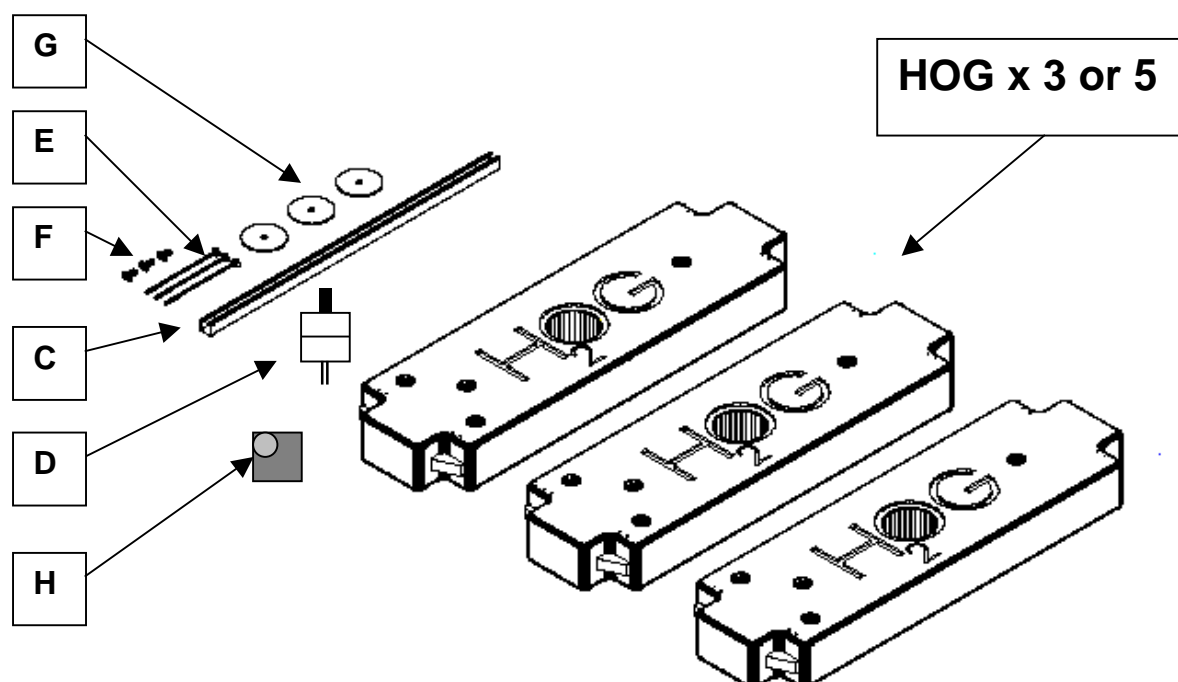
3 x H rubber plate

HOG5 On the Wall Kit

1 x C unistrut 3000mm long
1 x D leafguard/overflow

5 x E bolt
5 x F spring nut
5 x G steel plate

5 x H rubber plate



You will need to supply your own fixings for the unistrut to your wall – these will depend on the material of your wall – check with your builder if you are uncertain of the appropriate fixings.

You will also need to ensure that you have an even base for your HOGs – see the Assembly overleaf for more detail.

If you are using the Drip Irrigation Kit you will need an outdoor power point installed within 500mm of the outlet on your HOGs.

HOGWORKS STRONGLY RECOMMENDS THAT YOUR WATER HOGS ARE INSTALLED BY A QUALIFIED TRADESPERSON

SECTION 40 94 33

HUMAN MACHINE INTERFACE

PART 1 – GENERAL

1.01 SUMMARY

Section Includes: Materials and methods necessary to install a touchscreen

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. 3M Systems
3M Center
St. Paul, MN 55144-1000
Phone: 1-888-364-3577

2.2 EXISTING PRODUCTS

- A. 17" Micro Touch Chassis Touch LCD Monitor

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's installation instructions.
- B. Install flush to exterior of wood framed interior wall.

