

Texas A&M Solar Decathlon

solar.tamu.edu | (979) 458.0478

Project Manual and Specifications

August 7th, 2007



Project Title: DOE Solar Decathlon 2007
104 Decathlete Way
National Mall
Washington, DC

Description: The Solar Decathlon is a competition in which 20 teams of college and university students compete to design, build, and operate the most attractive, effective, and energy-efficient solar powered house.

Architect: Texas A&M University
College of Architecture
3137 TAMU
College Station, TX 77843
(p) 979.845.1221
(f) 979.845.4491

Engineer: Texas A&M University
College of Engineering
3126 TAMU
College Station, TX 77843
(p) 979.845.1321
(f) 979.845.8986

Stephanie Tsen, P.E. and Gerard Garcia, P.E.
StructuresPE, LLP
1018 West 11th St. Suite 100
Austin, TX 78703
(p) 512.499.0919
(f) 512.320.8521

Consultants: Research & Design:
Center for Maximum Potential Building Systems
8604 FM 969
Austin TX 78724
(p) 512.928.4786
(f) 512.926.4418

Energy-Related Research & Testing:
Energy Systems Laboratory
Wisnibaker Engineering Research Center
Room # 015
3581 TAMU
Texas A&M University
College Station, Texas 77843-3581
(p) 979.845.9213
(f) 979.862.2457

Larry Degelam, P.E.
Professor Emeritus of Architecture
Texas A&M University
2206 Quail Run
College Station, TX 77845



Table of Contents:

Summary of Changes	4
Structural Calculations	5-40
Specifications:	41-
General Requirements	41-43
Metals	46-46
Wood and Plastics	47-54
Thermal and Moisture Protection	55-64
Doors and Windows	65-69
Finishes	70-79
Specialties	80-85
Equipment	86-92
Furnishings	93
Special Construction	94-121
Mechanical	122-127
Electrical	128-131
Plumbing	132- 137
MSDS	138
Sherwin-Williams All Surface Enamel	139-143
Sherwin-Williams Harmony Latex Paint	144-148
Battery Acid	149-154
Lead/Acid Battery	152-154
Extraneous info	155
Water Requirement	156
Unlisted Electrical Equipment	157-161



Summary of Changes

from last submittal - 6/10/07

Addition of stamped structural calculations.

Update of old specification and product information sheets.

Addition of new specification and product information sheets - all categories.

Re-organization loosely based on Masterformat.

Addition of clarifying documents - water requirement, unlisted electrical.





STRUCTURES

Transmittal Sheet

PROJECT: Texas A&M - Solar Decathlon

PROJECT No.: 07.135

DATE: 7-19-07

TO: Mike Wassmer
National Renewable Energy Lab
1617 Cole Blvd
Golden, CO 80401

ATTN:

FROM: Stephanie Tsen, P.E.

Copies	Date	No.	Description
1	7-19-07		Calculations

These are transmitted:

For approval	<input type="checkbox"/>	No exceptions	<input type="checkbox"/>
For your use	<input type="checkbox"/>	Exceptions as noted	<input type="checkbox"/>
As requested	<input checked="" type="checkbox"/>	Revise and resubmit	<input type="checkbox"/>

Contract Signed?	<input type="checkbox"/>
AR checked	<input type="checkbox"/>



TEXAS A&M SOLAR DECATHLON

DESIGN CRITERIA, LOADS, AND CALCULATIONS

STRUCTURES- JOB # 07.135

7/19/07



Professional Engineer Seal for the State of Texas, No. 9435, with a signature and date 7/19/07.



TEXAS A&M SOLAR DECATHLON

STRUCTURES JOB # 07.135

DESIGN CRITERIA, LOADS, AND CALCULATIONS

TABLE OF CONTENTS

	<u>PAGE</u>
STRUCTURAL DESIGN AND SYSTEMS SUMMARY.....	1
CODES AND REFERENCES.....	2
MATERIALS: SPECIFICATIONS AND STRENGTH	3
BEAM DEFLECTION AND CAMBER CRITERIA.....	4
LOADS APPLIED TO STRUCTURE.....	5
CALCULATIONS	
a. Foundation.....	6
b. Core (Go-Home, Gro-home)	7
c. Gro-Walls	8
d. PV Superstructure.....	9
e. Gro-Deck.....	10
f. Miscellaneous structural elements.....	11



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

STRUCTURAL DESIGN AND SYSTEMS SUMMARY

This project is a combination of a prefabricated steel modular structure (Go-Home) and prefabricated steel pieces (joints, beams, etc.) for assembly into a modular structure (Gro-Home). This project will be an entry into the Solar Decathlon competition where it will be temporarily assembled on the National Mall in Washington D.C.

The main modules are 10 ft long x 10 ft wide x 10 ft high. Additional module types include the Gro-Wall and the Gro-Deck. The Gro-Wall hangs onto the main module like a saddlebag. It is made out of tubular steel pieces completely welded to each other with a diagonal at each end so that the module acts like a frame. The Gro-Deck includes either a walking surface or raised garden beds. It is constructed out of light gage steel perimeter beams with prefabricated light gage steel framing units.

The floor and the roof of the building are SIPS panels.

The foundation must bear on top of the grass or may penetrate 18" maximum.

Supported by but held off from the frame of the main structure is a secondary structure to support the photovoltaic (PV) panels. The PV panels are a necessary part of this building system: they make the building self-sustaining, which is a requirement for the Solar Decathlon.

There are miscellaneous structural elements including the ramp, thermal solar screen, etc.



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

CODES AND REFERENCES

- 2007 Solar Decathlon Building Code
- 2003 International Building Code
- 2006 International Residential Code
- AISC LRFD - Second Edition (1994)
- ASCE 7-02 Minimum design loads for buildings and other structures

COMPUTER PROGRAMS USED

- RISA 2D, RISA 3D



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

MATERIALS SPECIFICATIONS AND STRENGTHS

Structural Steel

Wide Flange Beams	ASTM - A572, Grade 50
Bantam Beams	ASTM - A529, Grade 50
Pipe	ASTM - A53 Type E or S, Grade B
Tubes	ASTM - A500 - Grade B
Angles and Channels	ASTM - A36
Plates	ASTM - A36
Base Plates	ASTM - A36
Connection Mat'l, Embedded Plates	ASTM - A36
Bolts	ASTM - A325, or ASTM - A490
Rods	ASTM - A36
Anchor Bolts in Concrete or Masonry	ASTM - A307 (U.N.O.)
Welding Electrodes	ASTM - E70xx (U.N.O.)
Headed Shear Studs	ASTM - A108

Foundations and Soils

Criteria as per 2007 Solar Decathlon Rules and Regulations – Solar Decathlon Building Code.

Allowable

SPREAD FOOTINGS

Soil Bearing - Isolated Footings: bearing on the top of the grass 1500 psf



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

BEAM DEFLECTION AND CAMBER

Deflection Criteria

- L/360 Live Load on roof structure
- L/240 Superimposed Dead + Live Load on beams - U.N.O
- L/360 Superimposed Dead + Live Load on beams - If L/d Exceeds 24
- L/600 Live Load on beams supporting gypcrete flooring

- L/600 Total Load on beams supporting masonry or concrete

- L/600 (1/2" max.) Live Load on beams supporting exterior cladding/glass/PV Panels



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

GRAVITY LOADS APPLIED TO STRUCTURE

MAIN STRUCTURE: GO-HOME, GRO-HOME, GRO-WALL

Live Loads

Floor Live Load = 50 psf

Roof Live Load = 20 psf

Dead Loads

Floor Dead Load = 10 psf

Roof Dead Load = 10 psf

PV Panel Dead Load = 10 psf

Wall Dead Load, glass = 10 psf

Mechanical Equipment loads supported by structure = 1830 lbs.

Mechanical Equipment loads supported by isolated footing = 4500 lbs.

EXTERIOR STRUCTURE: GRO-DECK (WALKING OR GARDEN AREA)

Live Loads

Floor Live Load = 50 psf

Dead Loads

Floor Dead Load = 10 psf

LATERAL LOADS APPLIED TO STRUCTURE

WIND DESIGN FOR MAIN WINDFORCE-RESISTING FRAMES AND SYSTEMS

P = 10 psf (minimum load)



TEXAS A&M SOLAR DECATHLON

STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

CALCULATIONS

FOUNDATION





Foundation: anchors.

7-13-07

1. check $1\frac{1}{8}$ " ϕ anchor compressive capacity for 25" height.

assume threads create 1" ϕ

$$A = \frac{(1")^2 \pi}{4} = 0.785 \text{ in}^2$$

$$I = 0.0491 \quad r = \sqrt{\frac{I}{A}} = 0.25"$$

$$\frac{KL}{r} = \frac{(2) 25"}{0.25"} = 200$$

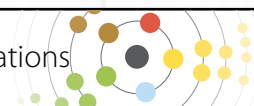
$$\therefore \phi_c F_{cr} = 5.33 \text{ ksi}$$

$$\begin{aligned} \phi P_n &= (0.785 \text{ in}^2) 5.33 \text{ ksi} \\ &= 4.18 \text{ k per } 1" \phi \text{ bolt.} \end{aligned}$$

$$\text{if braced, then } \frac{KL}{r} = 100$$

$$\phi_c F_{cr} = 20.46 \text{ ksi}$$

$$\phi P_n = (20.46 \text{ ksi})(0.785 \text{ in}^2) = 16.1 \text{ k}$$





Foundation

1. Patio: Deck = 50 psf LL
 10 psf DL
 + 8" x 8" lightweight aggregate channels

Garden: 20 psf LL
 30 psf DL
 + 8" x 8" lt. wt. aggregate channels

Deck is worse case loading use to size patio footings:

$$(50 \text{ psf})(10.5')(10.5') = 5.513^k \quad \text{LL}$$

$$(10 \text{ psf})(10.5')^2 = 1.1^k \quad \text{DL}$$

$$\frac{(90 \text{ psf})(8')^2}{144 \text{ in}^2}(10.5')^2 = 0.84^k \quad \text{DL}$$

7.453^k → scissor jack
 allowable capacity

Footing size: $\frac{7.453^k}{1.5 \text{ ksf}} = 4.97 \text{ ft}^2 \Rightarrow \text{need } 2.23 \text{ ft} \times 2.23 \text{ ft}$
 2'-3" x 2'-3"

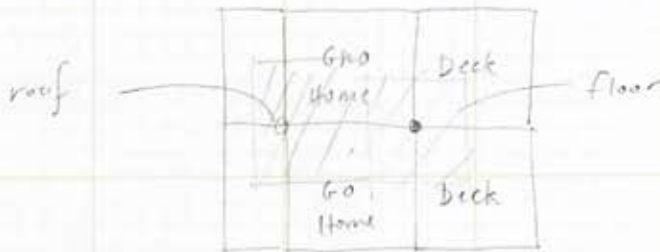




Foundation

2. Core :

worst case @ study / deck



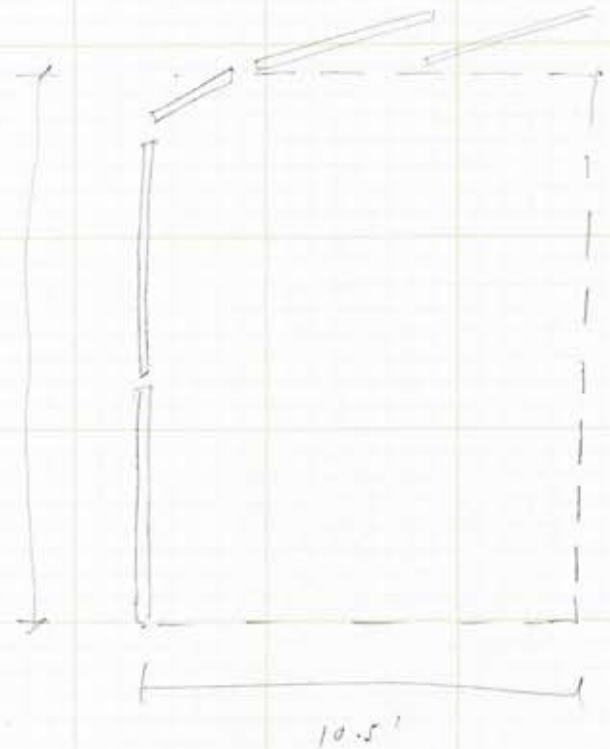
$$LL = (50 \text{ psf})(10.5')^2 = 5.513^k$$

$$RL = (20 \text{ psf})(10.5 + 5.5)(10.5') = 1.68^k$$

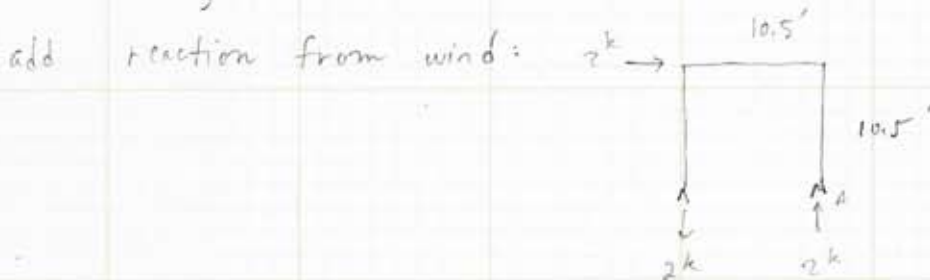
$$RDL = (10 \text{ psf})(84 \text{ ft}^2) = 0.84^k$$

$$FDL = (15 \text{ psf})(110.25 \text{ ft}^2) = 1.66^k$$

$$PV = (10 \text{ psf})(10.5')(10.5')(1.5) = 1.66^k$$



gravity
R to footing = 11.35^k



$$\sum M_A = 0 = -2(10.5') + (10.5')B \Rightarrow B = 2^k$$

heavy enough for no uplift:

$$0.9(1.66 + 1.66 + 0.84) - 1.3(2^k) = 3.744 - 2.6 = 1.144 > 0 \therefore$$

total rxn to footing = 13.35^k

no uplift



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

CALCULATIONS, CONT.

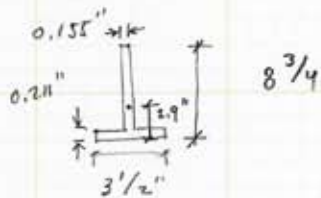
CORE (GO-HOME, GRO-HOME)





5-17-07

Gyro-beam

1. check \perp to support $\frac{5'}{2} = 2.5'$ of trib width

$$A = 2.062 \text{ in}^2$$

$$I_y = 0.7565 \text{ in}^4$$

$$r_y = 0.606 \text{ in}$$

$$I_x = 17.118 \text{ in}^4$$

$$\text{span} = 10'$$

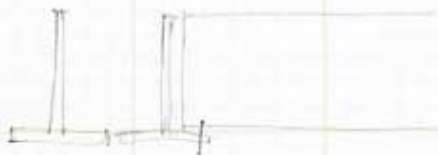
$$DL = (10 \text{ pf})(2.5') = 25 \text{ pf}$$

$$LL = (60 \text{ pf})(2.5') = 120 \text{ pf}$$

$$M_u = (0.145 \text{ kpf})(10')^2/8 = 1.82 \text{ k-ft}$$

$$\text{determine } L_p = \frac{300 r_y}{\sqrt{F_y}} \Rightarrow r_y = \sqrt{\frac{I_y}{A}} = \sqrt{\frac{1.51 \text{ in}^4}{3.43 \text{ in}^2}} = 0.66''$$

$$L_p = \frac{(300)(0.66'')}{\sqrt{36}} = 33.2'' = 2.76'$$



→ need to come up with a detail that will brace the web @ ~8" otherwise shape will not work.

$$\begin{aligned} \text{if braced, then } \phi M_n &= 0.9(36 \text{ ksi})\left(\frac{17.118 \text{ in}^4}{2.9''}\right) = 191.3 \text{ k-in} \\ &= 15.94 \text{ k-ft} > 1.82 \text{ k-ft} \checkmark \end{aligned}$$

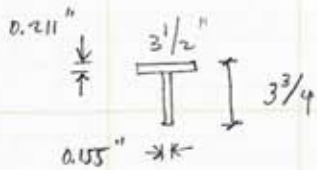




MD-Beam

5-17-07

2. check T to support 3.33' trib. width of SIPs



$$\begin{aligned} A &= 1.227 \text{ in}^2 \\ I_y &= 0.755 \text{ in}^4 \\ r_y &= 0.766 \text{ in} \end{aligned}$$

$$\begin{aligned} I_x &= 1.682 \text{ in}^4 \\ \bar{y} &= 3.22 \text{ in} \\ S_x &= 0.522 \text{ in}^3 \end{aligned}$$

$$L_p = \frac{(300)(0.766)}{\sqrt{36}} = 38.3 \text{ in} = 3.2'$$

$$FDL = (10 \text{ psf}) (3.33') = 33.3$$

$$FU = (60 \text{ psf}) (3.33') = 200$$

$$w = 1.2 (33.3) + 1.6 (200) = 360$$

$$M_u = \frac{(0.36 \text{ kip})(10')^2}{8} = 4.5 \text{ k-ft}$$

$$\begin{aligned} \phi M_n &= (0.9)(36 \text{ ksi})(0.522 \text{ in}^3) = 16.9 \text{ k-in} \\ &= 1.41 \text{ k-ft} \quad \text{N.G.} \end{aligned}$$

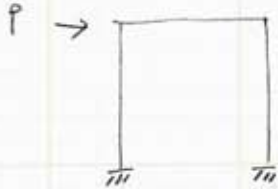
→ However these are just stiffening brs - SIPs can span 10' themselves





BY	DATE	SHEET NO.	OF
CHKD. BY	DATE	JOB NO.	
NOTES			

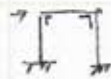
3. check portal frame:



assume WL = 20 psf

$$P = (10' \times 20 \text{ psf}) (5') = 1^k$$

$$M_u = 2.8 \text{ k-ft @ base}$$



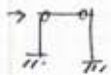
$$u_n = 0.225$$

$$5.1^k \text{ @ top}$$



$$u_n = 0.4$$

$$5 \text{ @ base}$$



$$u_n = 0.4$$

assume column area reduced by

$$\frac{4 - 1.75}{4} = \frac{2.25}{4} = 56.25\%$$

$$\frac{M_u}{4''} = \frac{33.6 \text{ k-in}}{4''} = 8.4^k$$



$$\begin{aligned} & \uparrow 1.125'' \\ & \uparrow 1.75'' \\ & \downarrow 1.125'' \end{aligned}$$





5-17-07

check $\lambda_c = \frac{KL}{r} \sqrt{\frac{F}{E}}$

$$L = 5''$$

$$I_y = \frac{(3/16)^3 (1.125'')}{12} = 6.2 \times 10^{-4}$$

$$r_y = \sqrt{\frac{6.2 \times 10^{-4}}{(3/16)(1.125'')}} = 0.054''$$

$$\lambda_c = \frac{5''}{(0.054'') \cdot 3.14} \sqrt{\frac{46}{29000}} = 1.17$$

$$F_{cr} = (0.658)^{1.17^2} F_y = 25.94 \text{ ksi}$$

$$\phi P_n = (0.85)(3/16'')(1.125'')(25.94 \text{ ksi}) = 4.65^k \text{ N.G.}$$

Bump up column thickness to $1/4''$. assume $L = 5''$

$$I_y = \frac{(0.25'')^3 (1.125'')}{12} = 1.465 \times 10^{-3}$$

$$r_y = \sqrt{\frac{1.465 \times 10^{-3}}{(0.25)(1.125'')}} = 0.072''$$

$$\lambda_c = \frac{5''}{(0.072'') \cdot \pi} \sqrt{\frac{46}{29000}} = 0.88$$

$$F_{cr} = 0.658^{0.88^2} F_y = (0.7227)(46) = 33 \text{ ksi}$$

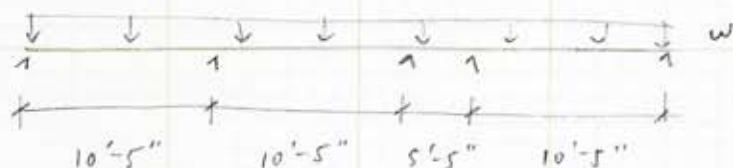
$$\phi P_n = (0.85)(0.25'')(1.125'')(33 \text{ ksi}) = 7.95^k \checkmark$$





5-25-07

4. check bantam beam B12.5x11.6 for bending / deflection



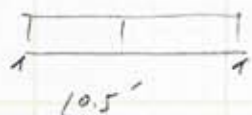
$$F_u = 50 \text{ psf}$$

$$F_{DL} =$$

Note: this condition doesn't apply @ site b/c SPS span between girders (parallel to Bantam Beam)

therefore, check a single span = 10'-5" for Bantam Beam.

(10 psf) 9'



glass load = 90 psf

$$W = 1.4 (0.09 \text{ klf}) = 0.126 \text{ klf}$$

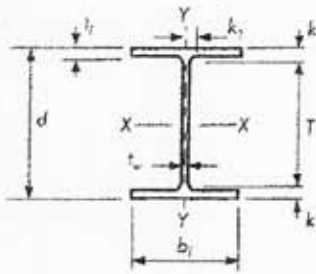
$$M_u = \frac{(0.126 \text{ klf})(10.5')^2}{8} = 1.74 \text{ k-ft} = 20.84 \text{ k-in}$$

$$\phi M_p = (0.9)(50 \text{ ksi})(13 \text{ in}^3) = 585 \text{ k-in}$$

$$L_p = \frac{300 (0.665)}{\sqrt{50}} = 28.2" = 2.35'$$

$$L_b = 10.5'$$





Bantam® Shapes

Dimensions & Properties

ASTM A529-50 grade ($F_y = 50 \text{ ksi}$)



Produced by Chaparral Steel

Designation	Area	Depth	Web Thickness		Flange		Distance		Elastic Properties					
	A	d	t_w	$t_w/2$	b_f	t_f	k	k_1	X-X Axis			Y-Y Axis		
									I_x	S_x	r_x	I_y	S_y	r_y
	in. ²	in.	in.	in.	in.	in.	in.	in.	in. ⁴	in. ³	in.	in. ⁴	in. ³	in.
B12.5x12.4	3.66	12.53	0.155	0.078	3.750	0.228	0.5000	0.3750	90.3	14.4	4.97	2.01	1.07	0.741
(11.6)	3.43	12.50	0.156	0.078	3.500	0.211	0.5000	0.3750	81.3	13.0	4.87	1.51	0.87	0.665
B12x11.8	3.49	11.91	0.177	0.089	3.065	0.225	0.5000	0.3750	71.8	12.1	4.54	1.09	0.71	0.530
(10.8)	3.20	11.87	0.162	0.081	3.065	0.206	0.5000	0.3750	65.8	11.1	4.54	1.00	0.65	0.558
B10x9	2.87	9.86	0.157	0.079	2.690	0.206	0.5000	0.3750	38.5	7.82	3.80	0.79	0.50	0.507
(8)	2.38	9.81	0.139	0.070	2.690	0.183	0.5000	0.3750	34.3	6.99	3.80	0.60	0.44	0.502
B8x6.5	1.92	7.83	0.133	0.067	2.280	0.186	0.5000	0.3750	18.1	4.62	3.07	0.37	0.33	0.439
B4x6	1.76	3.79	0.130	0.065	3.910	0.160	0.4375	0.3125	4.73	2.50	1.64	1.60	0.82	0.953



CHAPARRAL STEEL

Version 1.0 • February 1999



**Grade 50****Question**

07/01/2000

What are the design and application considerations when substituting ASTM A529 grade 50 for ASTM A572 grade 50 or ASTM A709 grade 50? What is the main difference in these grades of material as it relates to their application in construction?

Keith Woods
Pelham, AL

Answer(s)

07/01/2000

As far as strength (F_y) is concerned, there is no difference between the materials. Despite their similar strength characteristics, the specifications were written for distinctly different purposes:

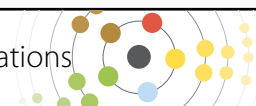
ASTM A529 grade 50 is only available in limited shape profiles and most commonly used in the metal buildings industry.

ASTM A572 grade 50 (now essentially replaced by ASTM A992 for wide-flange shapes) is available in most rolled shapes and is intended for (as was developed for) building applications.

ASTM A709 grade 50 was developed and intended for bridge applications. With supplementary requirements, it's essentially equivalent to AASHTO's M270 specification.

Keith A. Grubb, P.E., S.E.
Chicago, IL

Please feel free to submit a question/answer to solutions@aisc.org





STRUCTURES PE

BY

DATE

SHEET NO.

OF

CHKD. BY

DATE

JOB NO.

NOTES

7-13-07

$$V = 60 \text{ mph}$$

$$K_d = 0.85$$

$$I = (\text{Cat II}) \quad 1.0$$

$$Z = 0 - 18'$$

$$K_z = 0.88$$

$$K_h = 0.88$$

$$K_{zt} = \text{NA}$$

$$G = 0.85$$

partially enclosed building

$$GC_{pi} = \pm 0.55$$

$$C_p : L/B = (10.5)3.5/10.5 = 3.5$$

$$\text{Windward} = 0.8 \quad (q_z)$$

leeward \Rightarrow linear interpolat - :

$$\alpha = \frac{3.5 - 2}{4 - 2} = \frac{1.5}{2} = 0.75$$

$$g = -0.3 + 0.75(-0.2 - -0.3) \\ = \boxed{-0.225}$$





7-13-07

$$q_z = 0.00256 (0.94)(0.85)(60 \text{ mph})^2 (1.0) = 7.36 \text{ psf}$$

$$q_h = 7.36 \text{ psf}$$

$$p = q G C_p - q_i (G C_{pi})$$

$$= (7.36 \text{ psf})(0.85)(0.8) - 7.36 \text{ psf}(-0.225) = \boxed{6.7 \text{ psf}}$$

Method 2
MWFRS

alternative for low rise building:

$$p = q_h [G C_{pf} - G C_{pi}] = 6.9 (0.55 + 0.43) = 6.762 \text{ psf}$$
$$= 6.9 (0.55 + 1.07) = 11.17 \text{ psf}$$

$$\Rightarrow q_h = (0.00256)(0.88)(0.85)(60)^2 1.0 = 6.9 \text{ psf}$$

$$G C_{pf} = 0.43 \text{ to } 1.07$$

$$G C_{pi} = \pm 0.55$$

Design for load case 1 & 3 in Fig 6-9 per 6.5.12.13 for MWFRS





7-13-07

C+C

$$p = q_h [G C_p - G C_{pv}]$$

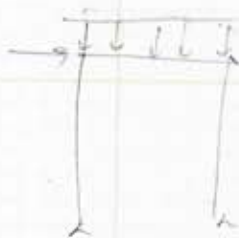
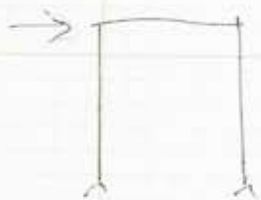
\swarrow -1.4 to -0.8 ± 0.55
 \swarrow 0.7 to 1.0

$$= (6.7 \text{ psf}) (-1.4 - 0.55) = -13.1 \text{ psf} \quad \left. \begin{array}{l} \text{C+C walls} \\ \text{C+C walls} \end{array} \right\}$$

$$(6.7 \text{ psf}) (1.0 + 0.55) = 10.4 \text{ psf}$$

$$(6.7 \text{ psf}) (-2.6 - 0.55) = -21.1 \text{ psf}$$

$$(6.7 \text{ psf}) (0.7 + 0.55) = 5.7 \text{ psf} \quad \left. \begin{array}{l} \text{C+C roofs} \end{array} \right\}$$





BY	DATE	SHEET NO.	OF
CHKD. BY	DATE	JOB NO.	
NOTES			

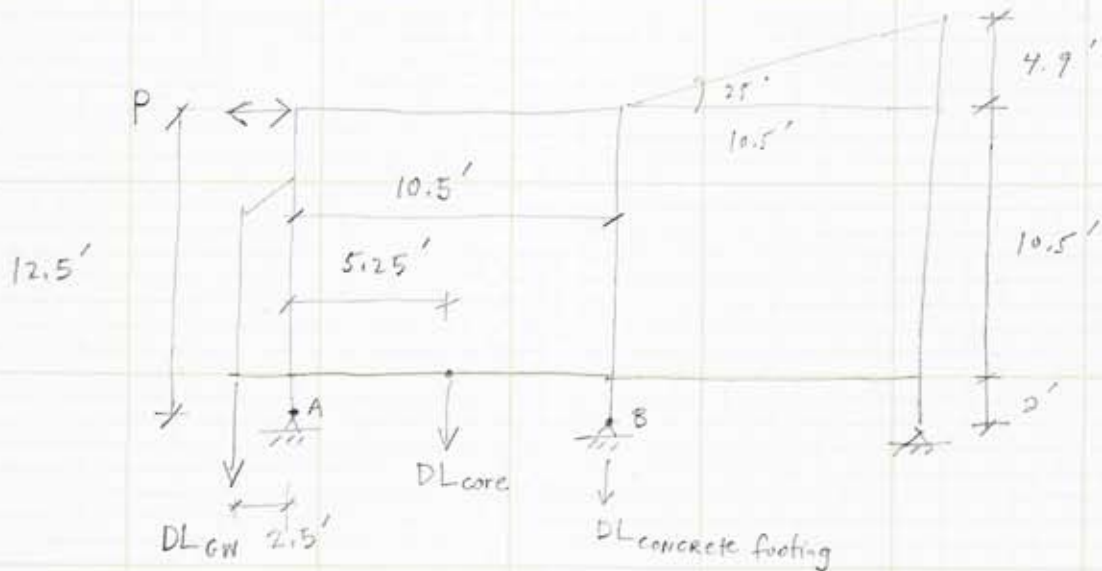
core : Check overturning for over simplified (exaggerated worst case) 7-18-07

wind load = 10 psf (min)

check overturning:

$$P = (10 \text{ psf})(10.5') \left(\frac{10.5'}{2} + 4.9' \right) = 1.07^k$$

$$DL_{GW} = 1.5^k$$



$$DL_{core} = (10 \text{ psf})(10.5')(10.5') = 1.1^k \quad \text{SIPS FLOOR}$$

$$+ (15 \text{ psf})(10.5')(10.5') = 1.65^k \quad \text{SIPS + PV ROOF}$$

$$\boxed{2.75^k} = DL_{core}$$

(Moverturning) S.F. = $M_{resisting}$

check overturning about A : $\left[(1.07^k)(12.5') + (1.5)(2.5') \right] \text{ S.F.} =$

$$(2.75^k)(5.25') + (DL_{FOOTING}) 10.5'$$

$$\Rightarrow (17.125 \text{ k-ft})_2 = 14.44 \text{ k-ft} + (DL_{FOOTING}) 10.5'$$





STRUCTURES PE

BY

DATE

SHEET No.

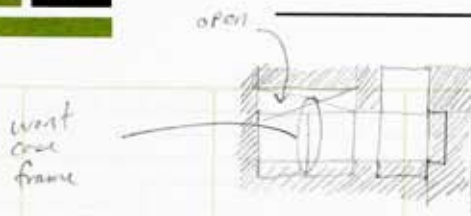
OF

CHKD. BY

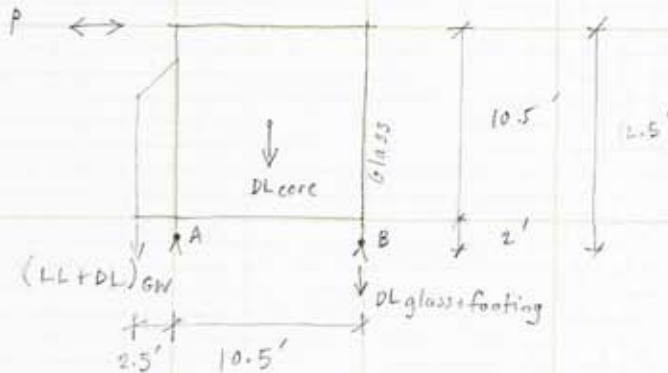
DATE

JOB No.

NOTES



core: check overturning
7-18-07



$$\begin{aligned} LL_{GW} &= (50)(2.5)(10.5) = 1.3 \text{ k} \\ DL_{GW} &= 1.5 \text{ k} \end{aligned} \quad \left. \begin{array}{l} \\ \end{array} \right\} 2.8 \text{ k}$$

$$P = (10 \text{ psf})(10.5')\left(\frac{10.5'}{2}\right) = 0.56 \text{ k}$$

$$DL_{\text{core}} = 2.75 \text{ k}$$

$$DL_{\text{SIPS+FLNR}} = (10 \text{ psf})(10.5')^2 = 1.1 \text{ k}$$

$$DL_{\text{SIPS+PV ROOF}} = (15 \text{ psf})(10.5')^2 = 1.65 \text{ k}$$

$$\underline{\quad 2.75 \text{ k} \quad}$$

$$DL_{\text{GLASS}} = (10 \text{ psf})(10.5')^2 = 1.1 \text{ k}$$

$$DL_{\text{FOOTING}} = (0.15 \text{ kcf})(3')^2 \frac{4''}{12''} = 0.45 \text{ k}$$

$$(M_o)_2 \overset{\text{S.F.}}{<} M_r$$

$$\left[(0.56 \text{ k})(12.5') + (2.8 \text{ k})(2.5') \right] 2 \leq (2.75 \text{ k})(5.25') + (1.1 \text{ k})(10.5') + (0.45 \text{ k})_{10.5'}$$

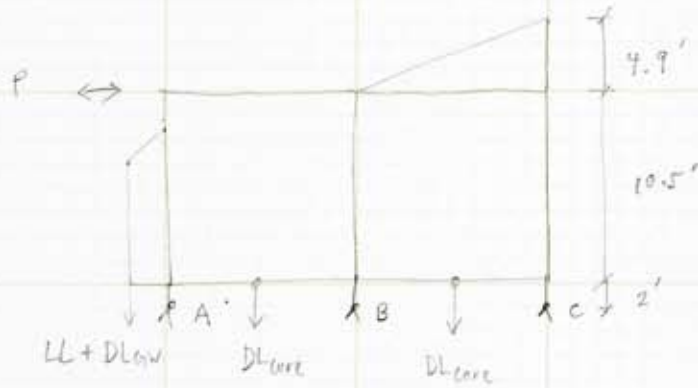




BY	DATE	SHEET No.	OF
CHKD. BY	DATE	JOB No.	
NOTES			

core: check overturning

7-19-07



$$P = 1.07^k$$

$$(LL + DL)_{GW} = 2.8^k$$

$$DL_{core} = 2.75^k$$

check overturning about A (S.F. = 2)

$$(M_o)_{\text{S.F.}} \leq M_R$$

$$[(1.1^k)(12.5') + (2.8^k)(2.5')] 2 \leq (2.75^k)(5.25') + (2.75)(15.75')$$

$$(13.75 + 7) 2 = 41.5 \text{ k-ft} < 14.44 + 43.3 = 57.8 \text{ k-ft} \quad (\text{OK})$$



TEXAS A&M SOLAR DECATHLON

STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

CALCULATIONS, CONT.

GRO-WALLS



(5)

Growall



STRUCTURES PE

BY

DATE

SHEET No.

OF

CHKD. BY

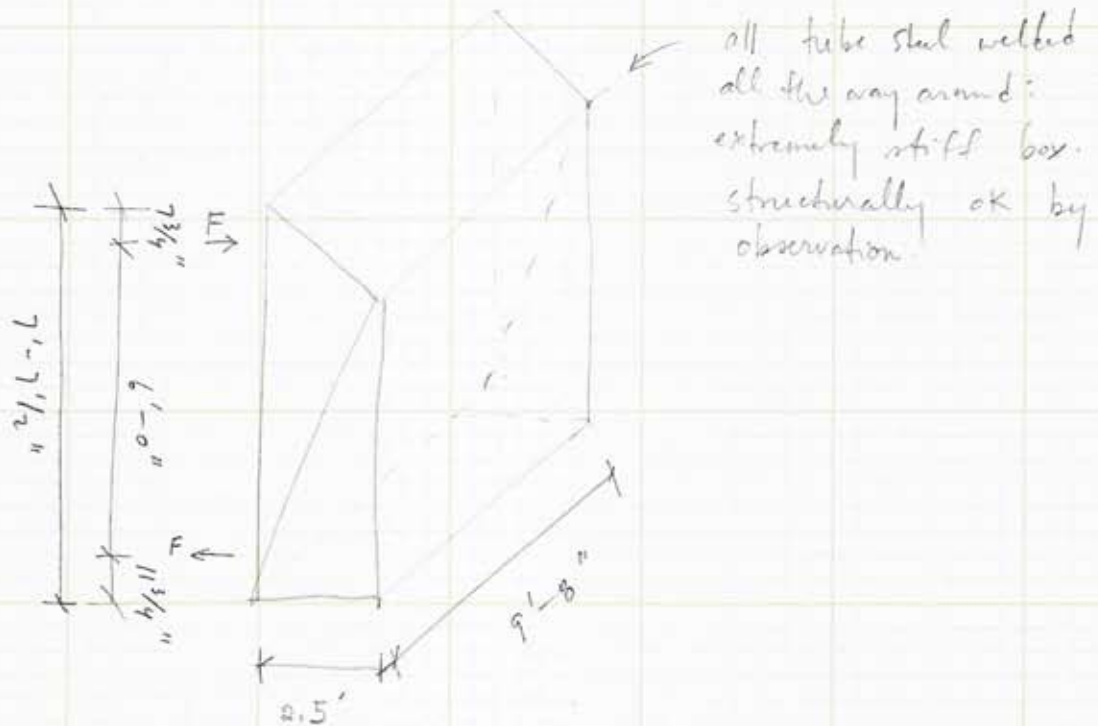
DATE

JOB No.

NOTES

7-12-07

Gro-wall module design



loads:

$$LL = (50 \text{ psf})(2.5')(9.67/2) = 604.4$$

$$DL = (20 \text{ psf})(2.5')(9.67/2) = 241.8$$

$$DL = 1.5^k \text{ (self weight of Growall)}$$

$$P = 1.2(1.75^k) + 1.6(0.61^k) = 3.1^k$$

$$M = (3.1^k) 2.5' = 7.7 \text{ k-ft}$$

$$F = \frac{7.7 \text{ k-ft}}{6} = 1.28^k$$

Gro-wall Attachment to structure is good



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

CALCULATIONS, CONT.

PV SUPER-STRUCTURE





PV Panels Superstructure

7-17-07

1. check mid beam to span 10'

assume panel weight = 15 plf

$$DL = (15 \text{ plf})(10.5') = 157.5 \text{ plf}$$

$$W = (1.4)(157.5 \text{ plf}) = 220.5 \text{ plf}$$

$$M_u = (0.22 \text{ klf})(10')^2/8 = 2.75 \text{ k-ft}$$

$$\phi M_n = (0.9)(50 \text{ ksi})(0.522 \text{ in}^2) = 23.49 \text{ k-in} = 2 \text{ k-ft} < 2.75 \text{ k-ft N.G.}$$

check deflection:

$$\Delta = \frac{(5)(0.16 \text{ klf})(10')^4(12 \text{ in/ft})^3}{(384)(29000)(1.682 \text{ in}^4)} = 0.74 \text{ in}$$

N.G. Add stiffness @ mid-span. use mid-beam



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

CALCULATIONS, CONT.

GRO-DECK





deck beams: note that mid-beams will not work, structurally
 & original Gro-beam concept phased out due to availability

1. loads:

$$LL = (50 \text{ psf}) 5.25' = 262.5 \text{ plf}$$

$$DL = (10 \text{ psf}) 5.25' = 52.5 \text{ plf}$$

$$DL = (90 \text{ plf}) \left(\frac{6'' \times 6''}{144 \text{ in}^2} \right) = 22.5 \text{ plf}$$

$$TL = 337.5 \text{ plf}$$

$$M_a = (337.5 \text{ plf})(10.5')^2 / 8 = 4.65 \text{ k-ft} = 55.8 \text{ k-in}$$

$$V_a = 1772 \#$$

2. member alternatives:

A. light gauge: 800S200-97

$$I_x = 11.203 \text{ in}^4$$

$$\Delta = 0.28''$$

weight = 46 #

B. wood: (3) 2x8

3. bolted connection @ web:

12 ga; #12-14 screws ($\phi = 0.24''$) $\phi V_n = 662 \#/\text{screw}$

bolts are ?

$$\frac{1772 \#}{662 \#} = 2.6 \text{ screws} \rightarrow 2-3 \text{ bolts. edge spacing} = 1.5 \phi$$





GRO-Deck - module

7-10-07

1. check light gage joist : 600200-43

$$S_x = 0.873 \text{ in}^3$$

$$U = (50 \text{ pcf}) \left(\frac{2.5'}{2} \right) = 62.5 \text{ pcf}$$

$$DL = (8 \text{ pcf}) \left(\frac{2.5'}{2} \right) = 10 \text{ pcf}$$

$$DL \text{ aggregate channels} = (90 \text{ pcf}) \left(\frac{6''}{12''} \right) \left(\frac{6''}{12''} \right) = 22.5 \text{ pcf}$$

$$TL = 95 \text{ pcf}$$

$$M_u = \frac{(95 \text{ pcf})(10')^2}{8} = 14.25 \text{ k-in}$$

$$\phi M_n = (0.9)(33 \text{ ksi})(S_x) > 14.25 \text{ k-in}$$

$$S_x > 0.48 \text{ in}^3$$

$$V_u = 475 \#$$

$$\Delta = \frac{5(75 \text{ pcf})(10')^4(12'')^3}{(384)(29000)(2.683 \text{ in}^4)} = 0.275''$$

if span = 2.5' @ 16" o.c.

$$= 4/436 \checkmark$$

$$TL = (60 \text{ pcf}) (1.33') = 80 \text{ pcf}$$

$$M_u = 0.75 \text{ k-in}$$

$$V_u = 100$$

purlins can be much lighter. currently 600200-43 1.67 lb/ft





2. check req'd bracing of T

$$I_x = 1.682 \text{ in}^4$$

$$U = (40 \text{ pcf}) 5' = 200 \text{ pcf}$$

$$D_L = (10 \text{ pcf}) 5' = 50 \text{ pcf}$$

$$P_L \text{ aggregate} = 22.5 \text{ pcf}$$

$$W = 1.2 (22.5 \text{ pcf}) + 1.6 (200) = 0.407$$

$$M_u = 0.407 \text{ kcf} (10')^2 / 8 = 5.1 \text{ k-ft}$$

$$Z = \frac{1.682 \text{ in}^4}{3.75''} = 0.89 \text{ in}^3$$

$$\phi M_n = (0.9)(50 \text{ ksi})(0.89 \text{ in}^3) = 3.3 \text{ k-ft}$$

$$\Delta = \frac{5 (0.273 \text{ kcf})(10')^4 (12''/1')^3}{(384)(29000)(1.682 \text{ in}^4)} = 1.3'' \Delta$$

MID-BM
NO GOOD

$$U = (50 \text{ pcf}) 5 = 250$$

$$P_L = 322.5 \text{ pcf}$$



→ light gage option:

$$M_u = 3.4 \text{ k-ft} = 40.8 \text{ k-in}$$

$$48.4 \text{ k-in}$$

$$V_u = 1.365 \text{ k}$$

$$1615 \text{ lb}$$

$$8005200-97 \rightarrow \Delta = 0.27''$$

95%



TEXAS A&M SOLAR DECATHLON
STRUCTURES JOB # 07.135

DESIGN CRITERIA AND LOADS

CALCULATIONS, CONT.

MISCELLANEOUS STRUCTURAL ELEMENTS



⑥ ~~Apple~~
Ramp

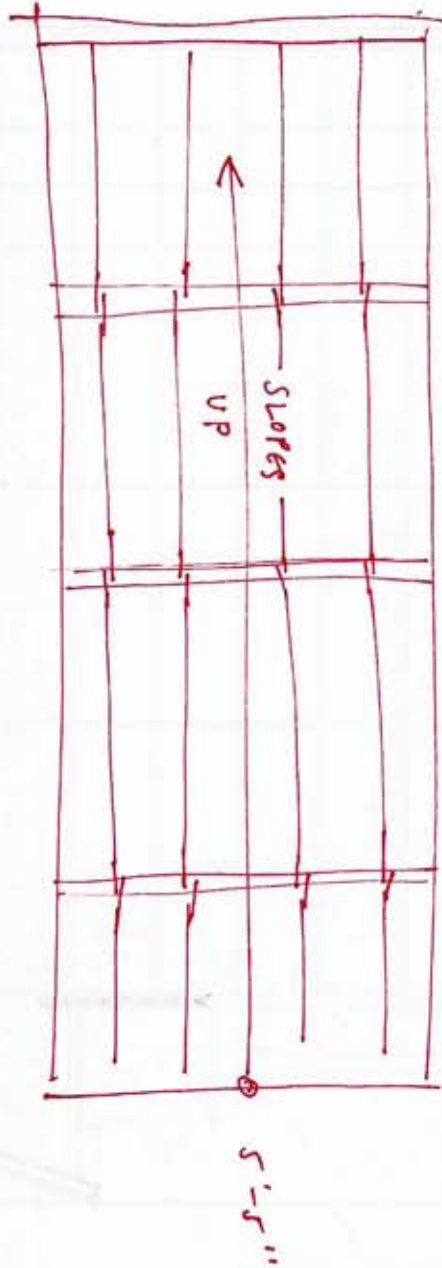


$$\frac{(9.35') (5.5')}{(12')} = 4.24 \text{ ft}^2$$

$$\frac{3.8'}{12'} = 0.317$$

$$4.24 \text{ ft}^2 \times 0.317 = 1.34 \text{ ft}^2$$

$$(6') (5.5') (11.5 \text{ psf}) = 379.5 \text{ psf}$$



~21' (vertical)



Specifications and Product Data Sheets

General Project Requirements

Metals

Wood and Plastics

Thermal and Moisture Protection

Doors and Windows

Finishes

Specialties

Equipment

Furnishings

Special Construction

Mechanical

Electrical

Plumbing



SUSTAINABLE DESIGN PROJECT REQUIREMENTS

PART 1 GENERAL

SUMMARY

Sustainable design and construction practices and documentation.

Related Sections:

Divisions 1 through 16 Sections for sustainability requirements specific to the work of each of those sections.

REFERENCES

Energy Star Roofing Guidelines www.energystar.gov

Green Seal Environmental Standard GS-11 for interior paint VOC thresholds www.greenseal.org

Bay Area Air Quality Management District for sealant standards www.baaqmd.gov

South Coast Air Quality Management District for adhesive standards www.aqmd.gov/rules/html/r1168.html

Greenguard website for product certification www.greenguard.org

Carpet and Rug Institute for carpet standards www.carpet-rug.com

SUSTAINABLE DESIGN GOAL

Perform work to conform to sustainability requirements.

QUALITY ASSURANCE

Designate personnel on Contractor's staff responsible for instructing workers and overseeing and documenting results of sustainable design requirements for Project.

Participation: Require compliance with sustainable design requirements by subcontractors, sub-subcontractors, and suppliers.

DEFINITIONS

Regionally Sourced Material: Materials that are manufactured or extracted within the State of Texas or within 500 miles of the project site. Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.

Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process (pre-consumer), or after consumer use (post-consumer).

Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.

Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

Agrifiber: Product manufactured from agricultural-based fiber

MSDS: Material Safety Data Sheet – Sheet contains information about hazardous chemicals, risks and recommended procedures for treating exposure. The sheet is federally required to be provided by manufacturers of chemically based products.

Volatile Organic Compound (VOC) – as defined by the US EPA. A chemical compound or mixture, derived from a vegetable or animal source (including certain minerals such as coal or petroleum that originally came from vegetable or animal sources), contained in a solid or liquid that volatilizes or evaporates at room temperature or an elevated temperature and, therefore, becomes present in the air or in discharge as vapor or smoke.

FSC – Forest Stewardship Council



PART 2 PRODUCTS

RECYCLED CONTENT

Provide 10 percent (the sum of post-consumer recycled content plus one-half of the post-industrial content) of the total dollar value of materials in the project with materials containing recycled content

REGIONALLY SOURCED MATERIALS

Provide 50 percent of building materials (by cost) that are regionally manufactured and/or extracted within in the State of Texas.

LOW-EMITTING MATERIALS

For interior applications use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24):

Wood Glues: 30 g/L.
Metal to Metal Adhesives: 30 g/L.
Adhesives for Porous Materials (Except Wood): 50 g/L.
Subfloor Adhesives: 50 g/L.
Plastic Foam Adhesives: 50 g/L.
Carpet Adhesives: 50 g/L.
Carpet Pad Adhesives: 50 g/L.
VCT and Asphalt Tile Adhesives: 50 g/L.
Cove Base Adhesives: 50 g/L.
Gypsum Board and Panel Adhesives: 50 g/L.
Rubber Floor Adhesives: 60 g/L.
Ceramic Tile Adhesives: 65 g/L.
Multipurpose Construction Adhesives: 70 g/L.
Fiberglass Adhesives: 80 g/L.
Structural Glazing Adhesives: 100 g/L.
Wood Flooring Adhesive: 100 g/L.
Contact Adhesive: 80 g/L.
Plastic Cement Welding Compounds: 250 g/L.
ABS Welding Compounds: 400 g/L.
CPVC Welding Compounds: 490 g/L.
PVC Welding Compounds: 510 g/L.
Adhesive Primer for Plastic: 650 g/L.
Sealants: 250 g/L.
Sealant Primers for Nonporous Substrates: 250 g/L.
Sealant Primers for Porous Substrates: 775 g/L.