END OF SECTION 40 94 33

SECTION 48 19 00

ELECTRICAL POWER CONTROL EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and methods necessary to install a PV combiner box
- B. Related Sections
 - 1. 10 71 00: Exterior Protection
 - 2. 23 56 00: Solar Energy Heating Equipment
 - 3. 25 10 00: Integrated Automation Network Equipment
 - 4. 26 09 00: Instrumentation and Control for Electrical Systems
 - 5. 26 31 00: Photovoltaic Collectors
 - 6. 26 33 13: Batteries
 - 7. 26 51 00: Interior Lighting
 - 8. 26 56 00: Exterior Lighting
 - 9. 27 16 00: Communication Connecting Cords, Devices and Adapters
 - 10. 28 30 00: Electronic Detection and Alarm
 - 11. 48 19 00: Electrical Power Generation Equipment
 - 12. 48 41 00: Solar Energy Electrical Power Generation Equipment

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Outback Power Systems
19009 62nd Ave NE
Arlington, WA 98223
Phone: 360-435-6030

2.2 EXISTING PRODUCTS

- A. Outback PSPV Combiner

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturers installation instructions located in the 2007 CUSD Operations and Maintenance Manual.

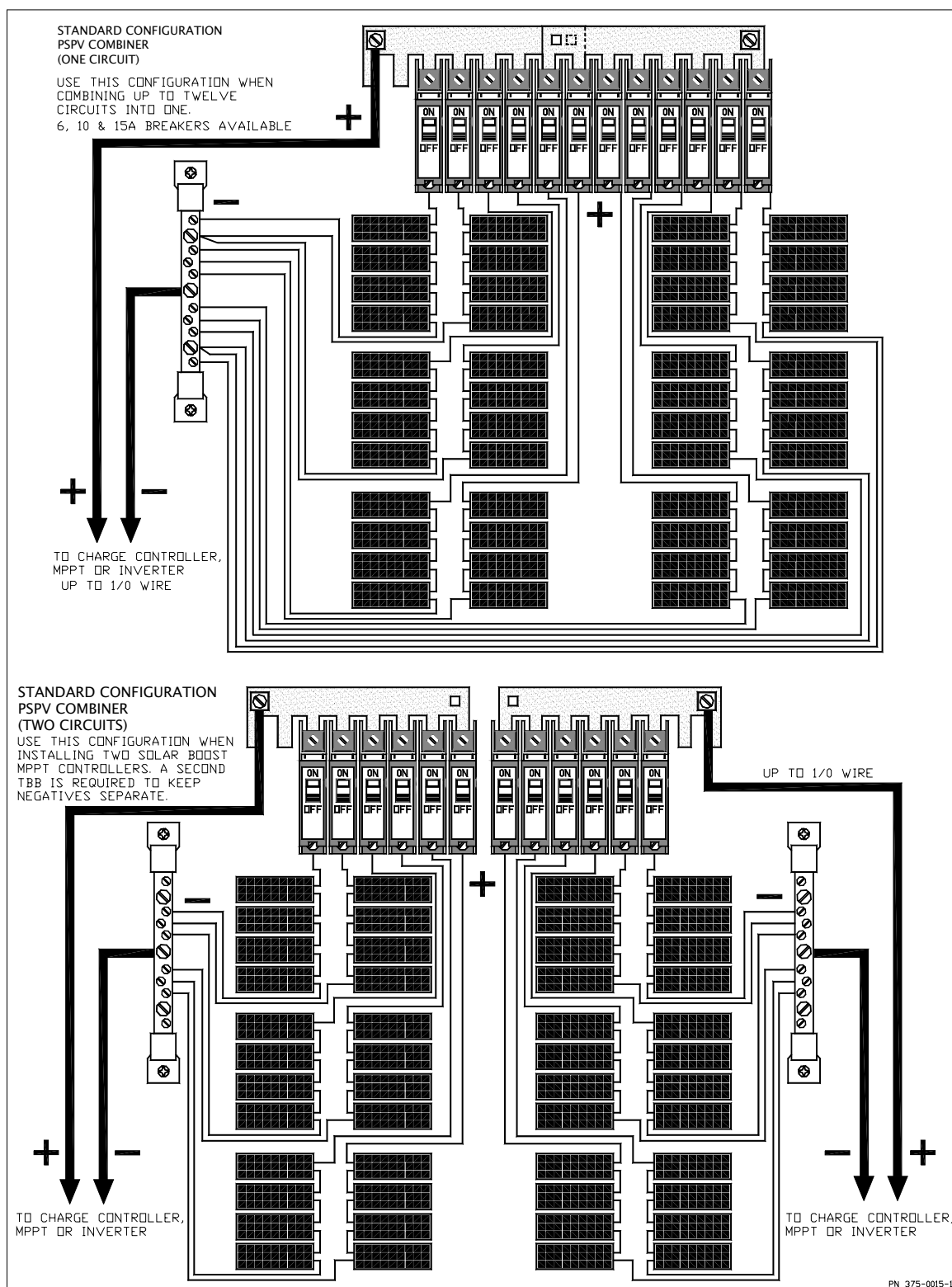
END OF SECTION 48 19 00