For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:

Flat Paints and Coatings: VOC not more than 50 g/L.
Non-Flat Paints and Coatings: VOC not more than 150 g/L.
Anti-Corrosive Coatings: VOC not more than 250 g/L.
Varnishes and Sanding Sealers: VOC not more than 350 g/L.
Stains: VOC not more than 250 g/L.

Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).



PART 2 Products (con't)

Restricted Components: Paints and coatings shall not contain any of the following:

- Acrolein.
- Acrylonitrile.
- Antimony.
- Benzene.
- Butyl benzyl phthalate.
- Cadmium.
- Di (2-ethylhexyl) phthalate.
- Di-n-butyl phthalate.
- Di-n-octyl phthalate.
- 1,2-dichlorobenzene.
- Diethyl phthalate.
- Dimethyl phthalate.
- Ethylbenzene.
- Formaldehyde.
- Hexavalent chromium.
- Isophorone.
- Lead.
- Mercury.
- Methyl ethyl ketone.
- Methyl isobutyl ketone.
- Methylene chloride.
- Naphthalene.
- Toluene (methylbenzene).
- 1,1,1-trichloroethane.
- Vinyl chloride.

Do not use composite wood and agrifiber products that contain urea-formaldehyde resin.

PART 3 EXECUTION

SITE DISTURBANCE

Certify development footprint exceeds local zoning open space requirements by at least 25%.
On previously developed sites, restore at least 50% of the remaining open area through revegetation.

CONSTRUCTION WASTE MANAGEMENT

Comply with Division 1 Section "Construction Waste Management."

CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction.
If Owner authorizes the use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 1 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction. Replace all air filters immediately prior to occupancy. Replacement air filters shall have a MERV 13 according to ASHRAE 52.2.



SERRATED GRATING



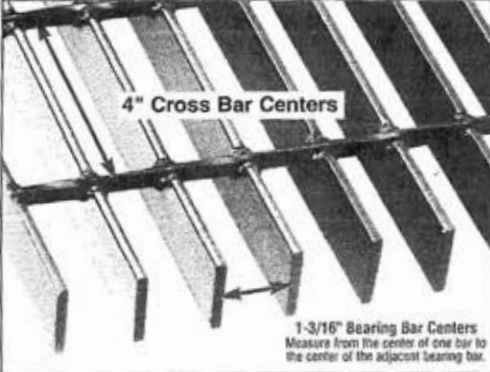
.50" Center to center

This type of grating surface is slip-resistant. Available for grating with rectangular bearing bars from 1" x 1/8" to 2-1/2" x 3/16".

NOTE: Depth of grating required for a specified load will be 1/4" greater than that shown in load tables.

Several other types of serrations available—ask us!

GW Welded Grating



4" Cross Bar Centers

1-3/16" Bearing Bar Centers
Measure from the center of one bar to the center of the adjacent bearing bar.

Rectangular Bar

CONSTRUCTION: Bearing bars and cross bars welded together

MATERIAL:
Carbon or Painted Black Steel
HD Galvanized Steel
Stainless Steel Type 304 (mill finish or sandblast) optional

Fast Cut-to-Size

HEIGHTS: 3/4" to 2-1/2" available
WIDTHS: Please see panel width chart
LENGTHS: 20' STOCK or cut-to-size
BAR THICKNESS: 1/8" or 3/16"

GW, SGW, GAA, GCC Series Panel Widths

No. Bars	GW, GW-2 GAA, GBB	SGW, SGW-2 GCC, GDD	No. Bars	GW, GW-2 GAA, GBB	SGW, SGW-2 GCC, GDD	No. Bars	GW, GW-2 GAA, GBB	SGW, SGW-2 GCC, GDD
2	1-3/8"	1-1/8"	15	16-13/16"	13-5/16"	28	32-1/4"	25-1/2"
3	2-9/16"	2-1/16"	16	18"	14-1/4"	29	33-7/16"	26-7/16"
4	3-3/4"	3"	17	19-3/16"	15-3/16"	30	34-5/8"	27-3/8"
5	4-15/16"	3-15/16"	18	20-3/8"	16-1/8"	31	35-13/16"	28-5/16"
6	6-1/8"	4-7/8"	19	21-9/16"	17-1/16"	32		29-1/4"
7	7-5/16"	5-13/16"	20	22-3/4"	18"	33		30-3/16"
8	8-1/2"	6-3/4"	21	23-15/16"	18-15/16"	34		31-1/8"
9	9-11/16"	7-11/16"	22	25-1/8"	19-7/8"	35		32-1/16"
10	10-7/8"	8-5/8"	23	26-5/16"	20-13/16"	36		33"
11	12-1/16"	9-9/16"	24	27-1/2"	21-3/4"	37		33-15/16"
12	13-1/4"	10-1/2"	25	28-11/16"	22-11/16"	38		34-7/8"
13	14-7/16"	11-7/16"	26	29-7/8"	23-5/8"	39		35-13/16"
14	15-5/8"	12-3/8"	27	31-1/16"	24-9/16"	■ STOCK SIZE		

Maximum width indicated. Wider areas will be made in two or more panels. GW & SGW panels are available up to 48" wide by special order—please inquire!

■ STOCK SIZE

All other widths are cut-to-size.

Deduct 1/16" from width for 1/8" bearing bars. NOTE: WIDTH AND LENGTH TOLERANCE ±1/4"

Press-Locked Bar

Press-Locked







Press-locked process assures firm, rigid connections.

CONSTRUCTION: Cross bars are pressed into the bearing bars under pressure, laterally displacing 1/16" of cross bar material into the dovetail slot.

MATERIAL:
Carbon or HD Galvanized, Painted Steel, Aluminum, Stainless Steel - Mill Finish

Not recommended for wheel traffic or barefoot pedestrian. Available by special order.

SERIES	GW(19W4)		GW-2(19W2)		SGW(15W4)		SGW-2(15W2)	
Bar Spacing								
Bearing Bar Size	Item No.	#/SF	Item No.	#/SF	Item No.	#/SF	Item No.	#/SF
3/4" x 1/8"	GW-75A	4.1	GW-75A-2	5.0	SGW-75A	5.0	SGW-75A-2	5.9
3/4" x 3/16"	GW-75	5.8	GW-75-2	6.7	SGW-75	7.2	SGW-75-2	8.1
1" x 1/8"	GW-100A	5.2	GW-100A-2	6.1	SGW-100A	6.4	SGW-100A-2	7.3
1" x 3/16"	GW-100	7.5	GW-100-2	8.4	SGW-100	9.3	SGW-100-2	10.2
1-1/4" x 1/8"	GW-125A	6.3	GW-125A-2	7.2	SGW-125A	7.9	SGW-125A-2	8.8
1-1/4" x 3/16"	GW-125	9.1	GW-125-2	10.0	SGW-125	11.3	SGW-125-2	12.2
1-1/2" x 1/8"	GW-150A	7.4	GW-150A-2	8.3	SGW-150A	9.3	SGW-150A-2	10.2
1-1/2" x 3/16"	GW-150	10.8	GW-150-2	11.7	SGW-150	13.5	SGW-150-2	14.4
1-3/4" x 3/16"	GW-175	12.5	GW-175-2	13.4	SGW-175	15.6	SGW-175-2	16.5
2" x 3/16"	GW-200	14.1	GW-200-2	15.0	SGW-200	17.7	SGW-200-2	18.6
2-1/4" x 3/16"	GW-225	15.8	GW-225-2	16.7	SGW-225	19.8	SGW-225-2	20.7
2-1/2" x 3/16"	GW-250	17.4	GW-250-2	18.3	SGW-250	21.9	SGW-250-2	22.8

GW, GW-2, GAA & GBB Series Steel


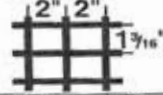
LOAD TABLE

Bearing Bar Size	SPAN	(1-3/16" Center to Center Bar Spacings)															
		2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"	9'-0"	9'-6"
3/4" x 1/8"	U	355	227	158	116	89	70										
	D	099	155	223	304	397	503										
	C	355	284	237	203	178	158										
	D	079	124	179	243	318	402										
3/4" x 3/16"	U	533	341	237	174	133	105										
	D	099	155	223	304	397	503										
	C	533	426	355	305	266	237										
	D	079	124	179	243	318	402										
1" x 1/8"	U	632	404	281	206	158	125	101	84	70							
	D	074	116	168	228	298	377	466	563	670							
	C	632	505	421	361	316	281	253	230	211							
	D	060	093	134	182	238	302	372	451	536							
1" x 3/16"	U	947	606	421	309	237	187	152	125	105							
	D	074	116	168	228	298	377	466	563	670							
	C	947	758	632	541	474	421	379	344	316							
	D	060	093	134	182	238	302	372	451	536							
1-1/4" x 1/8"	U	987	632	439	322	247	195	158	130	110	93	81					
	D	060	093	134	182	238	302	372	451	536	629	730					
	C	987	789	658	564	493	439	395	359	329	304	282					
	D	048	074	107	140	191	241	298	360	429	504	584					
1-1/4" x 3/16"	U	1480	947	658	483	370	292	237	196	164	140	121					
	D	060	093	134	182	238	302	372	451	536	629	730					
	C	1480	1184	987	846	740	658	592	538	493	455	423					
	D	046	074	107	146	191	241	298	360	429	504	584					
1-1/2" x 1/8"	U	1421	909	632	464	355	281	227	188	158	135	116	89				
	D	050	078	112	152	199	251	310	376	447	524	608	794				
	C	1421	1137	947	812	711	632	568	517	474	437	406	355				
	D	040	062	089	122	159	201	248	300	358	420	487	566				
1-1/2" x 3/16"	U	2132	1364	947	696	533	421	341	282	237	202	174	133				
	D	050	078	112	152	199	251	310	376	447	524	608	794				
	C	2132	1705	1421	1218	1066	947	853	775	711	656	609	533				
	D	040	062	089	122	159	201	248	300	358	420	487	566				
1-3/4" x 1/8"	U	2901	1857	1289	947	725	573	464	384	322	275	237	181				
	D	043	067	096	130	170	215	266	322	383	450	521	601				
	C	2901	2321	1934	1658	1451	1289	1161	1055	967	893	829	725				
	D	034	053	077	104	136	172	213	257	306	360	417	545				
2" x 3/16"	U	3789	2425	1684	1237	947	749	606	501	421	359	309	237				
	D	037	059	084	114	149	189	233	282	335	393	456	596				
	C	3789	3032	2526	2165	1895	1684	1516	1378	1263	1166	1083	947				
	D	030	047	067	091	119	151	186	225	268	315	365	477				
2-1/4" x 1/8"	U	4796	3069	2132	1566	1199	947	767	634	533	454	392	300				
	D	033	052	074	101	132	168	207	250	298	350	406	530				
	C	4796	3837	3197	2741	2398	2132	1918	1744	1599	1476	1370	1199				
	D	026	041	060	081	106	134	166	200	238	280	324	424				
2-1/2" x 3/16"	U	5921	3789	2632	1933	1480	1170	947	783	658	561	483	370				
	D	030	047	067	091	119	151	186	225	268	315	365	477				
	C	5921	4737	3947	3363	2961	2632	2366	2153	1974	1822	1692	1480				
	D	024	037	054	073	095	121	149	180	215	252	292	381				

Units in shaded area produce a deflection of 1/4" or less under a uniform load of 100 pounds per square foot. This deflection is recommended as the maximum to provide pedestrian comfort. It can be exceeded at the discretion of the engineer.

To determine load for types shown below, multiply value above by the corresponding load factor. Deflection under the factored loads will be same as shown in load table.

Series	SGW, SGW-2, GCC, GDD	GCM-1	GCM-2	GCM-3	GCM-4	GCM-5	GM, GGT	GO, GPH	GW, GWH	GV
Load Factor	1.27	2.70	2.35	1.90	1.72	1.45	1.15	1.61	.82	.58

SERIES	GAA (19P4)		GBB (19P2)	
Spacing				
Steel weights shown				
Bearing Bar Size	Item No.	#/SF	Item No.	#/SF
3/4" x 1/8"	GAA-75A	4.4	GBB-75A	4.6
3/4" x 3/16"	GAA-75	8.0	GBB-75	8.5
1" x 1/8"	GAA-100A	7.5	GBB-100A	8.0
1" x 3/16"	GAA-100	9.0	GBB-100	9.5
1-1/4" x 1/8"	GAA-125A	6.4	GBB-125A	9.0
1-1/4" x 3/16"	GAA-125	9.2	GBB-125	11.1
1-1/2" x 1/8"	GAA-150A	9.5	GBB-150A	10.1
1-1/2" x 3/16"	GAA-150	12.0	GBB-150	12.5
1-3/4" x 3/16"	GAA-175	13.5	GBB-175	14.0
2" x 3/16"	GAA-200	16.0	GBB-200	17.0
2-1/4" x 3/16"	GAA-225	17.5	GBB-225	18.5
2-1/2" x 3/16"	GAA-250	19.0	GBB-250	20.0

NELSON STUD WELDING

SPECIFICATION: **S3L** Shear Connectors (SC)

Nelson headed shear connectors deliver code specified shear strength values as used in composite construction, securing concrete to steel structural components. Nelson shear connectors meet requirements of the following codes and are also USNRC approved:

AWS D1.1 Structural Welding Code – Steel
AWS D1.6 Structural Welding Code – Stainless Steel
AWS D1.5 Bridge Welding Code /
AASHTO Standard Specification for Highway Bridges
ISO-13918 welding – Studs for arc stud welding
Canadian Standards Association W59 – Welded Steel Construction
International Building Code Section 19
AISC Manual of Steel Construction – Allowable Stress Design
AISC Manual of Steel Construction – Load & Resistance Factor Design

See also: ICBO Evaluation Report ER-2614 Nelson Shear Connectors

Shear connectors are typically used in composite steel construction for holding concrete slabs to steel members to resist shear forces and increase shear loading capacity in steel buildings, bridges, columns caissons, containment liners, etc. They also act as embedment anchors on miscellaneous embedded plates, frames, angles, strip plates, attachments and connections. Options for **Welding Through Metal Deck** are available for this stud.

For similar function studs, see Nelson **H4L Headed Concrete Anchors** and **D2L Deformed Bar Anchors**.

When ordering, specify **Type, Diameter, Length, Material, Quantity, and Part Number**

Example: **S3L 3/4 x 6-3/16"**; Mild Steel; 10,000 pieces; #101098015

Stud Diameter	Burn Off	A	H	Chuck	Recommended Standard Accessories		
					Foot	Ferrule Holder	Ferrule for Flat
3/4" 19 mm	0.187 4mm	0.375	1.250	500001088	502002042	501006027	100101152
7/8" 22mm	0.187 4mm	0.375	1.375	500001091	502002042	501006028	100101140
1" 25mm	0.250 6mm	0.500	1.625	500001424	502002042	501006046	100101045

* Burn Off: Burn off lengths shown are for welding to bare steel. For burn off values and other details when studs are welded through metal deck to steel see **WELD THROUGH DECK SPECIFICATION SHEET**

The **Nelson Ferrule Shooter** is available for semi-automatic dispensing of ceramic ferrules along with standard ferrules assembled 50 pieces per "string" for easy and fast loading onto the Ferrule Shooter dispenser. Following are the current ferrule assemblies available:

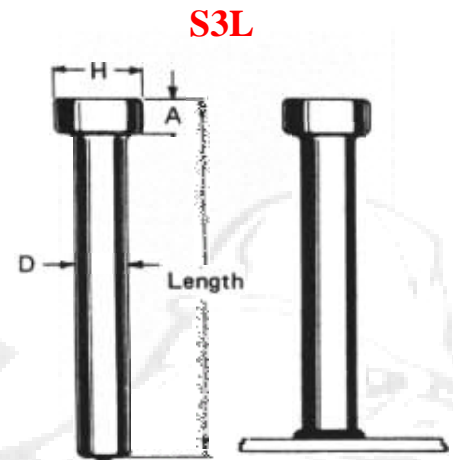
Stud diameter	Ferrule
3/4" downhand	100101260
3/4" weld through deck	100101249
7/8" downhand	100101261
7/8" weld through deck	100101262

MATERIALS: Studs are available in Low Carbon Mild Steel and 316L Stainless Steel. For specific grade information and physical and chemical properties, conforming standards, and information on stud plating and heat treating, please see **General Material Specifications**. Certified Material Test Reports (CMTR) and Certificates of Compliance (COC) are available and must be requested at time of order.

For ferrules and grips used in welding at an angle to plate, welding to angles, and welding to a vertical base plate, see the **Special Applications** section of the **Ferrule Specifications**

FLUX: All Nelson concrete anchors have a solid flux load.

Visit our website **www.NelsonStudWelding.com** for a list of our standard stock products.



PERFORMANCE PROPERTIES OF CORIAN®

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5 x 10 ⁶ psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2 x 10 ⁶ psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale
	56	ASTM D 785 Barcol Impressor ASTM D 2583
Thermal Expansion	3.02 x 10 ⁻⁵ in./in./°C (1.80 x 10 ⁻⁵ in./in./°F)	ASTM D 696
Gloss (60° Gardner)	5–75 (matte—highly polished)	ANSI Z124
Light Resistance (Xenon Arc)	No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria Resistance	Does not support microbial growth	ASTM G 21 & G 22
Boiling Water Resistance	No visible change	NEMA LD 3-2000 Method 3.5
High Temperature Resistance	No change	NEMA LD 3-2000 Method 3.6
Izod Impact (Notched Specimen)	0.28 ft.-lbs./in. of notch	ASTM D 256 (Method A)
Ball Impact Resistance: Sheets	No fracture—1/2 lb. ball: 1/4" slab—36" drop 1/2" slab—144" drop	NEMA LD 3-2000 Method 3.8
Weatherability	ΔE* ₉₄ < 5 in 1,000 hrs.	ASTM G 155
Specific Gravity†	1.7	
Water Absorption	Long-term 0.4% (3/4") 0.6% (1/2") 0.8% (1/4")	ASTM D 570
Toxicity	99 (solid colors) 66 (patterned colors)	Pittsburgh Protocol Test ("LC ₅₀ " Test)
Flammability	All colors (Class I and Class A)	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

†Approximate weight per square foot 1/4" (6 mm) 2.2 lbs. • 1/2" (12.3 mm) 4.4 lbs.

Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories.

NEMA results based on the NEMA LD 3-2000

C950-K03158-15 1/04

The information contained in this Technical Bulletin is given by E.I. du Pont de Nemours and Company free of charge. It is based on technical data which DuPont believes to be reliable and is intended for use by persons having knowledge of this technical area at their own discretion and risk. Seller assumes no responsibility for results obtained or damage incurred from the use of this Technical Bulletin either in whole or in part by a buyer of Corian®. Corian® is a DuPont registered trademark for its solid surfaces. Only DuPont makes Corian®. Copyright © 2004 E.I. du Pont de Nemours and Company. Printed in the U.S.A.

DuPont™
CORIAN®
SOLID SURFACES



The miracles of science™



E. Performance characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5 x 10 ⁶ psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2 x 10 ⁶ psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale
	56	ASTM D 785 Barcol Impressor ASTM D 2583
Thermal Expansion	3.02 x 10 ⁻⁵ in./in./°C (1.80 x 10 ⁻⁵ in./in./°F)	ASTM D 696
Gloss (60° Gardner)	5–75 (matte—highly polished)	ANSI Z124
Light Resistance (Xenon Arc)	No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria Resistance	Does not support microbial growth	ASTM G 21 & G 22
Boiling Water Resistance	No visible change	NEMA LD 3-2000 Method 3.5
High Temperature Resistance	No change	NEMA LD 3-2000 Method 3.6
Izod Impact (Notched Specimen)	0.28 ft.-lbs./in. of notch	ASTM D 256 (Method A)
Ball Impact Resistance: Sheets	No fracture—1/2 lb. ball: 1/4" slab—36" drop 1/2"† slab—144" drop	NEMA LD 3-2000 Method 3.8
Weatherability	ΔE* ₉₄ < 5 in 1,000 hrs.	ASTM G 155
Specific Gravity†	1.7	
Water Absorption	Long-term 0.4% (3/4") 0.6% (1/2"†) 0.8% (1/4")	ASTM D 570
Toxicity	99 (solid colors) 66 (patterned colors)	Pittsburgh Protocol Test ("LC ₅₀ " Test)
Flammability	All colors (Class I and Class A)	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

†Approximate weight per square foot 1/4" (6 mm) 2.2 lbs. • 1/2" (12.3 mm) 4.4 lbs.

Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories.

NEMA results based on the NEMA LD 3-2000

DuPont™
CORIAN®
SOLID SURFACES



The miracles of science™



I. Performance characteristics:

Property	Typical Result	Test
Tensile Strength	6,000 psi	ASTM D 638
Tensile Modulus	1.5×10^6 psi	ASTM D 638
Tensile Elongation	0.4% min.	ASTM D 638
Flexural Strength	10,000 psi	ASTM D 790
Flexural Modulus	1.2×10^6 psi	ASTM D 790
Hardness	>85	Rockwell "M" Scale
	56	ASTM D 785 Barcol Impressor ASTM D 2583
Thermal Expansion	3.02×10^{-5} in./in./°C (1.80×10^{-5} in./in./°F)	ASTM D 696
Gloss (60° Gardner)	5–75 (matte—highly polished)	ANSI Z124
Light Resistance (Xenon Arc)	No effect	NEMA LD 3-2000 Method 3.3
Wear and Cleanability	Passes	ANSI Z124.3 & Z124.6
Stain Resistance: Sheets	Passes	ANSI Z124.3 & Z124.6
Fungus and Bacteria Resistance	Does not support microbial growth	ASTM G 21 & G 22
Boiling Water Resistance	No visible change	NEMA LD 3-2000 Method 3.5
High Temperature Resistance	No change	NEMA LD 3-2000 Method 3.6
Izod Impact (Notched Specimen)	0.28 ft.-lbs./in. of notch	ASTM D 256 (Method A)
Ball Impact Resistance: Sheets	No fracture—1/2 lb. ball: 1/4" slab—36" drop 1/2"† slab—144" drop	NEMA LD 3-2000 Method 3.8
Weatherability	$\Delta E^*_{94} < 5$ in 1,000 hrs.	ASTM G 155
Specific Gravity†	1.7	
Water Absorption	Long-term 0.4% (3/4") 0.6% (1/2"†) 0.8% (1/4")	ASTM D 570
Toxicity	99 (solid colors) 66 (patterned colors)	Pittsburgh Protocol Test ("LC ₅₀ " Test)
Flammability	All colors (Class I and Class A)	ASTM E 84, NFPA 255 & UL 723
Flame Spread Index	<25	
Smoke Developed Index	<25	

†Approximate weight per square foot 1/4" (6 mm) 2.2 lbs. • 1/2" (12.3 mm) 4.4 lbs.

Shapes meet or exceed the ANSI Z124.3 and ANSI Z124.6 standards for plastic sinks and lavatories.

NEMA results based on the NEMA LD 3-2000



PHYSICAL AND MECHANICAL PROPERTIES

Property		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) 24 hr. immersion		ASTM D1037	4.3%
Water Absorption (unsanded surface) 24 hr. immersion		ASTM D1037	1.7%
Expansion/Contraction Properties (b)			
Thermal	Typical Trex Wood Polymer® lumber values for Coefficient of Thermal Expansion/Contraction (36" long samples) Width: 35.2×10^{-6} to 42.7×10^{-6} (inch/inch/°F) Length: 16.1×10^{-6} to 19.2×10^{-6} (inch/inch/°F)		
Moisture	Typical Trex Wood Polymer lumber values for Long Term Water Immersion Constant High Humidity 36" long samples: Width ~3% 6" long samples: Width ~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) Values	Design 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	



PLAS-TEX®

by Parkland Plastics, Inc.

This publication describes the uses, construction and installation methods for PLAS-TEX®.

Complete physical property data, cleaning procedures, flame and smoke, and other tests are available on our web site, www.parklandplastics.com as well as specific installation procedures for various types of construction.

Parkland Plastics is the foremost manufacturer of plastic sheet with 100% recycled content in the USA, with a proprietary process developed over 10 years.

We extrude sheet up to 3/4" thick which we fabricate using a high accuracy beam saw and a CNC router to make complex shapes. The thick sheet is also machined into profiles in our

facilities to make base molding, chair rail and other profiles. In addition, we can laminate our sheet onto a variety of substrates, such as gypsum wall board, insulation foam, plywood and fluted plastics.

Many of our products are designed with the specific needs of our customers in mind, such as the base and chair rail moldings that we make to protect walls from damage by shopping carts, cleaning equipment and even fork lifts. Our products are designed for easy installation, low maintenance and moisture resistance. This minimizes downtime, construction costs and ongoing maintenance expense.

What is PLAS-TEX?

PLAS-TEX is a mineral reinforced Polyethylene sheet made with 100% recycled plastic.

Product Uses

1. Wall coverings for kitchens, food processing plants, restrooms, convenience stores and other areas where sanitation and ease of cleaning are important considerations.
2. Factories where chemical resistance is an important consideration.
3. Wainscoting and wall panels in areas subject to abuse from pedestrian traffic, carts or fork lifts.
4. Wet or moist environments.

Features and Benefits

100% Waterproof

- No water damage with frequent wash-down
- No swelling, no rotting
- Will not harbor bacteria

Exclusive Hygienic Properties

- Clinically proven to resist bacterial growth
- Will not harbor E.coli, black mold or staph

Chemically Resistant

- Use cleaners of all types without damage
- No yellowing or color change with corrosive environments
- Acid resistant
- Reduce maintenance costs

Light Weight

- Easy to install
- Reduce roof load when used as ceiling

Made From Recycled Plastic

- Buy recycled without cost penalty and get superior product.

Available Colors and Textures:

- Bright white, Pewter white and Almond
- Matte, NRP and Silk finishes

Physical Properties

0.09 PLAS-TEX	ASTM E-84	Flame Spread	105
0.09 PLAS-TEX	ASTM E-84	Smoke Developed Index	435
0.09 PLAS-TEX	ASTM D-732	Shear Strength	2970 psi
0.09 PLAS-TEX	ASTM D-696	Coefficient of Linear Thermal Expansion	3.84 X 10 ⁻⁵ in/in/°F
0.09 PLAS-TEX	ASTM D-790	Flexural Modulus (psi)	90,460 +/- 2840 psi
0.09 PLAS-TEX	ASTM D-3029	Gardner Impact	231°C 22.60 in.lb -20°C 5.90 in.lb
0.09 PLAS-TEX	ASTM D-570	Water Absorption	0.055%
0.09 PLAS-TEX	ASTM D-790	Flexural Modulus (psi)	78,240 +/- 3,940 psi
0.09 PLAS-TEX	ASTM D2240	Hardness	51 Shore D
0.09 PLAS-TEX	ASTM D-792	Specific Gravity	0.0916
0.09 PLAS-TEX	ASTM D-649	Heat Distortion Temp.	51.30°C
0.10 PLAS-TEX	ASTM D-256	Unnotched Izod Impact	7.02 +/- 0.21 ft lb/in
0.10 PLAS-TEX	ASTM D-695	Compressive Strength	5293 psi
0.10 PLAS-TEX	ASTM D-638	Elongation @ Ultimate (psi)	410 +/- 10%
0.10 PLAS-TEX	ASTM D-638	Tensile Strength @ Ultimate (psi)	1190 +/- 60 psi
0.40 PLAS-TEX	ASTM D-882	Elongation @ Break (%)	555 +/- 1%
0.40 PLAS-TEX	ASTM D-882	Tensile Strength @ Break (%)	2062 +/- 179 psi

For More Information Please Contact us at:

Parkland Plastics, Inc.

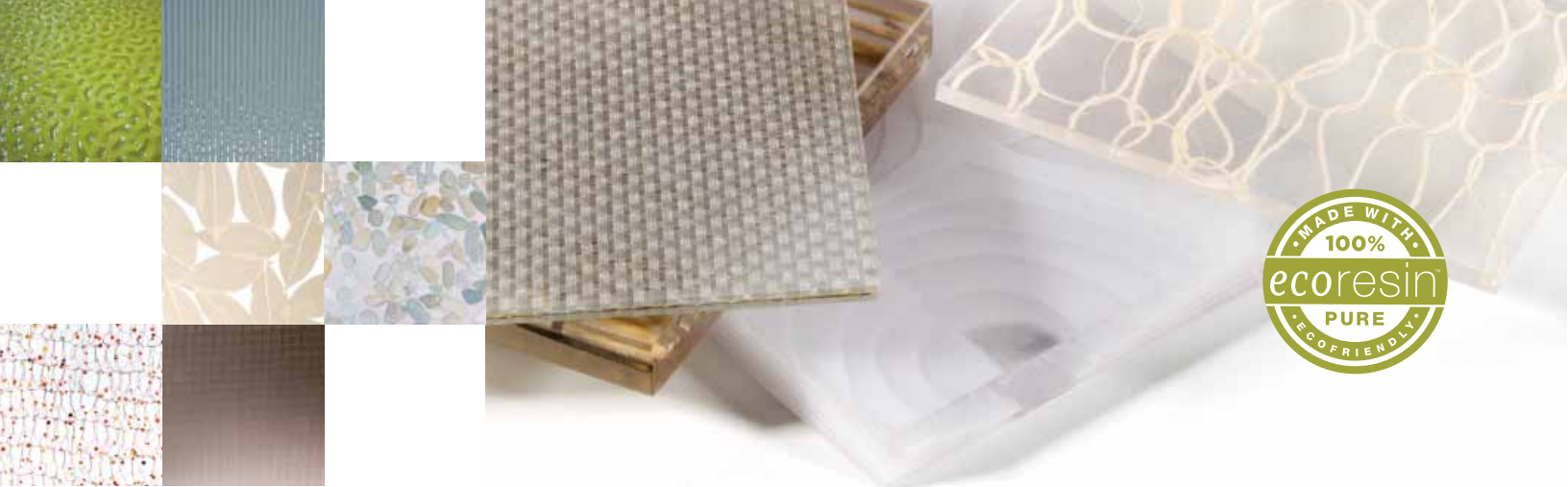
www.parklandplastics.com

104 Yoder Drive

Middlebury, Indiana 46540

(800) 835-4110





3form[®] ecoresin[™]

imaginative. versatile. sustainable

features

 **chemical resistant**

 **cost effective**

 **durable**

 **exterior**

 **fire**

 **formable**

 **responsible**

 **translucent**

 **versatile**

 **dimensions**

 **colors**

 **finishes**

benefits

easy to clean and use in a variety of demanding environments

wide range of price points to fit any budget

40 times the impact strength of glass

available with UV stabilization for outstanding exterior performance

self-extinguishing class-A and class-B performance

easily formed to create complex curves and shapes

non-toxic, sustainable material made from ecoresin[™], which is GREENGUARD Indoor Air Quality Certified[®]

create more than a million custom options

to provide both daylighting and privacy

offers unlimited aesthetic and design options

standard panels

4' x 8' (1219mm x 2438mm)

4' x 10' (1219mm x 3048mm)

5' x 10' (1524mm x 3048mm)

custom sizes available

over 70 standard colors

pantone color-matching system

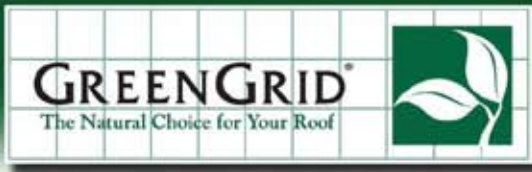
custom digital imagery

various options

For more information, please visit 3-form.com/materials-ecoresin or call 800.726.0126

JANUARY 2007 | MAT1P - 001





The PREMIER Green Roof System

Specifications Summary

ELEMENT

DESCRIPTION

Module sizes (*nominal*)

2 ft. x 2 ft. x 2.5 in.
2 ft. x 2 ft. x 4 in.
2 ft. x 4 ft. x 4 in.
40 in. x 40 in. x 4 in.
2 ft. x 2 ft. x 2.8 ft. x 4 in. (triangle)
2 ft. x 2 ft. x 8 in.
2 ft. x 4 ft. x 8 in.

Depth of modules (*three depths*)

2.5 in., 4 in., and 8 in. (nominal)

Weight of planted modules (*when wet*)

2 in. depth – Approx. 10-12 lb. per sq. ft.
4 in. depth – Approx. 15-18 lb. per sq. ft.
8 in. depth – Approx. 30+ lb. per sq. ft.

(Weight may vary based on requirements for project-specific vegetation selections and variations in regional materials incorporated in growth media.)

Module material

60% post-industrial recycled High Molecular Weight Polyethylene
– 150 mil. (2.5 and 4 in.)
– 175 mil. (8 in.)

Module drainage clearance above roof

0.5 in.

Color of modules

Black

Drainage/root resistance medium

3 oz. spunbonded polypropylene geotextile

Growth media

Proprietary mixture consisting of organic and inorganic material

Slip sheet protection fabric

6 oz. non-woven geotextile slip sheet. *(Installation of slip sheet between GreenGrid® modules and roof surface is recommended.)*

Vegetation

Perennials, grasses, or shrubs specifically selected for climate, hardiness zone, color, and size.



OPTIONAL ELEMENTS

Paver size

2 ft. x 2 ft. (various depths available)

Paver material

100% recycled rubber

Paver colors (*standard*)

Forest green, charcoal, brick red, black, and blue
(other, non-standard colors available)

Paver weight

7.5 lb. per sq. ft. *(based on 1.75 in. depth)*

Edge treatments

Aluminum or steel, available in various colors and designs.

GreenGrid and ABC Supply Co. are trademarks of American Builders & Contractors Supply Co., Inc.
The GreenGrid® System is a proprietary technology of ABC Supply. U.S. and International patents pending.
WESTON® is the exclusive licensee of the GreenGrid® System in the U.S.



AquaMaster Liner/Floating Cover

Item# 104331

Nova-Thene AquaMasterLiners and Floating Covers are perfect for pits, ponds, and waterways.

- Light-weight, heavy duty reinforced geomembrane fabric.
- Used for water retention and conservation.
- Ideal for pits, ponds, waterways and ice skating ponds.
- Constructed of woven black HDPE scrim.
- White/black with 2 mil coating on each side.
- 12 mil thickness.
- Minimum Order: 240 sq. ft./12'W x 20'L.
- Can be fabricated in width increments of 6', starting with 12'W, to any length, starting with 20'L, up to 30,000 square feet, the maximum panel size.

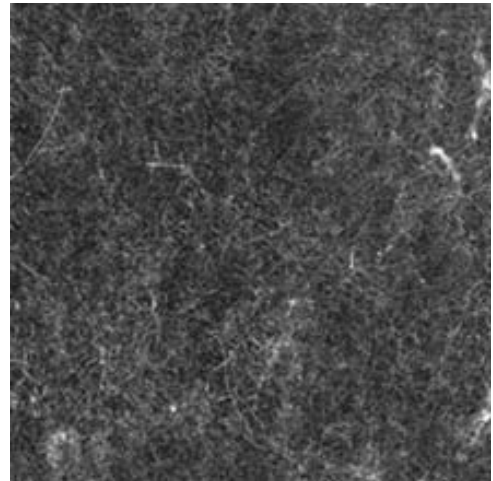


Non-Woven Pond Underliner

Item# 105246

Protect your pond liner with this durable, highly functional, cost effective underliner.

- Constructed from 8 oz., charcoal gray, non-woven fabric that is 100% staple polyester and polypropylene needle-punched design.
- Protects from tears and punctures caused by stone, roots, and soil chemicals.
- UV-resistant and virtually unaffected by hydrocarbons, mildew, rot and freeze-thaw.
- Will provide filtration, separation and tensile reinforcement to ponds, ice skating rinks, roads, roofs, dams, trenches, landfills, drainage areas and embankment stabilization.
- Provides more even diffusion of built-up gases and fluids.
- Thickness: 100 mil.
- Roll width: 12.5'.
- Puncture strength: 110.
- Mullen burst strength: 350.
- Sold per linear ft.



PRODUCT DATA SHEET

MULE-HIDE STANDARD BLACK AND FR EPDM MEMBRANE

PRODUCT DESCRIPTION

Mule-Hide Standard Black and FR EPDM is a high performance non-reinforced membrane that stands up to tearing, impacts, punctures and normal roof traffic. The elastomeric properties of the EPDM membrane compensate for thermal shock and building movement. EPDM membranes provide excellent resistance to ozone and aging. The membrane is manufactured in accordance with the guidelines established by the RMA (Rubber Manufacturers Association) and meets or exceeds the ASTM Standard Specification D 4637. Fire Retardant (FR) EPDM membranes are specially formulated to inhibit spread of flame and meet or exceed code body testing criteria for fire retardant roofing membranes.

BASIC USES

Can be installed as a new elastomeric roofing membrane in Ballasted, and Fully Adhered roofing systems.

SPECIFICATIONS

Mule-Hide .045 and .060 Inch Thick Standard Black and FR EPDM Membranes.

Physical Properties	Test Method	Standards	Typical Values	
			.045	.060 FR
Tolerance on Nominal Thickness, %	ASTM D 412	± 10	± 10	± 10
Weight, lbm/ft ² (kg/m ²)			0.26 (1.3)	0.35 (1.7)
Tensile Strength, min, psi(Mpa)	ASTM D 412	1305 (9)	1550 (10.7)	1550 (10.7)
Elongation, Ultimate, min, %	ASTM D 412	300	480	480
Tear Strength, min, lbf/in (kN/m)	ASTM D 624 (Die C)	150 (26.3)	200 (35.0)	200 (35.0)
Factory Seam Strength, min.	ASTM D 816 (Modified)	Membrane Rupture	Membrane Rupture	Membrane Rupture
Resistance to Heat Aging* Properties after 4 weeks @ 240°F(116°C)	ASTM D 573			
Tensile Strength, min, psi(MPa)	ASTM D 412	1205(8.3)	1500(10.3)	1500(10.3)
Elongation, Ultimate, min, %	ASTM D 412	200	225	225
Tear Resistance, min, lbf/in(kN/m)	ASTM D 624	125(21.9)	215 (37.6)	215 (37.6)
Linear Dimensional Change, max, %	ASTM D 1204	± 1.0	-0.4	-0.4
Ozone Resistance* Conditions after exposure 100 pphm Ozone in air for 168 hrs @ 104°F(40°C) Specimen is at 50% strain	ASTM D 1149	No Cracks	No Cracks	No Cracks
Brittleness Temp., max, deg. F (deg.C)	ASTM D 746	-49 (-45)	-67 (-55)	-67 (-55)
Resistance to Water Absorption* After 7 days immersion @ 158°F (70°C), Change in mass, max, %	ASTM D 471	+8, -2	+2.0	+2.0
Water Vapor Permeability* MAX. perm mils	ASTM E 96 (Proc. B or BW)	0.10	0.05	0.05
Resistance to Outdoor (Ultraviolet) Weathering Xenon-Arc, 4000 hrs. exposure, 176°F (80°C) black panel temperature	ASTM G 155	No Cracks No Cracking	No Cracks No Cracking	No Cracks No Cracking
*Not a Quality Control Test due to the time required for the test or the complexity of the test. However, all tests run on a statistical basis to ensure overall long-term performance of the sheeting.				

Form # PDS-E-1A
Date 01/01/2007

MULE-HIDE PRODUCTS CO., INC.

P.O. Box 1057, Beloit, WI 53512-1057 • 608/365-3111 • Fax: 608/365-7852





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

Business/Regional Office # 5360 Workmen Mill Road, Whittier, California 90601 # (562) 699-0543
Regional Office # 900 Montclair Road, Suite A, Birmingham, Alabama 35213 # (205) 566-9800
Regional Office # 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 # (708) 799-2305

Legacy report on the 1997 *Uniform Building Code*™, the 2000 *International Building Code*® and the 2000 *International Residential Code*® (IRC)

DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07210—Building Insulation

STAR R FOAM EPS INSULATION BOARDS

STAR R FOAM MANUFACTURING, INC.
1012 NORTH COMMERCE STREET
FORT WORTH, TEXAS 76106

1.0 SUBJECT

Star R Foam EPS Insulation Boards.

2.0 DESCRIPTION

2.1 General:

Star R Foam Manufacturing, Inc., insulation boards are expanded polystyrene foam plastic boards for use as thermal insulation material for exterior walls, wall cavities, classified roof assemblies, structural sandwich panels, and the perimeter of foundations and basements. Boards are produced from beads (EPS resins) recognized in a current ICC-ES evaluation report and in the approved quality control manual, and have a maximum flame-spread index of 25 and a maximum smoke-developed index of 450 when tested in accordance with UBC Standard 8-1 and ASTM E 84. The boards comply with ASTM C 578-01. Three board types are recognized in this evaluation report:

2.1.1 Star R Foam EPS boards: Star R Foam EPS boards are molded closed-cell, expanded polystyrene foam plastic boards. Thermal resistance (*R*-values) for the different densities is shown in Table 1. The boards are available in various lengths and widths and in thicknesses up to 4 inches (102 mm) with square, shiplap, or tongue-and-groove edges.

2.1.2 Star R Foam EIFS Grade (SWG) Board: These boards have a minimum density of 0.90 pcf (14.4 kg/m³) and are used as a component in exterior insulation and finish systems (EIFS). The boards comply with special requirements unique to EIFS, such as physical properties, conditioning, product dimensions, and labeling, in accordance with the ICC-ES Interim Criteria for Exterior Insulation and Finish Systems (AC24). The 4-inch-thick (102 mm) boards have a potential heat content no greater than 6,000 Btu per square foot (68.2 MJ/m²) when tested in accordance with UBC Standard 26-1 or NFPA 259-98. The boards are available in various lengths and widths and in thicknesses up to 4 inches (102 mm) with square, shiplap, or tongue-and-groove edges.

2.1.3 Star R One-coat Stucco Board: Star R One-coat Stucco boards are maximum 1 1/2-inch thick (25.4 mm), nominal 1.5 pcf (24 kg/m³) density, EPS insulation boards with square, shiplap or tongue-and-groove edges. The boards are available in various lengths and widths. The boards are permitted to be used in one-coat cementitious exterior wall coating systems recognized in an evaluation report in which a generic ASTM C 578-01, Type I or II, polystyrene insulation is specified.

2.2 Uses

2.2.1 General: Star R Foam EPS insulation boards recognized in this evaluation report are permitted to be used as a general, nonstructural, thermal insulation material. Other permitted uses include installation on exterior walls; in wall cavities; as a component of an approved roof assembly, sandwich panel, or door; and at the perimeter of foundations and basements.

Star R Foam insulation boards applied to exterior faces of walls are limited to a maximum thickness of 1 1/2 inches (38 mm), except the thickness is permitted to be greater than 1 1/2 inches (38 mm) if such installation is specifically recognized in an evaluation report for the exterior wall covering. Insulation is not permitted to be used as a nailing base for finish materials or wall covering materials.

The Star R One-coat Stucco insulation boards are permitted to be used in one-coat cementitious exterior wall coating systems recognized in an evaluation report in which a generic ASTM C 578-01, Type I or Type II, polystyrene board is specified.

The Star R Foam EIFS Grade (SWG) insulation boards are permitted to be used in exterior insulation and finish wall systems recognized for noncombustible construction in an evaluation report in which a generic ASTM C 578-01, Type I or Type II, polystyrene board is specified.

The Star R Foam EPS insulation boards are permitted to be used in roof-covering assemblies when specifically recognized in the current ICC-ES report for the roof-covering system. The evaluation report for the roof-covering material must recognize the foam plastic insulation as part of a tested Class A, B or C roof assembly under UBC Standard 15-2 or UL 790-98. Additionally, the Star R Foam insulation boards must be separated from the interior of the building as set forth in Section 2602.5.3 of the 1997 *Uniform Building Code*™ (UBC), Section 2603.4.1.5 of the 2000 *International Building Code*® (IBC), or Section R318.2.2 of the 2000 *International Residential Code*® (IRC), or the equivalent.

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 building or other action in this report, or as to any product covered by the report.



The Star R Foam EPS insulation boards are permitted to be used in doors in accordance with Section 2602.5.4 of the UBC; Sections 2603.4.1.7 and 2603.4.1.8 of the IBC; or Section R318.2.4 of the IRC.

2.2.2 Special Uses—Crawl Spaces and Attics: Maximum 1-inch-thick (25.4 mm) Star R Foam insulation boards, manufactured from Huntsman or Styrochem EPS resins (evaluation reports ER-5703 and ER-5687, respectively), with tongue-and-groove edges, are permitted to be installed on the interior face of exterior walls of attics and crawl spaces without a thermal barrier separating the attic or crawl space from the foam plastic, provided the following conditions are met:

1. Entry to the attic or crawl space is only for the servicing of utilities.
2. There are no interconnected basement or attic areas.
3. Air in the attic or crawl space is not circulated to other parts of the building.
4. The foam plastic does not exceed a 1-inch (25.4 mm) thickness.
5. Attic ventilation is provided in accordance with Section 1505.3 of the UBC; Section 1202.2 of the IBC; or Section R606 of the IRC.
6. Underfloor air is provided in accordance with Section 2306.7 of the UBC; Section 1202.4 of the IBC or Section R406 of the IRC.
7. Combustion air complying with Sections 701 and 703.1 of the 1997 ICBO *Uniform Mechanical Code*, or Sections 701 and 703.1 of the *International Mechanical Code*[®], is provided.
8. Installation is limited to combustible construction.
9. Insulation boards are labeled as noted in Section 2.5, item 2, of this report.

2.3 Installation:

The interior of the building must be separated from the insulation boards recognized in this evaluation report with an approved thermal barrier as required in Section 2602.4 of the UBC, Section 2603.4 of the IBC, or Section R318.2 of the IRC, except as described in Sections 2.2.2 of this evaluation report. The building official may require a vapor barrier.

Fasteners used to attach conventional wood, metal or plastic siding through insulation not exceeding a 1½-inch thickness, must have sufficient length to penetrate 1 inch (25.4 mm) into structural wood framing or protrude through structural sheathing or structural steel framing beneath. Attachment must comply with a current evaluation report for proprietary wall covering materials, or with the UBC, IBC, or IRC for conventional wall-covering materials.

Wall covering over the insulation must be structurally adequate to resist the required horizontal forces perpendicular to the wall. All walls must be braced in accordance with Section 2320.11.3 or 2320.11.4 of the UBC; Section 2306.9.3 of the IBC; or Section R602.10 of the IRC.

When the insulation boards are applied over open framing, vertical butt joints must be over framing members. Vertical tongue-and-groove joints need not be over framing members, provided joints are staggered a minimum of one stud space from adjacent courses. For cementitious exterior wall coating systems, unbacked joints are permitted only when specified

in the evaluation report on the cementitious exterior wall coating system.

2.4 Identification:

The insulation boards are packaged in bundles, and the packaging is labeled with the name Star R Foam Manufacturing, Inc., and the address of the manufacturer (Fort Worth, Texas; Anthony, Texas; North Las Vegas, Nevada); the date of manufacture; the evaluation report number (ER-5315); the density; the name of the quality control agency (RADCO); the flame spread rating; and the thermal-resistance rating.

In addition to the labeling noted above, the following additional labeling is required:

1. Type II tongue-and-groove insulation boards are individually identified with the board type and density, the Star R Foam name, the evaluation report number (ER-5315) and the name of the quality control agency (RADCO).
2. Labeling on insulation boards to be used in attics and crawl spaces in accordance with Section 2.2.2 must also bear the name "Huntsman" or "StyroChem."
3. Star R Foam EIFS Grade (SWG) insulation boards intended for use on walls required to be of noncombustible construction are further identified along one edge, and on both faces of one board from each insulation package, with the name of the exterior coating (EIFS) company and the EIFS company's ICC-ES evaluation report number.

3.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Interim Criteria for Foam Plastic Insulation (AC12), dated July 2002; reports of room-corner fire tests in accordance with UBC Standard 26-3; reports on ASTM C 578-01; and a quality control manual.

4.0 FINDINGS

That the Star R Foam EPS Insulation Boards described in this report comply with the 1997 *Uniform Building Code*[™] (UBC), the 2000 *International Building Code*[®] (IBC) and the 2000 *International Residential Code*[®] (IRC), subject to the following conditions:

- 4.1 The boards are installed in accordance with the applicable code and this report.
- 4.2 The interior of the building must be separated from the insulation boards with an approved thermal barrier, such as ½-inch-thick (12.7 mm) regular gypsum wallboard installed in accordance with the applicable code, except as noted in Section 2.2.2.
- 4.3 A vapor barrier may be required by the building official.
- 4.4 The foam plastic boards are produced, under a quality control program with inspections by RADCO (AA-650), at one of the following locations:
 - Anthony, Texas
 - Fort Worth, Texas
 - North Las Vegas, Nevada

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





1315 N. 13th Street
Rogers, AR 72756

Phone: (800) 803-5189
Fax: (479) 636-5810

Email: info@biobased.net
Website: www.biobased.net

Product Specification - BioBased 2000 NB Spray Foam

A. Product

BioBased 2000 NB 2.0 lb/ft³ spray foam polyurethane closed cell insulation formulated with HFC-245fa as the blowing agent.