Installation instructions for PSPV Combiner



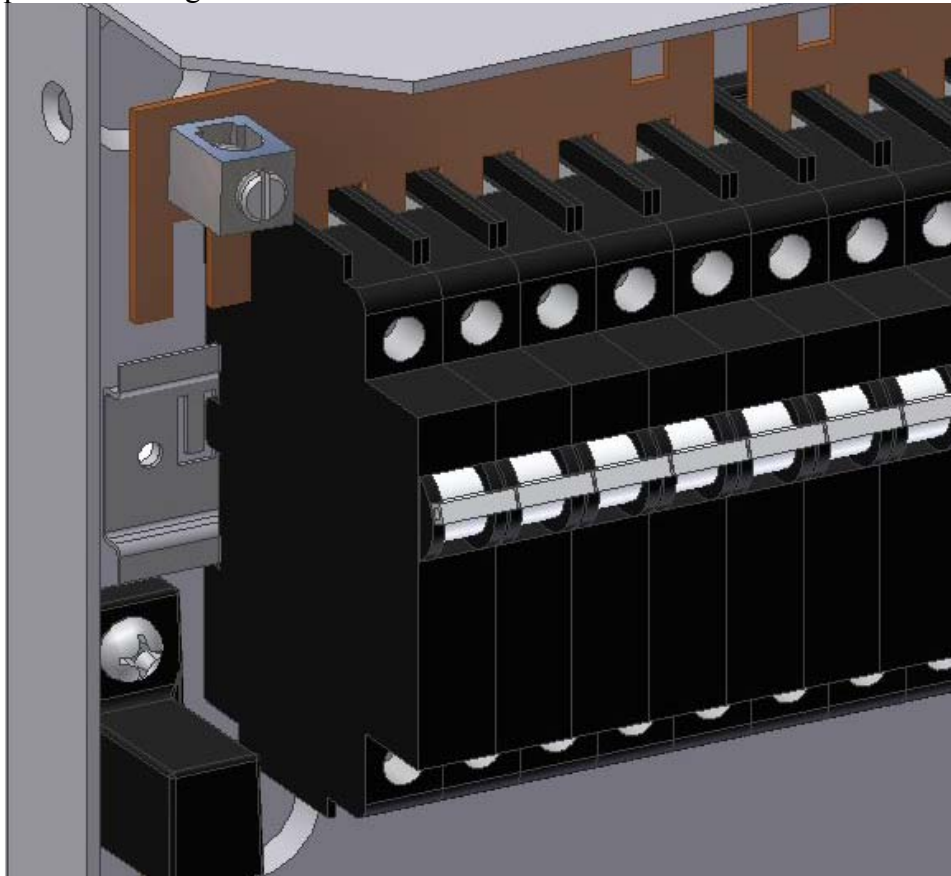
This wiring diagram is also located on the inside cover of the PSPV combiner.



The top diagram shows both Positive busbars connected together. This arrangement allows up to twelve strings to be combined into one. It is possible to bring wires off of each end of the busbars in order to further cut losses in the high current “combined” circuits. Two 1/0 lugs are provided in the busbar bag to facilitate this hook-up. Make sure that at least two fingers overlap in the middle of the busbars. This insures a good, low resistance connection for current to flow from one busbar to the other one.

The bottom diagram uses both busbars but arranged in two separate circuits. Two positive circuits are required when feeding two charge controllers such as the C40. Negatives can be combined in this system. Some controllers have shunts in the negative leg and must keep the PV negative circuits separate as well as the positive. Solar Boost controllers fall into this category. A second PV negative insulated busbar will be required for these installations. Use the OutBack TBB (terminal busbar) for the second PV negative as shown.