B. Product Description

BioBased 2000 NB spray foam insulation is a two-part product installed by Certified Dealers using custom designed application equipment. When installed, *BioBased 2000 NB* expands to completely fill all voids to effectively seal against air infiltration—often the major source of heat/cooling loss. *BioBased 2000 NB* also provides superior thermal and structural performance when compared to other insulation products. *BioBased 2000 NB* provides superior thermal and structural performance in conventional construction when compared to other insulation products, but is especially effective in steel framed structures, metal buildings, and older homes.

BioBased 2000 NB is applied by spraying liquid chemical components onto open wall, ceiling, and floor surfaces; or into wall and other cavities. When applied, the components quickly expand to make a foam layer of millions of air pockets—covering surfaces and filling cracks and voids. The foam adheres to almost all surfaces, and when cured can be trimmed off to provide a surface that is ready for drywall or other finishing.

C. Foam Physical Properties (ICC Acceptance Criteria)

International Code Council (ICC) Acceptance Criteria (AC12) Testing Requirements for Structural Foam	Required Test Results	BBS 2000NB Test Results
Thermal Resistance at 75°F (24°C) mean temperature: • ASTM C518	As reported	6.3 R (resistivity) per inch of thickness
Core Density: • ASTM D1622	1.5 – 3.0 lb/ft ³ (pounds per cubic foot)	2.0 lb/ft ³
Tensile Strength: • ASTM D1623	15 lb/in ² minimum (pounds per square inch)	50 lb/in ²
Dimensional Stability: • ASTM D2126	15% maximum total change	10%
Surface Burning Characteristics: • International Building Code (IBC) ASTM E84	75 or less flamespread index 450 or less smoke developed index	25 flamespread index 400 smoke developed index
Compressive Strength: • ASTM D1621	15 lb/in ² minimum (pounds per square inch)	25 lb/in ²

D. Additional Physical Properties

SHEAR STRENGTH

- Test Standard..... ASTM C273
- Strength in pounds per square inch.....45

CLOSED CELL CONTENT

- Test Standard..... ASTM D1940
- Percentage.....93

WATER ABSORPTION

- Test Standard..... ASTM D2642
- Rate in grams per cm³ of insulation.....0.020

WATER PERMEABILITY

- Test Standard..... ASTM E96
- Perms per inch.....0.94

VISCOSITY

- 'A' Component..... 200 cps
- 'B' Component..... 600 ±200 cps

SPECIFIC GRAVITY AT 70°F

- 'A' Component..... 1.24
- 'B' Component..... 1.24





E. Containers

A set of chemicals for *BioBased 2000 NB* spray foam insulation consists of one (1) 55 gallon drum each of 'A' component and 'B' component. The shipping weight for each set is 1090 lbs.

F. Storage and Handling

Refer to component MSDS's before handling or storing this product. All materials should be stored in their original containers and away from heat and moisture - especially after the seals have been broken and the containers opened. Both components should be stored indoors at a temperature between 50°F and 75°F. Temperatures above 75°F may decrease the standard shelf life of 6 months. Containers should be opened carefully to allow any pressure buildup to be vented safely. Extensive venting of the 'B' component may result in higher density foam and reduced yield. Component temperatures below 50°F increases the viscosity of the components.

For further information, refer to "*MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal*" (publication AX-119) published by *Alliance for the Polyurethanes Industry*, 1300 Wilson Blvd., Suite 800, Arlington, VA 22209.

G. Installation

BioBased 2000 NB must be installed only by certified technicians specializing in the installation of spray foam and who are fully familiar with the MSDS's, product labels, and all related safety and handling instructions.

BioBased 2000 NB is a fast reacting 2.0 lb/ft³ density spray foam system designed to be processed on substrates that are clean, dry, and free of moisture or frost. All metal substrates must be free of oil and grease, and should be properly primed.

Refer to "*Application Bulletin - BioBased 2000 NB Spray Foam*" for installation information.

General applications include structural reinforcement, insulation, recreation and transportation industries.

BioBased 2000 NB is not recommended for use as roofing, or for any application that requires compressive strengths greater than 25 psi.

The above data should only be used as a guide since the actual foam properties are influenced by the efficiency of the spray gun, component temperatures, foam thicknesses, and ambient conditions. While the above technical information is based on results of actual tests, it should only be used as a guideline for typical chemical and physical properties. The user must test and qualify the product. Final determination of suitability is the responsibility of the user.

BioBased Systems warrants that the physical properties of *BioBased 2000 NB* meet or exceed the numbers listed in the technical data, and that they have been verified through testing by independent laboratories. Further testing and product development is ongoing and those results will be listed in the most current specification literature.

H. Installation Specifications

Description	'A' Comp.	'B' Comp
Mixing Ratio	50%	50%
Block Heater Temperature	110°F	120–130°F
Hose Temperature	110–130°F	110–130°F
Drum Temperature	70°F	70°F

Description	Regular Blend	Winter Blend
Cream Time	2 seconds	1 second
Tack Free Time	on rise	on rise
Cure Time	4 hours	4 hours
Substrate Temp.	60°–120°F	40°–80°F

Please contact *BioBased Systems* for building science information for your particular application.

I. Warranty

BioBased Systems warrants that *BioBased 2000 NB* spray foam insulation, when installed according to *BioBased Systems* certified installation instructions and by a *BioBased Systems* Certified Dealer, will perform as indicated in the current product specification sheet.

J. Technical Support

BioBased Systems Certified Dealers and *BioBased Systems, LLC* both provide information for technical and regulatory issues. Architectural specifications in CSI three-part format are available upon request.

For safety, health, and toxicity information, refer to the *Material Safety Data Sheets* (MSDS) for this product.

K. Disclaimers

- *BioBased Systems, LLC* does not endorse open combustion appliances located in atticspaces.
- *BioBased 2000 NB* must be separated from living areas by a 15 minute thermal barrier.
- For proper use of this insulating material, refer to *BioBased Systems* application information and any of the following codes or guides:
 - ICC, International Building Code, Section 2603
 - ICC, International Building Code, Section R314
 - API publication AX-230: *Fire and Safety Guidelines for Use of Rigid Polyurethane and Polyisocyanurate Foam Insulation in Building Construction.*



Filing Category: ROOF, WALL AND FLOOR PANELS—Sandwich Panels**PRECISION PANEL BUILDING PANELS**

PRECISION PANEL STRUCTURES, INC.
1447 EAST STATE STREET
EAGLE, IDAHO 83616

1.0 SUBJECT

Precision Panel Building Panels.

2.0 DESCRIPTION**2.1 General:**

Precision Panel building panels are factory-assembled sandwich panels consisting of oriented strand board (OSB) facings with expanded polystyrene cores. The panels are for use as bearing walls and as roof and floor panels.

2.2 Materials:

2.2.1 Panel Core: The core material is expanded polystyrene (EPS) foam plastic, having a thickness ranging from $3\frac{5}{8}$ to $11\frac{3}{8}$ inches (92 to 289 mm). The EPS core has a nominal density of 1.0 pcf (16.02 kg/m³) and a minimum density of 0.95 pcf (15.22 kg/m³); and is recognized in an ICBO ES evaluation report as complying with ASTM C 578, Type I, as specified in the quality control manual. Use of roof or floor panels having a foam plastic core up to $11\frac{3}{8}$ inches (289 mm) thick and use of wall panels having a foam plastic core up to $5\frac{5}{8}$ inches (143 mm) thick are based on successful completion of room fire tests for interior of foam plastic systems in accordance with UBC Standard 26-3.

2.2.2 Panel Facings: Facing material is minimum $\frac{7}{16}$ -inch-thick (11.1 mm) OSB conforming with Structural I, Exposure 1, performance-rated panel requirements specified in UBC Standard 23-3 and the quality control manual.

2.2.3 Adhesive: The facing material is factory-bonded to the core material using a Type II, Class 2, adhesive described in the approved quality control manual.

2.2.4 Splines: Splines are either nominal 2-inch-thick (51 mm) solid-sawn stud-grade spruce-pine-fir or equivalent lumber having a depth equal to the panel core thickness, or surface splines consisting of 3-inch-wide (76 mm), $\frac{7}{16}$ -inch-thick OSB (Structural I, Exposure 1). Splines for panels used in shear walls must be surface splines. See Figures 1 through 16 for details.

2.3 Installation:

The panels are connected to each other with wood splines or with surface splines. Both types of splines are fastened to panels with either 8d box or common nails, spaced a maximum of 6 inches (152 mm) on center, or with an

approved fastening system justified to provide equivalent or higher shear and withdrawal properties. Top and bottom wall plates are dimensional lumber of minimum stud-grade spruce-pine-fir, sized to match the core thickness and fastened to the panel facings with 8d box or common nails, spaced at a maximum of 6 inches (152 mm) on center, or approved equivalent. Sill plates must be pressure-treated for decay resistance where required by the 1997 *Uniform Building Code*™ (UBC).

Panels used in shear walls must have surface splines, as described in Section 2.2.4 of this report, at vertical splice locations. Splines are fastened to panels with $2\frac{1}{2}$ -inch-long (64 mm), 8d common nails spaced a maximum of 6 inches (152 mm) on center. For panels used as shear walls, top and bottom plates are dimensional lumber of minimum No. 2 Douglas fir, sized to match the core thickness and fastened to the panel facings with 8d common nails spaced at a maximum of 6 inches (152 mm) on center.

Figures 1 through 16 of this evaluation report show typical installation details. Structural calculations justifying load-transfer connections must be provided to the building official for approval. Panels and their attachments must be inspected by the building official prior to their being covered with an approved weather-resistive barrier or underlayment.

2.4 Allowable Loads:

Table 1 shows allowable transverse loads; Table 2 shows allowable axial loads; and Table 3 shows allowable racking shear loads. Where loading conditions result in panels resisting combined axial and flexural stresses, the sum of the ratios of actual loads over allowable loads must not exceed 1. Openings (headers and supporting framing) must be accomplished by conventional framing methods designed in accordance with the UBC, and are not evaluated in this report.

2.5 Thermal Barrier:

The interior of the building must be protected from the foam plastic core of the sandwich panels with an approved thermal barrier, such as $\frac{1}{2}$ -inch-thick (12.7 mm) regular gypsum wallboard, complying with ASTM C 36. The gypsum wallboard must be installed on the interior face of the wall or roof panels, and on the underside of floor panels having occupied space beneath. The gypsum wallboard must be installed with the longitudinal edge of the wallboard perpendicular to the longitudinal edges of the panels, and attached to the OSB facings of the panels with No. 6, Type S, $1\frac{1}{4}$ -inch-long (31.7 mm) buglehead screws spaced 8 inches (203 mm) on center along the perimeter of the gypsum wallboard into the splines and plates; and spaced 12 inches (305 mm) on center vertically and horizontally in the field of the gypsum wallboard.

ES 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 ICBO 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.



2.6 Panel Cladding:

2.6.1 Roof Covering: The roof covering must comply with Chapter 15 of the UBC, except that roofs with hot-asphalt or hot-coal-tar pitch require mechanical attachment of a base ply prior to their application. Fasteners must have sufficient length to penetrate through the top panel facing. Underlayments and flashing are installed in accordance with the UBC or a current ICBO ES evaluation report.

2.6.2 Exterior Wall Covering: Exterior wall coverings may be any recognized in the UBC or a current ICBO ES evaluation report. A weather-resistive barrier over the exterior panel face is required in accordance with Section 1402 of the UBC, prior to application of the wall covering. Where portland cement plaster is used, compliance with Section 2506.4 of the UBC is necessary.

2.7 Identification:

The panels bear a stamp on the panel facings noting the product name; the name and address of the manufacturer (Precision Panel Structures, Inc., Eagle, Idaho); the evaluation report number (ICBO ES PFC-6054); and the name or logo of the quality control agency (PFS Corporation).

3.0 EVIDENCE SUBMITTED

Data in accordance with the ICBO ES Acceptance Criteria for Sandwich Panels (AC04), dated July 2001; reports of room corner fire tests in accordance with UBC Standard 26-3; and a quality control manual.

4.0 FINDINGS

That the Precision Panel Building Panels described in this report comply with the 1997 *Uniform Building Code*™ (UBC), subject to the following conditions:

- 4.1 Panels are erected in accordance with this report and the manufacturer's published instructions.**
- 4.2 Remaining portions of the structure are designed and constructed in accordance with the UBC.**
- 4.3 Structural calculations, plans and details are submitted to the building official for each project.**
- 4.4 Panel connections, other than panel-to-panel, are beyond the scope of this report.**
- 4.5 Panels are limited to allowable capacities noted in this report.**
- 4.6 All floor-to-wall and roof-to-wall details are designed such that gravity loads are applied and are in full contact over the entire wall panel thickness, including facings.**
- 4.7 Panel cores are separated from the building interior by a thermal barrier installed in accordance with Section 2.5 of this evaluation report.**
- 4.8 Panels are limited to use in Type V-N construction and Group R, Divisions 1 and 3, Occupancies.**
- 4.9 The panels and their connections are inspected and approved by the building official prior to covering with approved wall, roof or floor coverings.**
- 4.10 Panels are fabricated by Precision Panel Structures, Inc., in Eagle, Idaho; under a quality control program with inspections conducted by PFS Corporation (AA-652).**

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



TABLE 1—ALLOWABLE TRANSVERSE LOADS^{1,2,3,4} (psf)

PANEL SPAN (feet)	PANEL THICKNESS (inches)			
	6 ¹ / ₂		12 ¹ / ₄	
	Roof/Floor	Wall	Roof/Floor	Wall
8	102	36	109	38
10	82	29	109	38
12	67	24	109	38
14	46	20	80	28
16	32	18	49	17
18	25	16	49	17
20	17	14	39	14

For SI: 1 inch = 25.4 mm, 1 foot = 304.8, 1 psf = 6.894 kPa.

¹Allowable loads are based on tests, using the lower of ultimate load divided by 3 or the load at which deflection of L/180 is reached, and are based on minimum 3-inch bearing length.

²Interpolation of intermediate values is not allowed.

³Values are applicable to panels installed with either of the splines described in Section 2.2.4 of this report.

⁴The allowable transverse loads are the total dead and live load exclusive of the panel weight.

TABLE 2—ALLOWABLE AXIAL LOADS^{1,2} (plf)

PANEL HEIGHT (feet)	PANEL THICKNESS (inches)	
	4 ¹ / ₂	6 ¹ / ₂ to 12 ¹ / ₄
8	830	825
16	—	825
20	—	825

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 plf = 14.6 N/m.

¹Allowable loads are based on tests, using the ultimate load divided by 3.

²Values are applicable to panels installed with any of the splines described in Section 2.2.4 of this report.

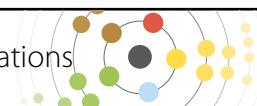
TABLE 3—ALLOWABLE SHEARWALL RACKING LOADS^{1,2} (plf)

PANEL THICKNESS (inches)	ALLOWABLE RACKING LOAD (plf)
4 ¹ / ₂	170
6 ¹ / ₂ to 12 ¹ / ₄	155

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 plf = 14.6 N/m.

¹Maximum panel height-to-width ratio is 1:1.

²Values are applicable to panels installed with the surface splines described in Section 2.2.4 of this report and installed per Section 2.3 of this report for shear walls.





pioneering insulated panel technology



about us products gallery availability pricing and library press releases contact

Commercial & Industrial Panels

other products

CF Architectural Wall Panel: Material Specifications

- Colors
- Load Span Tables
- R-Values
- Material Specs
- Joints
- Guide Specs
- Bid Request
- Product Info Request

Exterior Profile: Architectural flat with flush side joints for high profile projects.

Interior Profile: Mesa Wave pattern, 1/8" deep.

Core: Foamed-in-place, Blister-Free, Non-CFC polyurethane, Factory Mutual Class 1 approval.

Module Width: 24", 30", 36"

Panel Thickness: 2", 2-1/2", 3", 4"

Lengths: 8'-0" to 32'-0"

Exterior Facings: Stucco embossed G-90 galvanized and/or aluminum-zinc coated steel in 24 Ga. and 22 Ga.

Interior Facings: Mesa profile, stucco embossed G-90 galvanized and/or aluminum-zinc coated steel in 26 Ga., 24 Ga., 22 Ga., and Type 304 stainless steel in 26 Ga. unpainted.

Finishes: Full-strength fluoropolymer PVF², siliconized polyester and Polar White 4.0 mil thick PVC plastisol.

Colors: Twenty-one available exterior colors in full strength fluoropolymer PVF²; Polar White, Sandstone, Regal Gray, Desert Beige, Cool Sculpture Bronze, Aegean Blue, Brick Red, Cool Forest Green, Cool Marine Green, Cool Zinc Gray, Cool Bright Red, Cool Parchment, Tahoe Blue, Terra-Cotta, Regal Blue, Leaf Green, Hemlock Green, Jade Green, Cool Copper Penny, Cool Metallic Silver, and Cool Metallic Champagne. Three standard exterior colors in siliconized polyester; Polar White, Sandstone and Regal Gray. Interior color and coating is USDA compliant Igloo White.

Joint: Offset double tongue and groove with extended metal shelf for positive face fastening.

Fastening: Wafer head fastener and clip concealed in the side joint.



site map

© 2006 Metl-Span



DuPont™ Tyvek® HomeWrap®

PHYSICAL PROPERTIES DATA SHEET

PROPERTIES	METHOD	DUPONT™ TYVEK® HOMEWRAP®
Air Penetration Resistance	ASTM E2178 (cfm/ft²@1.57 psf)	.007
	Gurley Hill (TAPPI T-460) (sec/100cc)	300
	ASTM E1677	Type 1
Water Vapor Transmission	ASTM E96-05 Method A (g/m²·24 hrs) (perms)	400 56
	Method B (g/m²·24 hrs) (perms)	370 54
Water Penetration Resistance	ATTCC 127 (cm)	210
Basis Weight	TAPPI T-410 (oz/yd²)	1.8
Breaking Strength	ASTM D882 (lbs/in)	30/30
Tear Resistance (Trapezoid)	ASTM D1117 (lbs)	6/6
Surface Burning Characteristics	ASTM E84 Flame Spread Index	10 Class A
	Smoke Developed Index	35 Class A
Ultra Violet Light Exposure (UV)		120 days (4 months)

These values represent roll averages. Individual roll results may differ due to normal manufacturing variations.

For more information about DuPont™
Tyvek® Weatherization Systems, please
call 1-800-44-Tyvek or visit us at
www.Construction.Tyvek.com

WARNING: DuPont™ Tyvek® is combustible and
should be protected from a flame and other high heat
sources. If the temperature of DuPont™ Tyvek®
reaches 750 °F (400 °C), it will burn and the fire may
spread and fall away from the point of ignition.



The miracles of science™

DuPont™
Tyvek®
HomeWrap®

Copyright © 2007 E.I. du Pont de Nemours and Company. All rights reserved. The DuPont Oval Logo, DuPont™, The miracles of science™, Tyvek® and HomeWrap® are registered trademarks or trademarks of E.I. du Pont de Nemours and Company or its affiliates. K-05031 04/07



IN-SWINGING TILT'N TURN DOOR ASSEMBLY

PRODUCT

Shall be 301 Series, In-swinging, Tilt'N Turn Door Assemblies, as manufactured by Inline Fiberglass Limited. Frames are 60 mm (2- 3/8") deep and in compliance with [CSA-A440.1A3, B7, C5, F2, and CSA_A440.2], [AAMA 101/I.S.2 Rating C60.]

MATERIAL

All Frame and sash profiles are made from pultruded fiberglass, having a nominal wall thickness of 2.5mm (0.100") with minimum glass content of 60%. Non-structural accessory members are permitted to be vinyl or aluminum and identified as such.

CONSTRUCTION

Frame and sash corners are connected with molded reinforced polymer shearblocks and mechanically secured. Joints are factory sealed and neatly fitted together.

FINISH

All exposed surfaces are coated with durable, Isocyanate-free, 2-part Polymer enamel with a minimum dry film thickness of 1 mil with a medium gloss of 25-40. Finish shall not blister, crack or peel under normal atmospheric conditions. Standard colours are: White, Ivory, Sandalwood, Commercial Brown, and Forest Green. (Custom colours and split frame painting are available.)

HARDWARE

Full range of in-swing and Tilt N'Turn fittings (as manufactured by SIEGENIA) comprising interior butt hinges, single operating handle options and universal interlocked components with lock spacing adaptable to sash size.

WEATHER-STRIPPING

Santoprene Bulb-type gasket on interior and exterior with pressure equalizing gap at the exterior header.

GLASS

All windows are glazed with 22mm (7/8") insulating glass units. Glass thickness shall be in accordance with applicable Building Codes, but not less than 3mm (1/8"). Inline recommends the use of double-sealed insulating glass units certified by IGMAC or SIGMA. The full range of glazing options available include: colonial grilles, low conductivity spacers, inert gas fills, and glazings to reduce heat loss, solar heat gain and visible light transmission.

GLAZING METHOD

Laid-in fixed glazing using polyethylene closed cell adhesive tape on the exterior and a PVC glass stop locked-in from the interior provides a secure and positive seal for the glass.

INSTALLATION

Shall be performed by experienced installers in accordance with manufacturer's instructions and CSA_A440.4. Window shall be plumb and square after installation is complete and sealed to both interior and exterior walls with a high quality sealant around the perimeter of the frame. If perimeter cavity is to be foamed, additional anchorage may be required to prevent bowing. It shall be the responsibility of the installers to make all necessary final adjustments to ensure normal and smooth operation.

MAINTENANCE

Occasional cleaning of glass and frame components with non-abrasive detergent is recommended.

* Due to constant product improvements, Inline reserves the right to change information herein without notice.



SLIDING GLASS DOORS

PRODUCT

Shall be 600 Series Fiberglass Sliding Door as manufactured by Inline Fiberglass Limited. Frames are 145mm (5-3/4") deep and comprise an interior operating panel and an exterior fixed panel. Sliding Glass Doors shall be in compliance with [CAN/CGSB-82.1- M-3, B4, C3 and CSA-A440.2 Standards], [AAMA 101/I.S.2, Rating-R40.]

MATERIALS

All frame and sash profiles are made from pultruded fiberglass having a nominal wall thickness of 2.3mm (0.090"). Non-structural accessory members are permitted to be vinyl or aluminum and identified as such.

CONSTRUCTION

Frame and panel corners are connected with metal or molded reinforced polymer components and mechanically secured. Joints are factory sealed and neatly fitted together. The perimeter of open-back frames shall be filled with insulation.

HARDWARE

The sliding panel and fly screen are equipped with two adjustable, double, tandem rollers by TRUTH fitted with nylon wheels for silent operation. Locking handle is an attractive, die-cast zinc assembly with double hook. Frame sill member shall include stainless steel track liners. Door travel limit bumpers shall be provided at head and sill of jambs, for fully open and closed positions as well as anti-lift blocking to provide resistance to forced entry. A sill mounted foot lock by TRUTH and/or a cylinder lock, is available as an option.

FINISH

All exposed surfaces are coated with a durable, Isocynate, 2 part Polymer enamel with a minimum dry film thickness of 1 mil with a medium gloss of 25-40. Finish shall not blister, crack or peel under normal atmospheric conditions. Standard colours are: White, and Commercial Brown. (Custom colours and split frame painting are available).

WEATHER-STRIPPING

Double line of silicone coated woven pile with integral fin at interior to provide air and vapor seal.

GLASS

Operating and Fixed Panels are glazed with standard 22mm (1-7/16") for triple glazing, insulating glass units comprising safety glass components. Glass thickness shall be in accordance with applicable Building Codes, but not less than 3mm (1/8"). Inline recommends the use of double-sealed insulating glass units certified by IGMAC or SIGMA. The full range of glazing options available include: colonial grilles, low conductivity spacers, inert gas fills, and glazings to reduce heat loss, solar heat gain, and visible light transmission.

GLAZING METHOD

The fixed and operating sashes utilizes Laid-in fixed glazing using polyethylene closed cell tape on the exterior and a PVC glass stop locked in from the interior provides a secure and positive seal for the glass.

INSECT SCREENS

A heavy-duty extruded frame with Fiberglass mesh provides Standard Duty performance.

INSTALLATION

Shall be performed by experienced installers in accordance with manufacturer's instructions and CSA-A440.4. Window shall be plumb and square after installation is complete and sealed to both interior and exterior walls with a high sealant around the perimeter of the frame. If perimeter cavity is to be foamed, additional anchorage may be required to prevent bowing. It shall be the responsibility of the installers to make all necessary final adjustments to ensure normal and smooth operation.

MAINTENANCE

It is recommended that the glass and the frame components be cleaned occasionally with a non-abrasive detergent solution. An occasional coating with silicone spray of the internal weather-strips and areas indicated on the maintenance sheet will promote smoother operation.

* Due to constant product improvements, Inline reserves the right to change information herein without notice.



SINGLE SASH HORIZONTAL SLIDING WINDOW

PRODUCT

Shall be 800 Series Fiberglass [Single-Sash, Horizontal Sliding], [Fixed Lite] window Assemblies, as manufactured by INLINE FIBERGLASS Limited. Frames are 82.5mm (3-1/4") deep and in compliance with [CSA-440.1 A3, B7, C5 and CSA-A440.2 Standards], [AAMA 101/I.S.2 Rating R85.]

MATERIAL

All frame and sash profiles are made from pultruded fiberglass, having a nominal wall thickness of 2.3mm (0.090") with minimum glass content of 60%. Non-structural accessory members may be vinyl or aluminum and identified as such.

CONSTRUCTION

Frame and sash corners are connected with molded reinforced polymer components and mechanically secured. Joints are factory sealed and neatly fitted together. Slider frame and sash is pressure equalized and drains to exteriors.

FINISH

All exposed surfaces are coated with durable, Isocynate-free, 2 part Polymer enamel with a minimum dry film thickness of 1 mil with a medium gloss of 25-40. Finish shall not blister, crack or peel under normal atmospheric conditions. Standard colours are: White, Ivory, Sandalwood, Commercial Brown, and Forest Green. (Custom colours and split frame painting are available.)

HARDWARE

Locks: One or two sets of die-cast cam locks with release latch and keepers, molded celcon riding blocks, extruded PVC bumpers and pull handles. Sash opening restrictors are optional extra.

WEATHER-STRIPPING

Rain screen includes Q-Lon on the sash exterior and pile weather-strip at the mullion. Air barrier at the interior includes fin seal and fin type dust plugs, which ensure weather tightness.

GLASS

All windows are glazed with 20mm (13/16") insulating glass units. Glass thickness shall be in accordance with applicable Building Codes, but not less than 3mm (1/8"). Inline recommends the use of double-sealed insulating glass units certified by IGMAC or SIGMA. The full range of glazing options are available including: colonial grilles, low conductivity spacers, inert gas fills, and glazings to reduce heat loss, solar heat gain, and visible light transmission.

GLAZING METHOD

Laid-in fixed glazing using polyethylene closed cell adhesive tape on the interior and a PVC glass stop locked-in from the exterior provides a secure and positive seal for the glass. Fiberglass stops are optional.

INSECT SCREENS

Roll-formed aluminum frame with friction fit corner keys. Screen mesh (Fiberglass or Aluminum) retained by vinyl spline.

INSTALLATION

Shall be performed by experienced installers in accordance with manufacturer's instructions and CSA-A440.4. Window shall be plumb and square after installation is complete and sealed to both interior and exterior walls with a high quality sealant around the perimeter of the frame. If perimeter cavity is to be foamed, additional anchorage may be required to prevent bowing. It shall be the responsibility of the installers to make all necessary final adjustments to ensure normal and smooth operation.

MAINTENANCE

Occasional cleaning of glass and frame components with non-abrasive detergent is recommended.

* Due to constant product improvements, Inline reserves the right to change information herein without notice.



CASEMENT, AWNING and FIXED WINDOWS (OPEN-OUT)

PRODUCT

Shall be 325 Series [Casement], [Awning], [Fixed] Window assemblies, as manufactured by INLINE FIBERGLASS Limited. Frames are 82.5mm (3-1/4") deep and in compliance with [CAN/CSA-A440.1 A3, B7, C4, and CSA-A440.2], [AAMA 101/I.S.2, Rating HC- 55.]

MATERIALS

All frame and sash profiles are made from Pultruded Fiberglass, having nominal wall thickness of 2.3mm (0.090") with minimum glass content of 60%. Non-structural accessory members are permitted to be in vinyl or aluminum and are identified as such.

FINISH

The exposed surfaces are coated with durable Isocyanate-free, 2 part Polymer Enamel with a minimum dry film thickness of 1 mil with a medium gloss of 25-40. Finish shall not blister, crack or peel under normal atmospheric conditions. Standard colours are White, Ivory, Sandalwood, Commercial Brown, and Forest Green. (Custom colours and split frame painting are available).

HARDWARE

Concealed Stainless Steel Hinges, E-Gard Roto Gear Operators. [multi-point locks, metal cams by "TRUTH HARDWARE". Hardware is fastened into patented reinforcements.

WEATHER-STRIPPING

Q-Lon air-seal gasket on interior with Santoprene bulb-type "rain screen" gasket on the exterior to provide double weather barrier.

GLASS

All windows are glazed with 7/8" (22mm), 1-3/8" (35mm) for triple glazed glass units. Glass thickness shall be in accordance with applicable Building Codes, but not less than 3mm (1/8"). Inline recommends the use of double-sealed insulating glass units certified by IGMAC or SIGMA. The full range of glazing options available include: colonial grilles, low conductivity spacers, inert gas fills, and glazings to reduce heat loss, solar heat gain and visible light transmission.

GLAZING METHOD

Laid-in fixed glazing using polyethylene closed cell tape or shimmed butyl tape on the exterior and [Aluminum] [PVC] glass stop locked-in from the interior provides a secure and positive seal for the glass.

INSECT SCREENS

Roll-formed aluminum frame with friction fit corner keys. Screen mesh (Fiberglass or Aluminum) is held in place by a spline. Screens are mounted on the interior of operating windows and are removable. Rated Heavy Duty.

INSTALLATION

Shall be performed by experienced installers in accordance with manufacturer's instructions and CSA_A440.4. Window shall be plumb and square after installation is complete and sealed to both interior and exterior wall with a high quality sealant around the perimeter of the frame. If perimeter cavity is to be foamed, additional anchorage may be required to prevent bowing. It shall be the responsibility of the installers to make all necessary final adjustments to ensure normal and smooth operation.

MAINTENANCE

Occasional cleaning of glass and frame components with non-abrasive detergent is recommended.

* Due to constant product improvements, Inline reserves the right to change information herein without notice.





Front and Rear Entry Doors

To be built from premanufactured solid or insulated wood door.





Hardwood Flooring

3/4" mesquite strip flooring provided by texas kiln products



Aqua Resin Wood (stain)

BioShield Aqua Resin Stain Finish is a solvent-free water-based, Zero VOC, low-drip, resilient wood stain finish for interior and exterior applications.

Specifications: Easy to apply, low drip, low splash. Excellent weathering, high bondability, fast drying. Colors are light-stable and UV resistant. Aqua Resin Stain Finish is based on non-toxic and natural raw materials presenting no harm to the environment or water ways. The finish is Zero VOC and completely solvent free.

Application Areas: Aqua Resin Stain Finish is a weather resistant finish for exterior and interior wood surfaces such as windows, doors, wood paneling and other architectural woodwork.

Surface Preparation: Surfaces have to be dry, absorbent and free from flaking and cracking. Loose coats of paint and old finish have to be removed entirely. Sound previously applied finish coats need to be sanded. Resinous and oily woods need to be thoroughly cleaned with a solvent before applying Aqua Resin Stain Finish. Aqua Resin Satin Finish does not contain biocides and will not prevent discoloration of the wood due to fungus.

Application: Aqua Resin Stain Finish has a gel-like consistency and needs to be stirred before use. Apply by brush, fine roller or sprayer (Airless or Aircoat) at temperatures above 80 C (460 Fahrenheit). Our suggested drying time may vary strongly due to temperature and moisture contents of air. Apply one thinned-down coat (5-10% of water) for priming, then two coats full strength. For doors and windows apply three coats full strength. Light sanding between coats (180-240 Grit) is recommended.

Tools: Brush, fine roller or sprayer (Airless or Aircoat). Wash tools with water and soap immediately after use.

Coverage: 120-150 square feet per liter depending on surface characteristics and wood type.

Drying Time: Depending on temperature and moisture the finished surface should be dry-to-touch after 15-30 minutes, and may be sanded after one to two hours. Refinish after a minimum of one to two hours drying time.





Hard Oil (sealer)

This low-VOC, low-odor hard oil creates a deeply penetrating finish that is hard to beat for most wood surfaces. We especially recommend it for high-moisture and high-traffic areas such as baths and kitchens. As one of our most durable oils, it is suitable for hardwood and softwood floors.

Specifications: This product becomes a clear to slightly amber breathable and elastic coating with superior water-resistant characteristics. It will enhance the grain of any wood and is an economical product because of its coverage characteristics.

Application: Hard Oil #9 can be applied by brush or spray to dry, absorbent surfaces free from contaminants such as oil, grease, wax, and nicotine. The moisture content for hardwoods should be 12 percent or less and for softwoods it should be 18 percent or less. Very resinous woods such as teak should be cleaned with Bio-Shield Thinner #23, and other exotic woods should be wiped with an alcohol thinner (Ethanol).

The oil should be applied in a thin, even coat, and we recommend two to three coats. After the oil has been applied, any excess must be wiped from the surface after approximately 15 to 20 minutes with a soft, lint-free absorbent cotton cloth. After allowing the final coat of #9 to dry for at least 24 hours, we recommend a finishing coat of our Natural Resin Floor Finish #4, Floor Wax Impregnation #30, Floor Hardwax #32, or Wax Finish #39. Drying times will vary due to application method, surface porosity, and climate.

Coverage: Hard Oil #9 will cover 150 to 300 square feet per liter depending upon surface absorbency.

Ingredients: Linseed Oil, Tung Oil, Colophonium Resin, Castor Stand Oil, Isoaliphatics, Lead-free dryers (Zircon, Cobalt Octoat), and Oximes (Anti-skinning Agent).





HARMONY®

INTERIOR LATEX FLAT B5 SERIES

CHARACTERISTICS

Harmony Interior Latex Flat provides a durable, low-odor, anti-microbial*, interior paint formulated without silica. You can use this product, without typical odor complaints, in **occupied** areas because of the very low odor during application and drying.

Harmony® Coatings meet or exceed the criteria set forth by the U. S. Green Building Council LEED-CI, Version 2.0 and LEED-NC Version 2.2. All results have been verified by our ISO 9001 Laboratory.

Color: Most Colors
Coverage: 350-400 sq ft/gal
@ 4 mils wet; 1.7 mils dry

Drying Time, @ 77°F, 50% RH:
temperature and humidity dependent

Touch: 1 hour
Recoat: 4 hours

Flash Point: N/A

Finish: 0 - 5 units @ 85°

Tinting with Blend-A-Color:

Base	oz/gal	Strength
Extra White	0-5	100%
Deep Base	4-12	100%

Addition of Blend-A-Color Tinting Color may increase the VOC.

Vehicle Type: EVA
B5W951

VOC (EPA Method 24): 0 g/L; 0 lb/gal

Volume Solids: 42 ± 2%

Weight Solids: 60 ± 2%

Weight per Gallon: 12.1 lb

OTC Compliant

* Anti-microbial - This product contains agents which inhibit the growth of microbes on the surface of this paint film.

SPECIFICATIONS

Block

- 1 ct. Loxon Block Surfacers*
- 2 cts. Harmony Interior Latex Flat

Drywall

- 1 ct. Harmony Interior Latex Primer
- 2 cts. Harmony Interior Latex Flat

Masonry

- 1 ct. PrepRite Masonry Primer*
or Harmony Interior Latex Primer
- 2 cts. Harmony Interior Latex Flat

Plaster

- 1 ct. PrepRite Masonry Primer*
or Harmony Interior Latex Primer
- 2 cts. Harmony Interior Latex Flat

Wood, Composition Board

- 1 ct. PrepRite Classic Interior Latex Primer*
- or Harmony Interior Latex Primer
- 2 cts. Harmony Interior Latex Flat

* These primers contain relatively low amounts of VOCs, but could result in minor, noticeable odors.

SURFACE PREPARATION

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other 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 more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

Remove all surface contamination by washing with ProClean Professional® Prep Wash Concentrated Cleaner or other appropriate cleaner, rinse thoroughly and allow to dry. Scrape and sand peeled or checked paint to a sound surface. Sand glossy surfaces dull. Seal stains from water, smoke, ink, pencil, grease, etc. with PrepRite® ProBlock® Primer Sealer.

Drywall

Fill cracks and holes with patching paste/spackle and sand smooth. Joint compounds must be cured and sanded smooth. Remove all sanding dust.

Masonry, Concrete, Cement, Block

All new surfaces must be cured according to the supplier's recommendations—usually about 30 days. Remove all form release and curing agents. Rough surfaces can be filled to provide a smooth surface. If painting cannot wait 30 days, allow the surface to cure 7 days and prime the surface with PrepRite® Masonry Primer.



HARMONY[®]

INTERIOR LATEX FLAT

B5 SERIES



<u>SURFACE PREPARATION</u>	<u>APPLICATION</u>	<u>CAUTIONS</u>
<p>Plaster Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.</p> <p>Wood Sand any exposed wood to a fresh surface. Patch all holes and imperfections with a wood filler or putty and sand smooth.</p> <p>Mildew Remove before painting by washing with ProClean Professional Mildew Eliminator or a solution of 1 part liquid bleach and 3 parts water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with water and allow the surface to dry before painting. Wear protective eyewear, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.</p> <p>Caulking Gaps between walls, ceilings, crown moldings, and other interior trim can be filled with the appropriate Pro Select[®] caulk after priming the surface.</p>	<p>Apply at temperatures above 50°F. No reduction necessary.</p> <p>Brush—Use a nylon/polyester brush.</p> <p>Roller—Use a 3/8" - 3/4" nap synthetic roller cover.</p> <p>Spray—Airless Pressure 2000 psi Tip015"-.021"</p> <p><u>CLEANUP INFORMATION</u></p> <p>Clean spills, spatters, hands and tools immediately after use with soap and warm water. After cleaning, flush spray equipment with mineral spirits to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using mineral spirits.</p>	<p>For interior use only. Protect from freezing. Non-photochemically reactive.</p> <p>CAUTIONS Use only with adequate ventilation. To avoid overexposure, open windows 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 respiratory protection (NIOSH approved) or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage. FIRST AID: In case of eye contact, flush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately. WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. DO NOT TAKE INTERNALLY. KEEP OUT OF THE REACH OF CHILDREN. HOTW 10/15/2004 B05W00951 03 00</p> <p>The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Sheet.</p>





INTERIOR/EXTERIOR ALKYD ALL SURFACE ENAMEL A11 SERIES

CHARACTERISTICS

All Surface Enamel is designed for use on interior and exterior wood, metal, drywall, and other surfaces.

This high quality coating provides excellent resistance to weather and sunlight. The exceptional durability allows it to be used on doors, trim, windows, and other hard wear areas, including exterior wood floors.

Topcoats

Color: Many Colors
Coverage: 350 - 400 sq ft/gal
@ 4.0 mils wet; 1.6 mils dry

Drying Time, @ 77°F, 50% RH:

temperature and humidity dependent

Touch: 1-2 hours

Recoat: 8 hours

Flash Point: 101°F, PMCC

Finish: 70 units @ 60°

Satin Black 10-20 units @ 85°

Satin Ultradeep 30-40 units @ 85°

Tinting with Blend-A-Color:

Base oz/gal **Strength**

Tinting White 0-3 75%

Ultradeep Base 3-9 75%

Vehicle Type: Alkyd

A11W201

VOC (less exempt solvents):

440 g/L; 3.67 lb/gal

Volume Solids: 43 ± 2%

Weight Solids: 58 ± 2%

Weight per Gallon: 8.8 lb

Not OTC Compliant

Primer

Color: White

Coverage: 200 - 275 sq ft/gal

@ 8.0 mils wet; 4.0 mils dry

Drying Time, @ 77°F, 50% RH:

temperature and humidity dependent

Touch: 30 minutes

Topcoat: 1 hour

Flash Point: 87°F, PMCC

Vehicle Type: Alkyd

A11W210

VOC (less exempt solvents):

498 g/L; 4.16 lb/gal

Volume Solids: 42 ± 2%

Weight Solids: 63 ± 2%

Weight per Gallon: 11.3 lb

Not OTC Compliant

SPECIFICATIONS

Aluminum

1 ct. Galvite HS

2 cts. All Surface Enamel

Drywall, interior

1 ct. PrepRite Classic Primer

2 cts. All Surface Enamel

Galvanized Steel

1 ct. Galvite HS

2 cts. All Surface Enamel

Masonry, Concrete, Cement, Block

1 ct. PrepRite Block Filler (optional)

or PrepRite Masonry Primer, interior

or Loxon Masonry Primer, exterior

2 cts. All Surface Enamel

Plaster

1 ct. PrepRite Masonry Primer

2 cts. All Surface Enamel

Steel

1 ct. All Surface Enamel Primer

2 cts. All Surface Enamel

Wood, interior

1 ct. PrepRite Classic Primer

2 cts. All Surface Enamel

Wood, exterior

1 ct. A-100 Exterior Oil Primer

2 cts. All Surface Enamel

Wood, exterior floors

2 cts. All Surface Enamel

SURFACE PREPARATION

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other 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 more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

Remove all surface contamination by washing with ProClean Professional® Prep Wash Concentrated Cleaner or other appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Glossy surfaces should be sanded dull. Stains from water, smoke, ink, pencil, grease, etc. should be sealed with PrepRite® ProBlock® Primer Sealer.

Aluminum and Galvanized Steel

Wash with ProClean Professional® Prep Wash Concentrated Cleaner to remove any oil, grease, or other surface contamination. Remove all corrosion with sandpaper, steel wool, or other abrading method.

Drywall

Fill cracks and holes with patching paste/spackle and sand smooth. Joint compounds must be cured and sanded smooth. Remove all sanding dust.



INTERIOR/EXTERIOR ALKYD ALL SURFACE ENAMEL A11 SERIES



SURFACE PREPARATION

Masonry, Concrete, Cement, Block

All new surfaces must be cured according to the supplier's recommendations—usually about 30 days. Remove all form release and curing agents. Rough surfaces can be filled to provide a smooth surface. If painting cannot wait 30 days, allow the surface to cure 7 days and prime the surface with PrepRite Masonry Primer (interior) or Loxon Masonry Primer (exterior).

Plaster

Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.

Steel

Rust and mill scale must be removed using sandpaper, steel wool, or other abrading method. Bare steel must be primed the same day as cleaned.

Wood

Sand any exposed wood to a fresh surface. Patch all holes and imperfections with a wood filler or putty and sand smooth.

Mildew

Remove before painting by washing with ProClean Professional Mildew Eliminator or a solution of 1 part liquid bleach and 3 parts water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with water and allow the surface to dry before painting. Wear protective eyewear, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.

Caulking

Exterior gaps between windows, doors, trim, and other through-wall openings; and interior gaps between walls, ceilings, crown moldings, and other trim can be filled with the appropriate Pro Select® Caulk after priming the surface.

SURFACE PREPARATION

Caulking

Exterior gaps between windows, doors, trim, and other through-wall openings; and interior gaps between walls, ceilings, crown moldings, and other trim can be filled with the appropriate Pro Select® Caulk after priming the surface.

APPLICATION

Apply at temperatures above 50°F.

No reduction necessary

Brush

Use a natural bristle brush

Roller

Use a 1/4" - 3/8" nap lambswool cover.

Spray—Airless

Pressure 1800 psi

Tip017" - .019"

Reduction
if needed, up to 5% (6 oz) per gallon

CLEANUP INFORMATION

Clean spills, spatters, hands and tools immediately after use with mineral spirits. Follow manufacturer's safety recommendations when using mineral spirits.

CAUTIONS

Not for use on roofs.

Do not use colorants formulated for interior use only on exterior surfaces.

LABEL CAUTIONS

CAUTION contains CRYSTALLINE SILICA. Use only with adequate ventilation. To avoid overexposure, open windows 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 respiratory protection (NIOSH approved) or leave the area. Adequate ventilation required when sanding or abrading the dried film. If adequate ventilation cannot be provided wear an approved particulate respirator (NIOSH approved). Follow respirator manufacturer's directions for respirator use. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage. FIRST AID: In case of eye contact, flush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately. DELAYED EFFECTS FROM LONG TERM OVEREXPOSURE. Abrading or sanding of the dry film may release crystalline silica which has been shown to cause lung damage and cancer under long term exposure. WARNING: This product contains chemicals known to the State of California to cause cancer. DO NOT TAKE INTERNALLY. KEEP OUT OF THE REACH OF CHILDREN.
HOTW 12/15/2004 A11W00201 33 00

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Sheet.



Sheetrock® Gypsum Sheathing



- Water-repellent face; treated gypsum core
- 2' and 4' widths
- Score and snap – quick/economical application
- Fire resistant

Description

SHEETROCK® brand gypsum sheathing features a moisture-resistant gypsum core encased in a moisture-repellant paper on both sides and long edges. FIRECODE® Core technology adds extra fire resistance and enhanced safety ratings. Weather resistance, water repellency, fire resistance, and low installed cost make SHEETROCK gypsum sheathing suitable for application under many exterior surfaces for both residential and commercial construction. Applications include, but are not limited to, masonry backup; wood, vinyl, and aluminum siding; wood shingles; and traditional and synthetic stucco.

Advantages

Low In-Place Cost With SHEETROCK gypsum sheathing, in-place cost is lower than with exterior-grade plywood, masonry, or portland cement plaster.

Resists Water Special 100% recycled, repellent paper on both sides sheds water. Treated gypsum core permits water vapor to escape from stud space, protecting wood framing from moisture buildup.

Fire-Resistant A noncombustible gypsum core adds fire safety to every application. 5/8" FIRECODE Type X core panels available for assemblies requiring added fire resistance.

Quick, Dry Installation SHEETROCK gypsum sheathing offers the speed and economy of regular drywall construction: quick score-and-snap cutting, no sawing or special tools, and rapid screw or nail attachment.

Limitations

1. Sheathing may be stored outside for up to one month, but must be stored off the ground and must have a protective covering.
2. Maximum stud spacing is 24" o.c.
3. For in-place exposure up to six months, all gaps resulting from cuts, corners, joints, and machine end-cuts of the sheathing should be filled with exterior caulk at time of construction or wrapped with a suitable water barrier.
4. Sheathing is not recommended for exterior ceilings and soffits, unless covered with metal lath and exterior portland cement stucco.
5. Direct application of paint, texture finishes and coatings over gypsum sheathing is not recommended.

Product Data

Thickness		Width		Edges	Length	Approx. wt.	
In.	mm	In.	mm			Lb./ft²	kg/m²
1/2"	12.7	24	610	"V" T&G	8	2.0	9.8
1/2"	12.7	48	1219	Square	8,9	2.0	9.8
5/8"	15.9	48	1219	Square	8,9	2.4	11.7

Compliance: Meets ASTM C79

Thermal Resistance: "R": 0.45 hr. ft² °F/Btu (0.08 K.m²/W)

Permeance: 1/2" SHEETROCK gypsum sheathing / 23.3 Perms, 5/8" SHEETROCK gypsum sheathing / 26.7 P

Surface Burning Characteristics: Flame Spread 15, Smoke Developed 0

Packaging: 2 panels per bundle

Submittal Approvals:

Job Name

Contractor

Date





Georgia-Pacific

DensArmor Plus®

Paperless Interior Drywall

Technical Service Hotline 1.800.225.6119 or

www.densarmorplus.com

Applicable Standards

ASTM C 1658 and appropriate sections of ASTM C 630 and ASTM C 1177 (Physical Properties); CSA-A82.27-M and Federal Specification SS-L-30d, Type III, Grade W

Sizes and Edges

DensArmor Plus Thickness: 1/2" – 12.7mm; Width: 4'; Lengths: 8' - 12'; Edges: Tapered
DensArmor Plus Fireguard C Thickness: 1/2" – 12.7mm; Width: 4'; Lengths: 8' - 12'; Edges: Tapered
DensArmor Plus Fireguard Thickness: 5/8" – 15.9mm; Width: 4'; Lengths: 8' - 12'; Edges: Tapered

Tables

I. Maximum Framing Spacing (Wood or Metal)

Single-ply Thickness	Application	O.C. Spacing
Ceilings*		
1/2", 5/8"	Parallel to framing	16 o.c.
1/2", 5/8"	Right angles to framing	24 o.c.
Walls		
1/2", 5/8"	Right angles or parallel to framing	24 o.c.