Circuit breakers available for the PSPV come in 6, 10 and 15 amps. These are rated for up to 125VDC. Place them over the din rail mount and push the yellow locking tab in. The breaker will still slide back and forth on the din rail. The first breaker should be slid all the way to the left up against the stop tab. See image below.



Using a thin screwdriver, bent the tab up at the end of the din rail. Install as many breakers as required and then bend up the tab on the far side of the last (right) breaker. This will secure the breakers from sliding off the din rail.

Ground Terminal: The ground terminal provided can be mounted either inside the chassis or outside. It can be moved from the right side to the left as well. There is a screw covering up another ground terminal mounting hole on the opposite side of the chassis. Make sure that the star washer is used if moving the ground terminal. The star washer bites through the powder coating to insure a good bond to the chassis.

Rain-proofing: There is little to do to rainproof this enclosure. Make sure that all mounting holes are filled or sealed as well as the extra TBB mounting holes. A squirt of silicone sealant works just fine.

Pole Mounting: The mounting holes have been spaced to fit the largest muffler clamp available at your nearby auto parts store. This is an economical and available clamp for this type of installation.

SECTION 48 19 00

ELECTRICAL POWER CONTROL EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes: Materials and methods necessary to install AC and DC Disconnects
- B. Related Sections
 - 1. 10 71 00: Exterior Protection
 - 2. 23 56 00: Solar Energy Heating Equipment
 - 3. 25 10 00: Integrated Automation Network Equipment
 - 4. 26 09 00: Instrumentation and Control for Electrical Systems
 - 5. 26 31 00: Photovoltaic Collectors
 - 6. 26 33 13: Batteries
 - 7. 26 51 00: Interior Lighting
 - 8. 26 56 00: Exterior Lighting
 - 9. 27 16 00: Communication Connecting Cords, Devices and Adapters
 - 10. 28 30 00: Electronic Detection and Alarm
 - 11. 48 19 00: Electrical Power Generation Equipment
 - 12. 48 41 00: Solar Energy Electrical Power Generation Equipment

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Outback Power Systems
19009 62nd Ave NE
Arlington, WA 98223
Phone: 360-435-6030

2.2 EXISTING PRODUCTS

- A. AC Disconnect: Outback FX1000AC
- B. DC Disconnect: Outback FX1000DC

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturers installation instructions located in the 2007 CUSD Operations and Maintenance Manual.

END OF SECTION 48 19 00

SECTION 48 19 13

ELECTRICAL POWER GENERATION BATTERY CHARGING EQUIPMENT

PART 1 – GENERAL

1.01 SUMMARY

Section Includes: Materials and methods necessary to install an electrical charge controller

B. Related Sections

1. 10 71 00: Exterior Protection
2. 23 56 00: Solar Energy Heating Equipment
3. 25 10 00: Integrated Automation Network Equipment
4. 26 09 00: Instrumentation and Control for Electrical Systems
5. 26 31 00: Photovoltaic Collectors
6. 26 33 13: Batteries
7. 26 51 00: Interior Lighting
8. 26 56 00: Exterior Lighting
9. 27 16 00: Communication Connecting Cords, Devices and Adapters
10. 28 30 00: Electronic Detection and Alarm
11. 48 19 00: Electrical Power Generation Equipment
12. 48 41 00: Solar Energy Electrical Power Generation Equipment

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Outback Power Systems
19009 62nd Ave NE
Arlington, WA 96223
Phone: 360-435-6030

2.2 EXISTING PRODUCTS

- A. Outback MX60PV MPPT Charge Controllers
Quantity: 2

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Charge Controller shall be installed by approved manufacturer representative in accordance with manufacturer's published instructions, details and the drawings that are part of the contract documents for project.

END OF SECTION 48 19 13

MX60

Maximum Power Point Tracking Charge Controller

OutBack
Power Systems



Active Maximum Power Point Tracking

High Operating Efficiency

Battery Voltages from 12 VDC to 60 VDC

PV Arrays up to 150 VDC Open Circuit

Negative or Positive Ground Systems

Built-in Data Logging

Standard 2 Year Warranty



The MX60 is on the cutting edge of charge controller design. OutBack's real time active Maximum Power Point Tracking (MPPT) system ensures that your solar array is operating at its peak power point regardless of age, shading or environmental conditions. A peak operating efficiency of 98% maximizes your PV array's performance. The MX60's wide DC input range and 60 amp DC output current rating for 12, 24 or 48 VDC systems provides unmatched flexibility

in the wiring as well as the sizing of your solar array. The ability to step-down a high voltage solar array to a low voltage battery can save you money by reducing the size of wire required and making the installation simpler and faster.

All of the MX60's status information is displayed on the large built-in 3.1" (8 cm) backlit LCD screen and OutBack's exclusive system networking allows your MX60 to communicate with the rest of your OutBack products for complete integration and high performance operation. Monitoring the performance of your solar array investment is easy through the use of the built-in data logging system or via the MATE and optional PC software (available separately).

The MX60 is the only choice when you demand a high performance, efficient and customizable charge controller for your advanced power system.

MX60 Specifications

Nominal Battery Voltages	12, 24, 32, 36, 48, 54 or 60 VDC (Single model - selectable via field programming)
Output Current	60 amps maximum with adjustable current limit for smaller systems
Maximum Solar Array Size	12 VDC systems 800 Watts / 24 VDC systems 1600 Watts / 48 VDC systems 3200 Watts
PV Open Circuit Voltage (VOC)	150 VDC absolute maximum coldest conditions / 140 VDC start-up and operating maximum
Standby Power Consumption	Less than 1 Watt
Charging Regulation	Five Stages: Bulk, Absorption, Float, Silent and Equalization
Voltage Regulation Set points	10 to 80 VDC user adjustable with password protection
Equalization Voltage	Up to 5.0 VDC above Absorb Set point Adjustable Timer - Automatic Termination when completed
Battery Temperature Compensation	Automatic with optional RTS installed / 5.0 mV per °C per 2V battery cell
Voltage Step-Down Capability	Can charge a lower voltage battery from a higher voltage PV array
Power Conversion Efficiency	Typical 98% at 60 amps with a 48 V battery and nominal 48 V solar array
Status Display	3.1" (8 cm) backlit LCD screen with 4 lines with 80 alphanumeric characters total
Remote Interface	Proprietary network system using RJ 45 Modular Connectors with CAT 5e Cable (8 wires)
Data Logging	Last 64 days of operation - amp hours, watt hours and time in float for each day along with total accumulated amp hours, kW hours of production
Hydro / Wind Turbine Applications	Consult factory for approved turbines
Positive Ground Applications	Requires two pole breakers for switching both positive and negative conductors on both solar array and battery connections (HUB-4 and HUB-10 are not recommended for use in positive ground applications)
Operating Temperature Range	Minimum -40° to maximum 60° C (Power capacity of the controller is derated when above 25° C)
Environmental Rating	Indoor Type 1
Conduit Knockouts	Two ½" and ¾" on the back; One ¾" and 1" on each side; Two ¾" and 1" on the bottom
Warranty	Standard 2 year / Optional 5 year
Weight	Unit 11.6 lbs (5.3 kg) Shipping 14 lbs (6.4 kg)
Dimensions (H x W x L)	Unit 13.5 x 5.75 x 4" (40 x 14 x 10 cm) Shipping 18 x 11 x 8" (46 x 30 x 20 cm)
Options	Remote Temperature Sensor (RTS), HUB and MATE



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08860 Les Botigues de Sitges
Barcelona, ESPAÑA
Phone: (+34) 600.843.845

www.outbackpower.com

Available From:

SECTION 48 19 16

ELECTRICAL POWER GENERATION INVERTERS

PART 1 – GENERAL

1.01 SUMMARY

- A. Section includes the following:
 - 1. Electrical power generation inverters
- B. Related Section
 - 1. 05 12 00: Structural Steel Framing
 - 2. 05 16 00: Structural Cabling
 - 3. 26 24 00: Switchboards and Panelboards
 - 4. 26 31 00: Photovoltaic Collectors
 - 5. 26 33 13: Batteries
 - 6. 48 19 00: Electrical Power Control Equipment
 - 7. 48 19 13: Electrical Power Generation Battery Charging Equipment