*When using a water-based texture on ceilings, DensArmor Plus shall be installed at right angles to framing.

III. Physical Properties

Properties	1/2" DensArmor Plus	1/2" DensArmor Plus Fireguard C	5/8" DensArmor Plus Fireguard
Thickness, nominal	1/2" (12.7mm) ± 1/64" (0.4mm)	1/2" (12.7mm) ± 1/64" (0.4mm)	5/8" (15.9mm) ± 1/64" (0.4mm)
Width, standard	4' (1220mm) ± 3/32" (2.4mm)	4' (1220mm) ± 3/32" (2.4mm)	4' (1220mm) ± 3/32" (2.4mm)
Length, standard	8' (2440mm) to 12' (4880mm) ± 1/4" (6.4mm)	8' (2440mm) to 12' (4880mm) ± 1/4" (6.4mm)	8' (2440mm) to 12' (4880mm) ± 1/4" (6.4mm)
Weight ¹ , lbs./M sq. ft., nominal	2020 ¹	2020 ¹	2570 ¹
Edges	Tapered	Tapered	Tapered
Surfacing	Coated glass mat on face, back	Coated glass mat on face, back	Coated glass mat on face, back
Flexural strength, parallel, lbs.	80	80	100
Flexural strength, perpendicular	100	100	140
R Value ²	.56	.56	.67
Nail pull resistance minimum, lbs.	80	80	90
Hardness, lbs. force, core, edges and ends	>15	>15	>15
Water absorption (% of weight)	<5%	<5%	<5%
Surface burning characteristics (per ASTM E 84 or CAN/UL-S102): flame spread/smoke developed	10/5	10/5	10/5
Humidified deflection, inches	2/8"	2/8"	1/8"

¹Represents approximate weight for design and shipping purposes.

²Tested in accordance with ASTM C 518.

II. Single-Ply Application¹

Nails: ASTM C 514, Nails for the Application of Gypsum Board
Screws: ASTM C 1002, Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Base

Wallboard Thickness	Nail Applications		Screw Applications		
	Minimum Nail Length	Spacing Walls	Spacing Ceilings	Screw Length	Spacing Walls ² Ceilings
1/2"	1-3/8"	8	7	1	16 12
5/8"	1-5/8"	8	7	1-1/8"	16 12

¹Also refer to local code requirements.

²Where framing members are spaced 24 o.c., screw spacing is 12 o.c.

NOTE: Specified minimum values are as in ASTM C 1658 and applicable sections of ASTM C 630 and ASTM C 1177 standards.



Georgia-Pacific
Gypsum

SALES INFORMATION AND ORDER PLACEMENT

U.S.A. Midwest: 1-800-876-4746 West: 1-800-824-7503
South: 1-800-327-2344 Northeast: 1-800-947-4497

CANADA Canada Toll Free: 1-800-387-6823
Quebec Toll Free: 1-800-361-0486

TECHNICAL INFORMATION Complete technical information, application instructions, test data, and specifications can be obtained by visiting our Web site at www.gpgypsum.com or by calling the GP Technical Hotline.

Georgia-Pacific Gypsum Technical Hotline
U.S.A. and Canada: 1-800-225-6119
Mon-Fri, 8 a.m. - 5 p.m. ET

TRADEMARKS

The GEORGIA-PACIFIC logo and all trademarks are owned by or licensed to Georgia-Pacific Gypsum LLC.

UPDATES AND CURRENT INFORMATION

The information in this document may change without notice. Visit our Web site for updates and current information.

LIMITATION OF REMEDIES AND DAMAGES

Unless otherwise stated in our written limited warranty for these products, our sole liability for any product claim shall be limited to reimbursement of the cost of repair or replacement of the affected product, up to a maximum amount of two times the original purchase price for the affected product. We shall not be responsible under any circumstances for lost profits, damage to a structure or its contents, or indirect, incidental, special or consequential damages. Claims shall be deemed waived if they are not submitted to us in writing within ten days after

SAFETY

CAUTION: This product contains fiberglass. Fibers and dust may be released from this product during normal handling and may result in skin, eye and respiratory irritation. Avoid breathing dust and contact with the skin and eyes. Follow these standard work practices: Wear a loose-fitting, long-sleeved shirt and long pants, protective gloves and eye protection (goggles or safety glasses with side shields). Wear a dust mask when sanding. Additional protection may be needed when very dusty. Do not use a power saw. For Material Safety Data Sheet or additional information, call 1-800-225-6119 or visit our Web site.



Duette honeycomb shades



The popular brand that originated the honeycomb shade category, Hunter Douglas' Duette® honeycomb shades come in sheer, semi-sheer, semi-opaque and opaque fabrics to give you a choice in light control. Distinguished by a crisp, clean style, the honeycomb construction of these soft, yet durable Duette shades—available in single, double and triple honeycombs—make them highly energy efficient. The latest innovation from Hunter Douglas is Architella™ honeycomb shades. Offering greater energy efficiency, greater sound absorption and a radiant color palette, Architella is the next generation of honeycomb shades to enhance your home.

Features

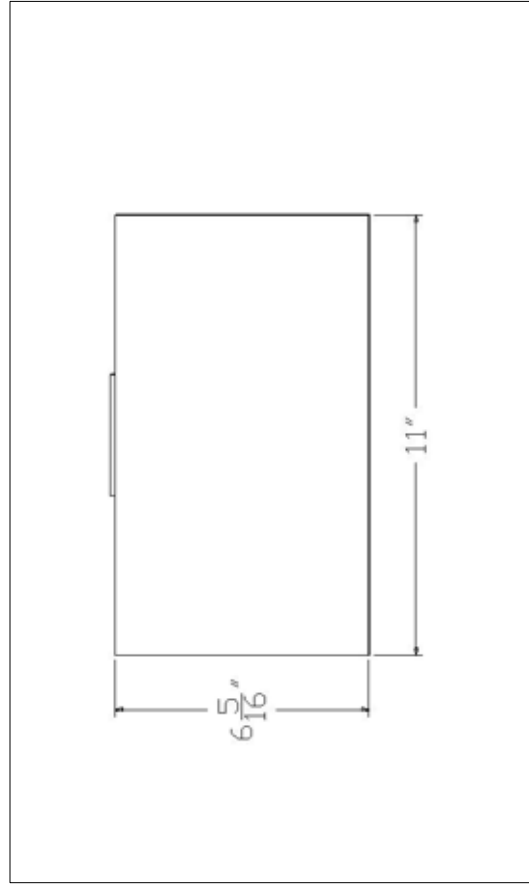
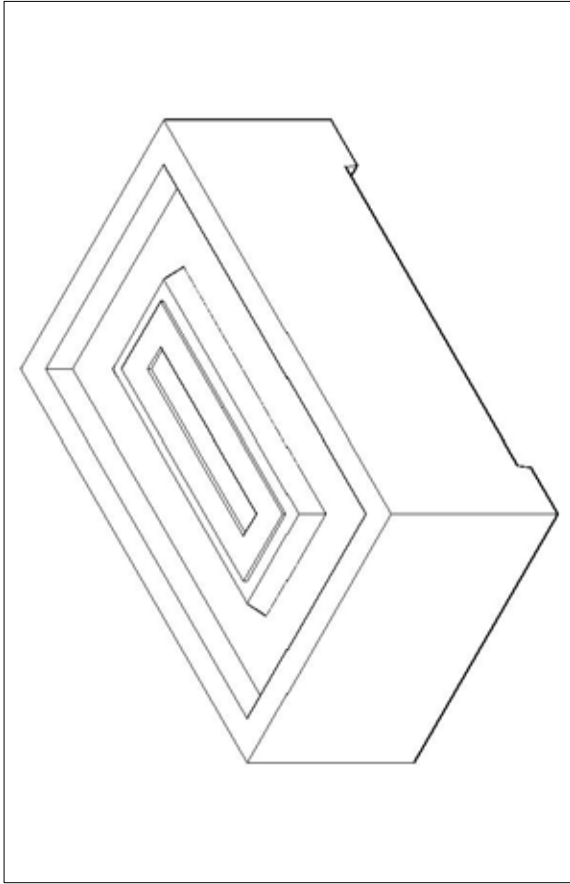
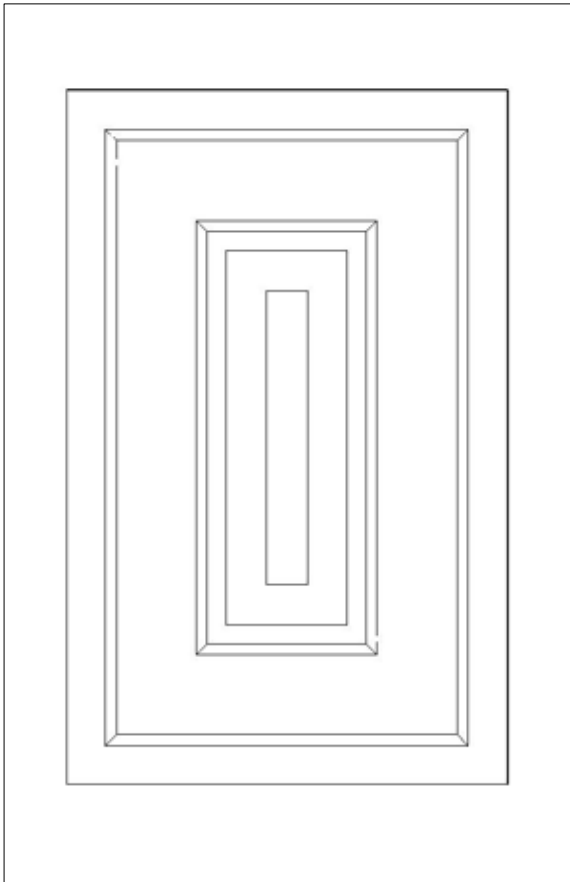
May We Also Recommend...



Silhouette window shadings

Material	Fabric
Pleat Size	3/8", 3/4", or 1 1/4" single, double or triple honeycomb
Sizes Available	Width: 4" to 174" Height: 6" to 192"
Material/Color Options	315 combinations
Privacy and Light Control	(1 to 5 scale) (1) Reduced glare, no privacy (2) Softened light, moderate privacy (3) Softened light, substantial privacy (4) Diffused light, complete privacy (5) Blocked light, complete privacy
Specialty Shapes and Applications	Arches, angles, trapezoids, circles, bay and corner windows, skylights, sliding glass doors, french doors, cut-outs, privacy/natural light combinations (Duolite™), cordless operable sidelights
Operation Systems Options	Standard cordlock, UltraGlide® retractable cord system, EasyRise™ continuous cord loop system, LiteRise® cordless system, Simplicity™/Skyrise® skylight systems, Vertiglide™ vertical pleat system, top-down/bottom-up, TruRise®
Motorization Options	Battery-powered PowerRise®, Electrical-powered remote or switch control
Soil and Dust Resistant	Yes
Uniform Exterior Appearance	Yes
Orientation/Window Shape	Horizontal or Vertical
Safety Features	Yes





workingwonders, llc large linear burner

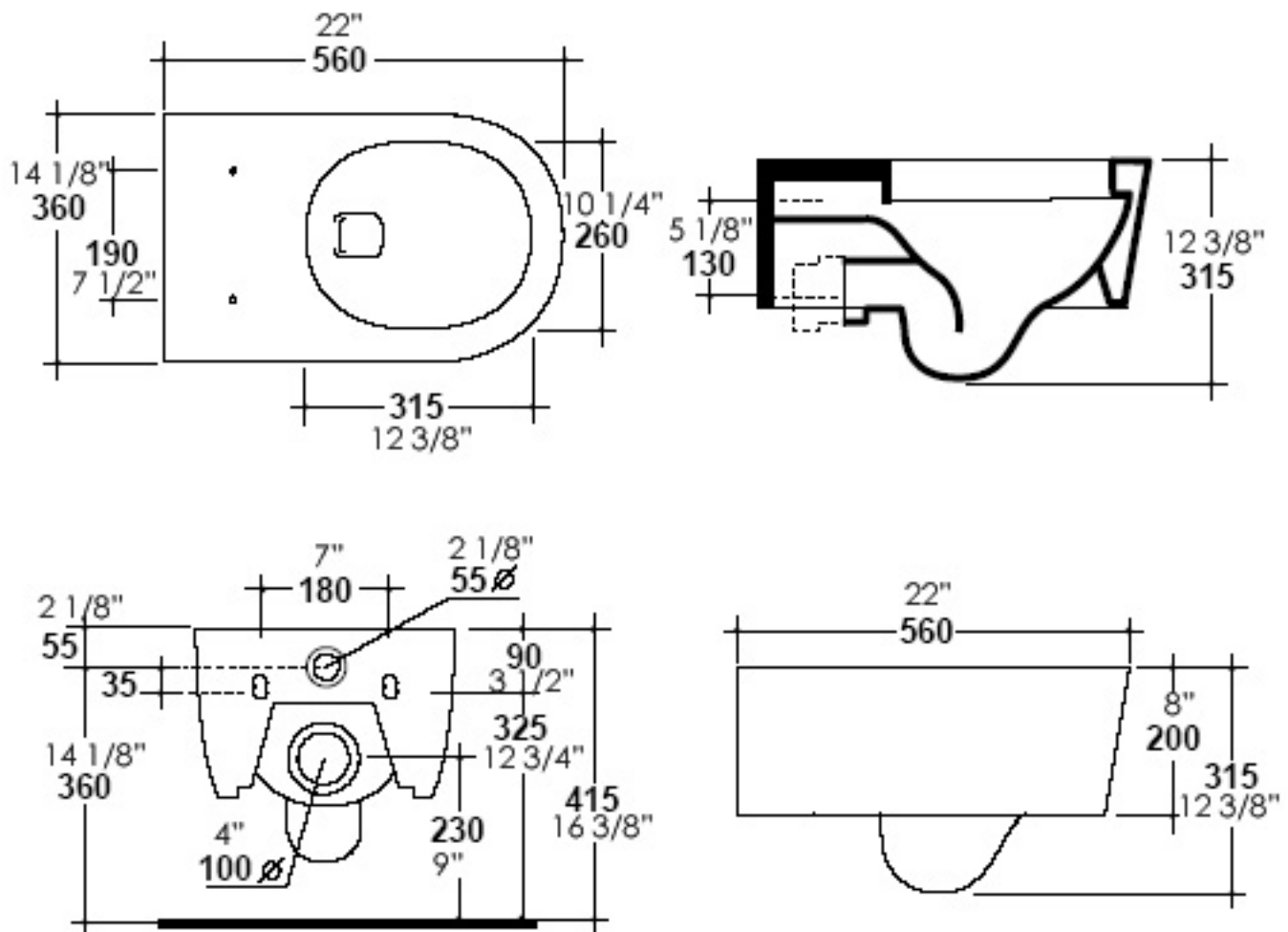
1' - 5 $\frac{5}{16}$ " L x 11" W x 6 $\frac{5}{16}$ " H (26 lbs.)

LACAVA

L'Amore per l'Eleganza

web site: lacavadesign.com email: info@lacavadesign.com

LINK #5051WC

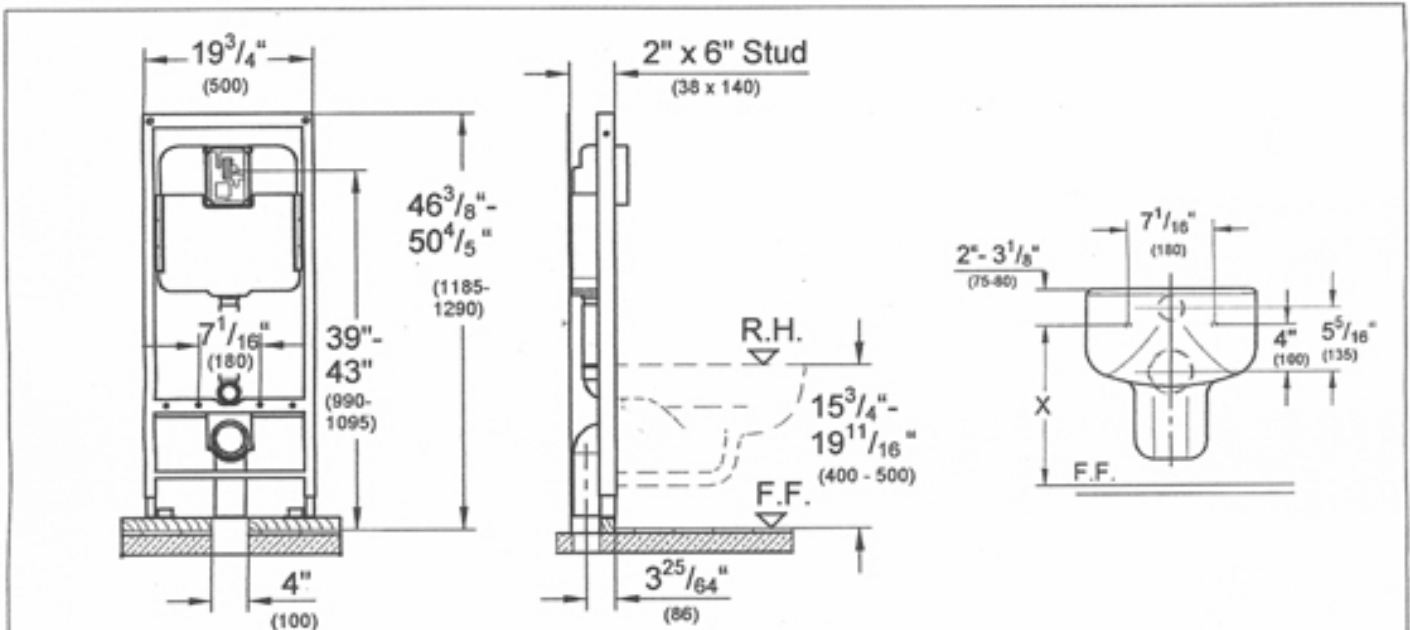
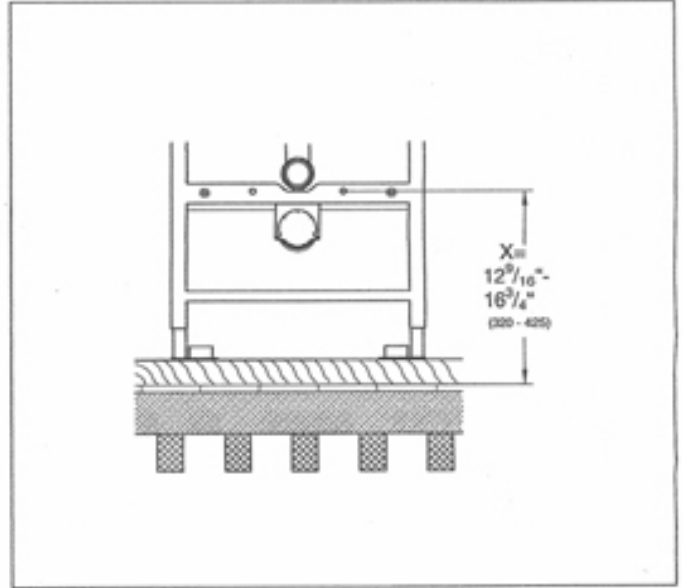
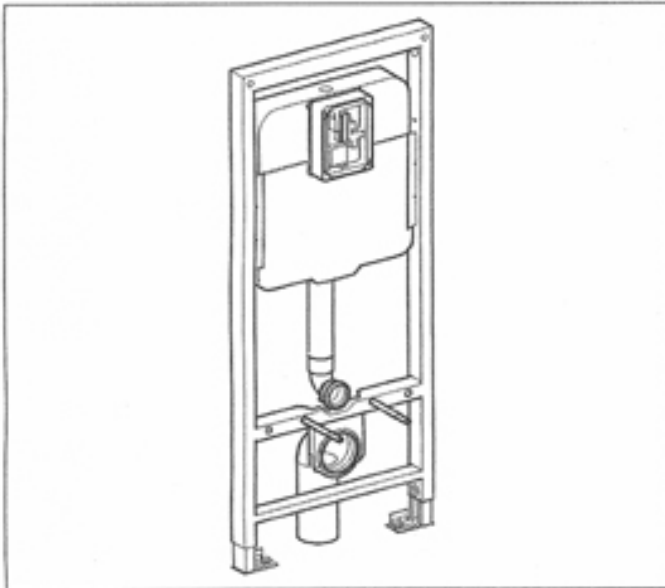


LACAVA

L' Amore per l' Eleganza

web site: lacavadesign.com email: info@lacavadesign.com

RAPID "L" # GR38211-000



Concealed Tank and Carrier

The GROHE concealed water closet tank and carrier are adjustable for bowl rim height $12\frac{9}{16}"$ to $16\frac{3}{4}"$ to be used with an IAPMO listed 1.6 GBF wall hung bowl. Requires $\frac{1}{2}"$ water supply and 3" nominal outlet.

In compliance with:
 IAPMO PS 58-92
 CSA B125-98



Features

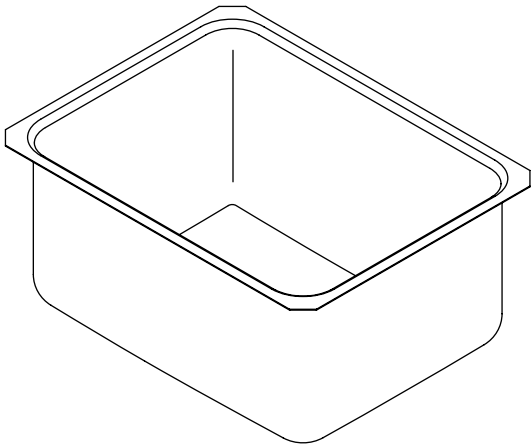
- 18 gauge stainless steel
- Undercounter
- Single compartment
- Includes installation hardware
- Squared bowl
- 14" (35.6 cm) x 18-5/8" (47.3 cm)

Codes/Standards Applicable

Specified model meets or exceeds the following:

- IAPMO/UPC
- ASME A112.19.3

UNDERCOUNTER SINK
K-3163



Colors/Finishes

- NA: None applicable

Accessories:

- CP: Polished Chrome
- 0: White
- Other: Refer to Price Book for additional colors/finishes

Specified Model

Model	Description	Colors/Finishes	
K-3163	Undercounter sink	<input type="checkbox"/> NA	
Optional Accessories			
K-3277	Wire basket	<input type="checkbox"/> 0 White	<input type="checkbox"/> Other_____
K-8801	Duostrainer® sink strainer	<input type="checkbox"/> CP	<input type="checkbox"/> Other_____

Product Specification:

The undercounter sink shall be 14" (35.6 cm) in length, and 18-5/8" (47.3 cm) in width. Sink shall be made of 18 gauge stainless steel. Sink shall be single compartment. Sink shall include installation hardware. Sink shall be Kohler Model K-3163-_____.

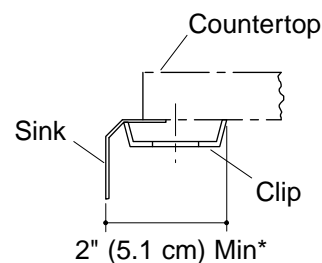
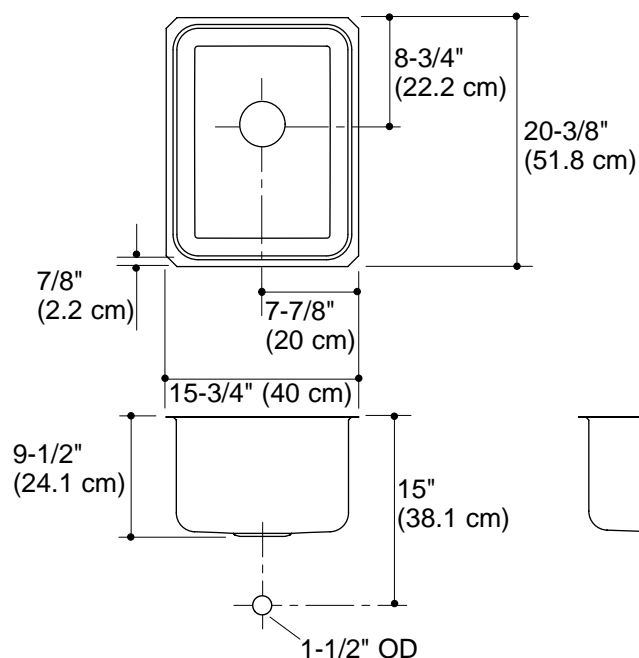


Technical Information

Fixture:*	basin area	water depth
Sink	14" (35.6 cm) x 18-5/8" (47.3 cm)	9-1/2" (24.1 cm)
Drain Hole	3-5/8" D. (9.2 cm)	
* Approximate measurements for comparaisn only.		
Included Components:		
Hardware kit (3 required)		91915
Cutout template		113195-7

Installation Notes

Install this product according to the installation guide.