1.01 SYSTEM DESCRIPTION

- A. Tools Required for Installation
 - 1. Assorted Phillips screw drivers
 - 2. Level, pencil, and utility knife
 - 3. Slotted screw driver
 - 4. Wire strippers
 - 5. Assorted open-end wrenches
 - 6. Torque wrench
 - 7. Socket wrench and sockets
 - 8. Electrical tape
 - 9. Multi-meter (AC/DC volts)
- B. Hardware / Materials Required for Installation
 - 1. Screws and hardware to mount inverters to scaffolding
 - 2. Conduits and appropriate fittings for wire runs (i.e. wire nuts)
 - 3. Electrical wire of appropriate size and length
 - a. 5ft run one way: #4/0 AWG stranded copper cables
 - b. 10ft run one way: #4/0 AWG x 2 (parallel?) stranded copper cables
 - c. 15ft run is not recommended
 - 4. Battery cable lugs (depending on types of battery cables used)
 - 5. Breaker panels
 - 6. Ground busses, bars, bonding blocks, and/or rods
- C. Optional Systems Accessories:
 - 1. Conduit Boxes
 - 2. Battery Cables
 - 3. DC disconnects and fuses
 - 4. Remote monitors

1.02 SUBMITTALS

- A. Product Data: Submit product data, including manufacturer's published installation manual located in the CUSD Operations and Maintenance Manual.
- B. Diagrams: Submit manufacturer's published system wiring diagrams for the chosen system. The diagrams are located in the CUSD Operations and Maintenance Manual.
- C. Drawings: Submit drawings showing layout, product components and accessories, electrical connections and component location.
- C. Warranty: Provide a copy of manufacturer's warranty, with manufacturer's instructions, in the CUSD Operations and Maintenance Manual.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Packing, Shipping, Handling, and Unloading
- B. Acceptance at Site
 - 1. Remove inverter from shipping carton and inspect for any damaged or missing components. The following items should be present:
 - a. Sine Wave Plus Inverter / Charger
 - b. Sine Wave Plus Inverter / Charger Owner's Guide
 - c. Battery Temperature Sensor
 - d. Batters Terminal Covers
 - 2. Contact manufacturer immediately to report missing or damaged components.
 - 3. Save proof of purchase. This is required for warranty service.
 - 4. Save original shipping carton and packing materials.
- C. Storage and Protection
 - 1. Store inverters in manufacturer's packaging in the High Voltage Lab (HVL) until ready for installation. Store in a location designated by the Construction Coordinator.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Outback Power Systems
19009 62nd Ave NE
Arlington, WA 98223
Phone: 360-435-6030

2.2 PRODUCTS

- A. Outback VFX 3648 Inverters
 - 1. Quantity: 4

PART 3 – EXECUTION

3.1 INSTALLATION

- A. For complete installation instruction refer to manufacturer's owner's manual, located in the CUSD Operations and Maintenance Manual.
- B. For wiring diagrams and component connections refer to CUSD Construction Documents.

3.2 FIELD QUALITY CONTROL

- A. Basic Functional Tests: perform the following steps after installation of inverters is complete. For detailed instructions refer to Chapter 4 of the Owner's Manual located in the CUSD Operations and Maintenance Manual.
 - 1. Confirm all connections
 - 2. Measure the voltage and polarities of the cables (measure at the battery side of the disconnect or breaker)
 - 3. Apply battery power to the inverter
 - 4. Turn on the inverter and perform the following checks:
 - a. AC voltage check
 - b. Confirm battery charger operation
 - 5. Confirm inverter operation.

END OF SECTION 48 19 16

FX & VFX Series

Sealed & Vented True Sinewave Inverter/Charger

OutBack
Power Systems

Sealed FX

Vented VFX



The OutBack true sinewave inverter/charger is a complete power solution. It incorporates a DC to AC sinewave inverter, battery charger and AC transfer switch housed within a die-cast aluminum chassis. Intelligent multistage battery charging runs your generator less, and prolongs the life of your batteries. Built-in networked communications enables multiple units to be stacked and connected with other OutBack power electronics providing industry leading integration and near infinite application flexibility. The exclusive modular system architecture means that increased power output is just an additional inverter/charger away. Our flagship *FX* series uses a sealed chassis that can operate in the harshest environmental conditions such as high humidity and corrosive salt air. The *VFX* series uses a vented chassis with “bug proof” screened openings that allow high output AC power in the hottest of operating conditions.

OutBack Power inverter/chargers are the only choice when you need a true sinewave, powerful, modular and reliable power solution for your home, business or extreme application.

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Sealed FX

- Sinewave Output
- Intelligent Battery Charging
- Modular Stackable Design
- High Operating Efficiency
- Weather-resistant Sealed Chassis
- Corrosion Resistant Internal Components
- Field Serviceable
- Integrated Network Communications
- Standard 2 Year Limited Warranty

Vented VFX

- Sinewave Output
- Intelligent Battery Charging
- Modular System Architecture
- High Operating Efficiency
- “Bug Proof” Chassis
- Corrosion Resistant Internal Components
- Field Serviceable
- Integrated Network Communications
- Standard 2 Year Limited Warranty

Off-Grid Specifications

Sealed Models					Vented Models		
		FX2012T	FX2524T	FX3048T	VFX2812	VFX3524	VFX3648
Nominal DC Input Voltage		12 VDC	24 VDC	48 VDC	12 VDC	24 VDC	48 VDC
Continuous Power Rating at 25° C		2000 VA	2500 VA	3000 VA	2800 VA	3500 VA	3600 VA
AC Voltage/Frequency		120 VAC 60 Hz	120 VAC 60 Hz	120 VAC 60 Hz	120 VAC 60 Hz	120 VAC 60 Hz	120 VAC 60 Hz
Continuous AC RMS Output at 25° C		17.0 amps AC	20.8 amps AC	25.0 amps AC	23.3 amps AC	29.2 amps AC	30.0 amps AC
Idle Power	Full	~ 20 Watts	~ 20 Watts	~ 23 Watts	~ 20 Watts	~ 20 Watts	~ 23 Watts
	Search	~ 6 Watts	~ 6 Watts	~ 6 Watts	~ 6 Watts	~ 6 Watts	~ 6 Watts
Typical Efficiency		90%	92%	93%	90%	92%	93%
Total Harmonic Distortion	Typical	2%	2%	2%	2%	2%	2%
	Maximum	5%	5%	5%	5%	5%	5%
Output Voltage Regulation		± 2%	± 2%	± 2%	± 2%	± 2%	± 2%
Maximum Output Current	Peak	56 amps AC	70 amps AC	70 amps AC	56 amps AC	70 amps AC	70 amps AC
	RMS	40 amps AC	50 amps AC	50 amps AC	40 amps AC	50 amps AC	50 amps AC
AC Overload Capability	Surge	4800 VA	6000 VA	6000 VA	4800 VA	6000 VA	6000 VA
	5 Second	4000 VA	4800 VA	4800 VA	4000 VA	5000 VA	5000 VA
	30 Minutes	2500 VA	3200 VA	3200 VA	3200 VA	4000 VA	4000 VA
AC Input Current Maximum		60 amps AC	60 amps AC	60 amps AC	60 amps AC	60 amps AC	60 amps AC
AC Input Voltage Range (MATE Adjustable)		80 to 150 VAC	80 to 150 VAC	80 to 150 VAC	80 to 150 VAC	80 to 150 VAC	80 to 150 VAC
AC Input Frequency Range		54 to 66 Hz	54 to 66 Hz	54 to 66 Hz	54 to 66 Hz	54 to 66 Hz	54 to 66 Hz
DC Input Voltage Range		10.5 to 17.5 VDC	21.0 to 34.0 VDC	42.0 to 68.0 VDC	10.5 to 17.0 VDC	21.0 to 34.0 VDC	42.0 to 68.0 VDC
Continuous Battery Charge Output		80 amps DC	55 amps DC	35 amps DC	125 amps DC	85 amps DC	45 amps DC
Minimum Recommended DC Breaker		OBDC-250	OBDC-175	OBDC-100	OBDC-250	OBDC-250	OBDC-175
Warranty			Standard 2 year / Optional 5 year		Standard 2 year / Optional 5 year		
Weight	Unit	62.6 lbs (28.4 kg)			61 lbs (27.7 kg)		
	Shipping	67 lbs (30 kg)			64 lbs (29 kg)		
Dimensions (H x W x L)	Unit	13 x 8.25 x 16.25" (33 x 21 x 41 cm)			12 x 8.25 x 16.25" (30 x 21 x 41 cm)		
	Shipping	21.75 x 13 x 22" (55 x 33 x 56 cm)			21.75 x 13 x 22" (55 x 33 x 56 cm)		



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