* Allow clearance around sink rim for clip attachment.

Product Diagram



Features

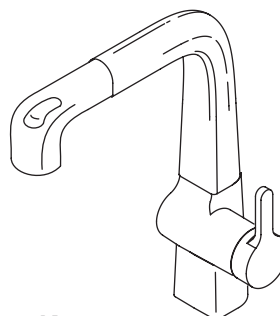
- Metal construction
- 360° swing spout with integral pull-out spray and hose
- Three function sprayhead with spray, aerated stream, and pause settings
- Promotion™ technology with nylon hose and ball joint for easy operation
- One-piece, self-contained ceramic disc valve allows both volume and temperature control
- Temperature memory allows faucet to be turned on and off at any temperature setting
- High-temperature limit setting for added safety
- Integral backflow protection
- ADA compliant lever handle
- Lower flow aerator options are available (refer to the Kohler Price Book)
- 2.2 gallons (8.3 L) per minute maximum flow rate
- Contemporary styling

PULL-OUT KITCHEN SINK FAUCET

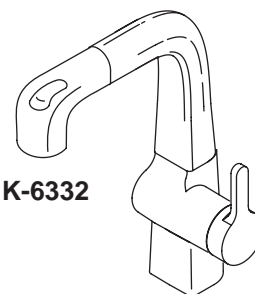
K-6331

ALSO K-6332

ADA



K-6331



K-6332

Codes/Standards Applicable

Specified model meets or exceeds the following:

- ADA
- IAPMO/cUPC
- ASME A112.18.1/CSA B125.1
- NSF 61
- Energy Policy Act of 1992

Colors/Finishes

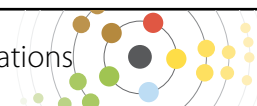
- CP: Polished Chrome
- Other: Refer to Price Book for additional colors/finishes

Specified Model:

Model	Description	Colors/Finishes	
K-6331	Primary pull-out kitchen sink faucet – 9" (22.9 cm) spout reach	<input type="checkbox"/> CP	<input type="checkbox"/> Other ____
K-6332	Secondary/prep pull-out kitchen sink faucet – 8" (20.3 cm) spout reach	<input type="checkbox"/> CP	<input type="checkbox"/> Other ____

Product Specification

The contemporary pull-out kitchen sink faucet shall be of metal construction. Valve shall be a one-piece, self-contained ceramic disc valve, allowing volume and temperature control. Valve shall feature temperature memory, allowing the faucet to be turned on and off at any temperature setting. Product shall feature a high-temperature limit stop for added safety. Product shall feature a 360° swing spout with integral pullout spray and hose. Product shall feature a three function sprayhead with spray, aerated stream, and pause settings. Product shall include integral backflow protection, ADA compliant lever handle, and 2.2 gallon (8.3 L) per minute flow rate. Product shall feature Promotion technology with nylon hose and ball joint for easy operation. Product shall be available with lower flow aerator options (see Kohler Price Book). Kitchen faucet shall be Kohler Model K-____-____.



INDUSTRIAL EXPOSED SHOWER K-7252

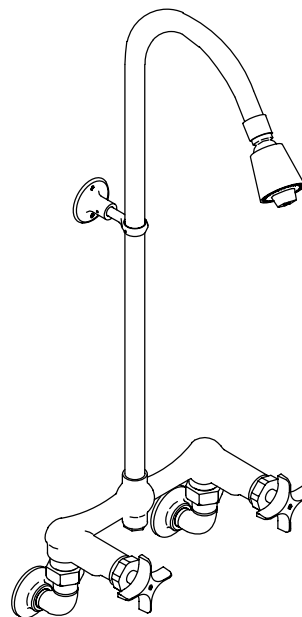
FEATURES

- Brass construction
- For 6" centers
- Brass valve bodies
- Valvet[®] valves
- Four-arm handles

CODES/STANDARDS APPLICABLE

Specified model meets or exceeds the following:

- ASME/ANSI A112.18.1M
- CSA B125
- IAPMO/UPC



COLORS/FINISHES

- CP Polished Chrome

SPECIFIED MODEL:

Model	Description	
K-7252	Industrial Exposed Shower	<input type="checkbox"/> CP

PRODUCT SPECIFICATION:

Two-handle industrial exposed shower shall be of brass construction. Faucet shall feature brass valve bodies. Faucet shall also feature Valvet valves. Product shall include 6" centers, showerhead, four-arm handles, and wall-mount bracket. Faucet shall be Kohler Model K-7252-CP.





Model MWC24 Convection Microwave Oven

The Wolf convection microwave with optional trim fits perfectly above a 30" or 36" Wolf built-in oven to finish off your cooking tower in a single look. The trim comes in three stainless steel finishes—classic, platinum and carbon. Aside from looking beautiful whether you use it in conjunction with an oven or not, the Model MWC24 offers you the convection performance you would expect from Wolf.

Model MWC24 shown with 36" trim in classic stainless steel finish installed above Model SO36U/S 36" built-in oven.

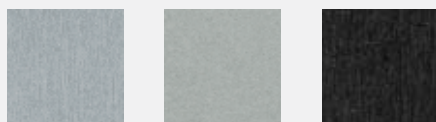


Specifications

Overall Dimensions	24 ³ / ₄ " W x 14 ⁷ / ₈ " H x 20 ¹ / ₈ " D
Overall Width with 30" Trim	29 ⁷ / ₈ "
Overall Width with 36" Trim	35 ⁵ / ₈ "
Overall Height with Trim	19 ⁷ / ₈ "
Power	900 W
Interior Capacity	1.5 cu ft
Interior Dimensions	16 ¹ / ₈ " W x 9 ⁵ / ₈ " H x 16 ¹ / ₈ " D
Opening Dimensions with 30" Trim	27 ¹ / ₂ " W x 18 ¹¹ / ₁₆ " H x 20 ¹ / ₈ " min D
Opening Dimensions with 36" Trim	33 ³ / ₈ " W x 18 ¹¹ / ₁₆ " H x 20 ¹ / ₈ " min D
Electrical Rating (with convection)	1.6 kW
Electrical Requirements	120 V AC, 60 Hz 15 amp dedicated circuit
Power Cord	3 ¹ / ₂ ' cord with grounded plug
Shipping Weight	68 lbs

Product Notes

The Model MWC24 convection microwave oven can be used free-standing or with optional 30" or 36" wide trim, it can be built in to fit above a Wolf 30" or 36" built-in single oven. Optional trim is available in classic, platinum or carbon stainless steel finish.



30" Trim Options*

	MWCTRIM30/S	MWCTRIM30/P	MWCTRIM30/B
Stainless Steel Trim Finish	Classic	Platinum	Carbon

Trim allows Model MWC24 to be built in to fit a 30" wide space.

*Refer to Installation Instructions provided with the trim kit for detailed specifications.

36" Trim Options*

	MWCTRIM36/S	MWCTRIM36/P	MWCTRIM36/B
Stainless Steel Trim Finish	Classic	Platinum	Carbon

Trim allows Model MWC24 to be built in to fit a 36" wide space.

*Refer to Installation Instructions provided with the trim kit for detailed specifications.

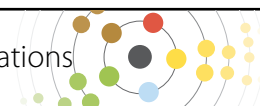
Features

- Built-in or free-standing convection microwave oven with 1.5 cu ft capacity and 900 watts of power
- Classic, platinum or carbon stainless steel trim finishes
- Easy-to-operate control panel with programmable power options and interactive display—99 minutes, 99 seconds
- Menu label and recipe guide
- Sensor cooking
- Slow cook mode for up to four hours
- Optional 30" or 36" trim allows microwave to be built in to fit above a Wolf 30" or 36" built-in oven
- Multi-language—English, French and Spanish
- Removable turntable and turntable support
- Microwave tray for popcorn and meat
- Multiple rack baking
- Oven light comes on when oven is operating or door is open



Accessories

The optional trim kits listed above are available as sales accessories through your Wolf dealer. To obtain local dealer information, visit the Locator section of our website, wolfappliance.com.





Model 700TC(I) Integrated Refrigerator/Freezer

Integrated refrigeration can be used anywhere in the home. It merges seamlessly into the décor, with no visible hinges or grilles. Model 700TC(I) has an upper cabinet refrigerator with freezer storage drawers. Two distinct temperature zones ensure the freshest food and energy efficiency. Model 700TCI features an automatic ice maker.



Specifications

Overall Dimensions	27" W x 80" H x 24" D
Refrigerator Capacity	10.2 cu ft
Freezer Capacity	5.1 cu ft
Finished Opening	27" W x 80" H x 25" D*
Door Clearance	25 1/2"
Drawer Clearance	19 1/2"
Electrical Requirements	115 V AC, 60 Hz 15 amp dedicated circuit
Plumbing Requirements (Model 700TCI)	1/4" OD copper line 20–100 psi
Annual Energy Usage	\$52**

*Depth is 24" from the front of the unit to its back. Your design may necessitate moving the unit back, or cabinets forward to achieve a flush fit. This will require a minimum opening depth of 25".

**Based on 9.06 cents per kilowatt hour.

Product Notes

Stainless steel panels with handles are available as accessories. Panels for an 80" finished height are offered in classic, platinum and carbon finishes. Panels for an 84" finished height come in the classic finish only. These panels are not installed at the factory.



Model Options

	700TC	700TCI
Design	Integrated	Integrated
Automatic Ice Maker		■
Shipping Weight (lbs)	360	360

Panel Availability

	Classic	Platinum	Carbon
80" Heights	■	■	■
84" Heights	■		

Interior Features

- **Refrigerator**
 - Dual Refrigeration
 - 3 Adjustable Glass Shelves
 - 1 Stationary Shelf
 - Adjustable Deli Drawer
 - 3 Adjustable Door Shelves
 - Adjustable Dairy Compartment
 - Egg Container
- **Freezer (Drawers)**
 - 2 Removable Drawer Dividers (700TC)
 - 1 Removable Drawer Divider (700TCI)
 - Automatic Defrost
 - Automatic Ice Maker (700TCI)



Accessories

- Stainless steel door and drawer panels with tubular handles available in three finishes (see chart above for specifics)
- Polished chrome handles for custom panel applications
- Dozen egg container with lid
- 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.

With the installation of a harness kit, this appliance is certified by Star-K to meet strict religious regulations in conjunction with specific instructions found on www.star-k.org.





Model CT30E 30" Framed Electric Cooktop

The black ceramic glass top of the Wolf 30" framed electric cooktop is beautifully complemented by your choice of classic, platinum or carbon stainless steel trim finish. Four heating elements with six zones offers exceptional control of temperature for cooking utensils of every size. All of the heating elements offer True Simmer along with one element that enables you to set a temperature for melting.



Model CT30E with classic stainless steel trim finish

Specifications

Overall Dimensions 30" W x 3 1/2" H x 21" D

Maximum Element Power

(2) Dual-Zone 2200 W / 750 W

and 1900 W / 950 W

(2) Single-Zone 1500 W and 1200 W

Element Outer Diameter

Dual-Zone 9" and 8 1/2"

Single-Zone 7" and 6 1/2"

Recommended Cabinet Width 33"

Minimum Height Clearance 4"

Minimum Cabinet Depth 22 3/4"

Countertop Cut-Out* 28 3/8" W x 19 1/4" D

Electrical 240 V AC / 60 Hz / 40 amp

Requirements 208 V AC / 60 Hz / 30 amp

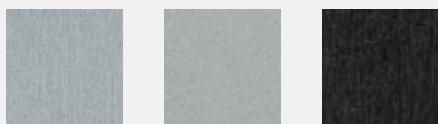
Conduit 4' flexible 3-wire

Electrical Rating 6.8 kW at 240 V AC
5.2 kW at 208 V AC

**If the 30" cooktop is to be used in combination with additional cooktops or modules with a filler strip, the cut-out width increases to 29".*

Product Notes

The 30" framed electric cooktop is available in your choice of three stainless steel trim finishes; classic, platinum and carbon.



Model Options

	CT30E/S	CT30E/P	CT30E/B
Trim Finish	Classic	Platinum	Carbon
Shipping Weight (lbs)	45	45	45

Features

- Easy-to-clean black ceramic glass surface is resistant to scratching, staining, impact and heat—translucent surface allows you to see the glow of hot elements
- Illuminated electronic touch controls with graduated control lighting
- Four ribbon-type radiant heating elements with six temperature zones
- Two dual-zone and two single-zone elements
- True Simmer setting on all elements and melt setting on one element
- Hot surface indicators on all elements
- High frequency pulsation elements improve cooking performance and control
- Temperature limiter to ensure that safe operating temperature of ceramic glass is never exceeded
- Child safety lock key and universal off



Model CT30E

Accessories

- Filler strip for installation of multiple cooktops or modules

Accessories are available through your Wolf dealer. To obtain local dealer information, visit the locator section of our website, wolfappliance.com.



This appliance is certified by Star-K to meet strict religious regulations in conjunction with specific instructions found on www.star-k.org.





Model DD30 30" Downdraft Ventilation System

The cooktop downdraft unit rises from the countertop to whisk away odors and smoke into the easy-to-clean, five-layer mesh filter. For ease in matching your cooktop, the remote-mounted control module and top cover are available in classic, platinum or carbon stainless steel finish. (I) models include an internal blower. In-line and remote blower options are available for (R) models.



Model DD30 shown in classic stainless steel trim finish. Also shown is Model IM15/S multi-function cooktop and Model CT15G/S gas cooktop.

Specifications

Overall Width	30"
Overall Height (above countertop)	9 ¹ / ₁₆ "
Overall Depth	2 ³ / ₈ "
Duct Size	(I) Models 3 ¹ / ₄ " x 10" (R) Models 3 ¹ / ₄ " x 14"
Discharge	Adjustable
Electrical Requirements	110/120 V AC 60 Hz, 15 amp dedicated circuit
Power Cord	2 ¹ / ₂ ' cord with grounded plug

Product Notes

The downdraft control kit includes control module, top cover, mounting brackets, DIN connector and necessary hardware. The control kit is sold as a sales accessory in your choice of classic, platinum or carbon stainless steel finish.

IMPORTANT NOTE: Wolf downdraft ventilation systems are recommended for use with Wolf electric and gas cooktops and integrated modules, excluding the unframed electric cooktops and electric grill, steamer and fryer modules. Model DD30 cannot be used with Wolf dual fuel ranges, gas ranges, sealed burner rangetops (except Model SRT304) or gas rangetops.



Model Options

	DD30I	DD30R
Includes 500 CFM Internal Blower	■	
Requires In-Line or Remote Blower		■
Control Module and Top Cover Finish		
Classic Stainless Steel	■	■
Platinum Stainless Steel	■	■
Carbon Stainless Steel	■	■
Shipping Weight (lbs)	75	75

Features

- Remote mounted control module with LED indicators
- Three-speed blower control
- Filter clean timer
- Delay-off feature automatically turns unit off, chimney remains up
- Stainless steel filter cover with dishwasher safe aluminum mesh filter

Blower Options – (R) Models

- 1100 CFM In-Line Blower
- 900, 1200 or 1500 CFM Remote Blower

(I) models include a 500 CFM internal blower. (R) models require an in-line or remote blower. For additional information on blowers, visit our website, wolfappliance.com.



Accessories

- Control module and top cover available in classic, platinum and carbon finishes—control kit also includes mounting brackets, DIN connector and hardware
- Bracket supports for installation of two integrated modules
- Trim kit for installation with Model SRT304 sealed burner rangetop
- Transitions in various sizes

Accessories are available through your Wolf dealer. To obtain local dealer information, visit the Locator section of our website, wolfappliance.com.

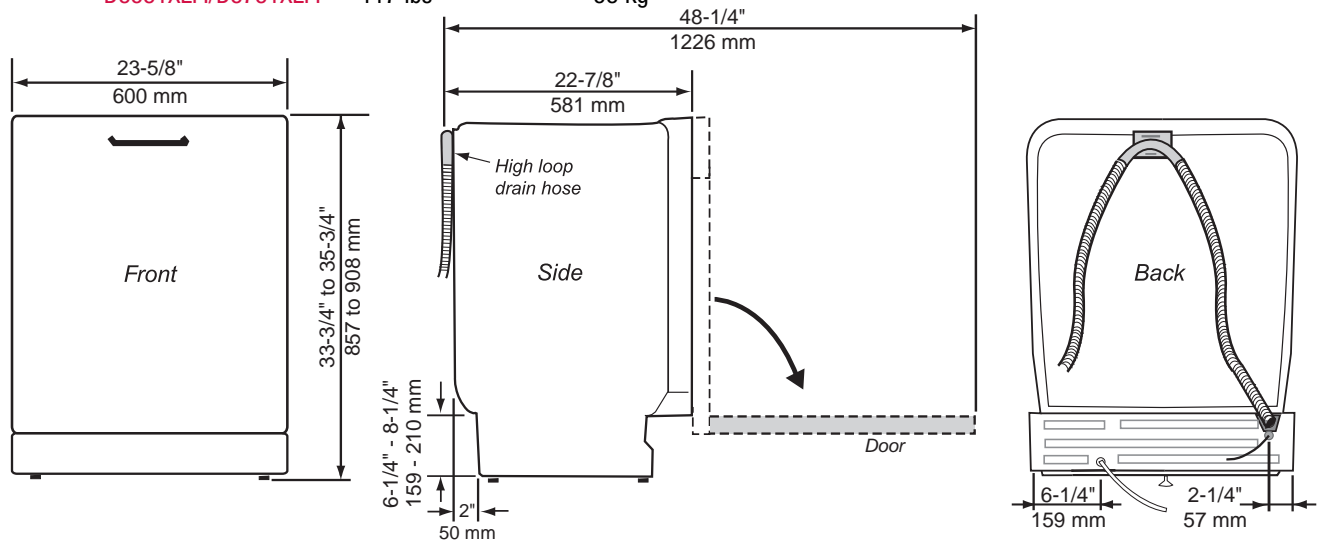


Unit Dimensions

	US	METRIC
HEIGHT*	33-3/4" to 35-3/4"	857 to 908 mm
WIDTH	23-5/8"	600 mm
DEPTH	22-7/8"***	581 mm
DEPTH W/DOOR OPEN	48-1/4"	1226 mm
WEIGHT: D3232XLFI	108 lbs	49 kg
D3251XLFI	111 lbs	50 kg
D3531XLFI/D3731XLFI	117 lbs	53 kg

Technical Data

Electricity	120V, 60Hz, 15 amp
Water pressure	18-176 psi
Heating element	1200 watt
Max loading	1300 watt



***Does not include the depth of a custom or optional door. If an ASKO optional door is used, add 2-1/2" (63.5 mm) to the depth.

Custom Front Panels

The D3232XLFI, D3251XLFI, D3531XLFI and D3731XLFI can only be installed with a fully-integrated custom door panel that extends from the toe kick to the counter top. A one-piece custom door panel with a curved handle is available (see page 7).

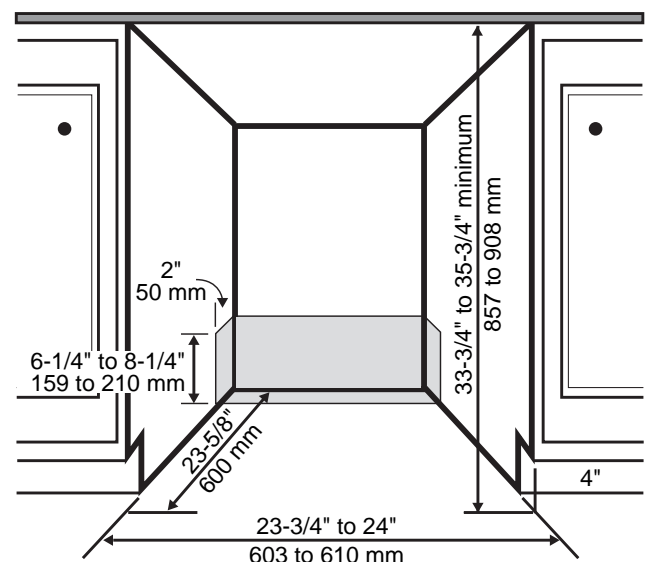
Refer to page 19 for instructions on how to install the custom panels.

Cutout Dimensions

	US	METRIC
HEIGHT*	33-3/4" to 35-3/4"	857 to 908 mm
WIDTH	23-3/4" to 24"	603 to 610 mm
DEPTH	23-5/8"	600 mm

NOTE: Maintain a 1/8" (3 mm) minimum clearance between unit and cabinet.

The electrical and water supplies should enter through the area indicated by the shaded area. Preferably, they should come through the right side of the machine. The access hole must be round and smooth and no bigger than 2" in diameter.



*If an accessory fill strip is used, then 3/8" (9.5 mm) must be added to dishwasher height and cutout height.

Specifications are subject to change without notice. See installation instructions for additional details.





W6461

COLORS	White	Titanium	Titanium Stainless	Stainless Steel
SKUs	W6461	W6461T	W6461TS	W6461SS
SHIPPING WT	174 lbs	174 lbs	174 lbs	184 lbs

Key Features (♦ Unique Features)

- ♦ EasyControl™ system with program dial, option buttons and LED window
- ♦ 11 programs are printed around knob on control panel.
- ♦ Six option features (buttons) are denoted on detergent drawer: temperature, spin speed, delay start, Super rinse, high water and anti-crease.
- ♦ LED window shows temperature, estimated remaining time, spin speeds, and available options.
- New Anti-Crease program (first ever in a washer) greatly reduces wrinkles before clothing goes in the dryer. After the last spin, the tank rotates for three seconds every minute for up to two hours or until the door is opened.
- Remembers last program used and automatically repeats program unless changed.
- Time delay start (1-24 hours)
- Seven wash temperature options (85° F to 205° F)
- 400-1600 rpm spin speeds, adjustable
- SensiSave water & energy saving system
- Program interrupt, add-an-item feature

Vents to 60 feet!



T731 (Vented) / T741 (Ventless)

	VENTED				VENTLESS
COLORS	White	Titanium	Titanium Stainless	Stainless Steel	White
SKUs	T731W	T731T	T731TS	T731SS	T741W
SHIPPING WT	86 lbs	86 lbs	86 lbs	96 lbs	104 lbs

Key Features (♦ Unique Features)

- ♦ EasyControl™ system with program dial, option buttons and LED window
- ♦ Six programs are printed around knob on control panel
- ♦ Six option features (buttons) are identified on sticker inside door: timed drying (5-90 mnts.), Anti-Crease, Delay Start (1-24 hours), temperature (low-normal), end-of-program buzzer, and cool-down cycle
- ♦ LED window shows: SensiDry™ program selected, time when a timed-drying program selected, number of minutes when Air Fluff selected, “End” when program is completed, and “C” when in cool-down cycle
- T731 vents 3 ways
- T731 exhausts to 60 feet (see page 23)
- ♦ Four-way Aqua-Block Water Containment System (T741)
- Internal moisture condenser system eliminates need for exterior wall venting (T741)
- Remembers last program used and automatically repeats program unless changed

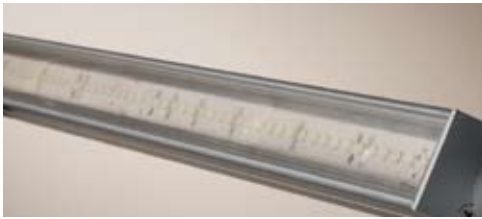


TRE'O® TC Series - Interior Architectural Digital Lighting



Luminaire

The TRE'O® TC Series luminaire is constructed of extruded aluminum with tooled end caps in nominal lengths from 1 to 12 feet. The TRE'O Series is provided with a selection of mountings that allow for 180 degree rotation and aiming of the fixture. All painted surfaces are pretreated with a phosphate wash and powder coated to a 3 mil thickness. U.L. and Canadian Standards approved for dry locations. Two year limited warranty. Please refer to the Insight website for the most current specifications.



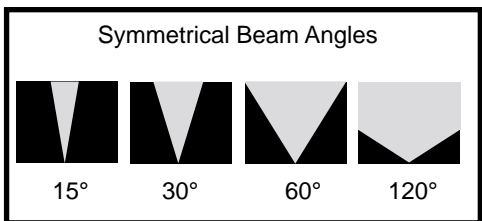
Lens

TRE'O® is provided with an acrylic snap-in tool-less lens, protecting the sealed LED platform. 120° clear lens is the default when ordering a TRE'O® TC product.



Insight LED Technology

Insight's TRE'O® is manufactured employing both classical heat dissipating designs and proprietary embedded intellectual property, providing a complete approach to long life and performance. See technology statement on page 4.



Optics

TRE'O® TC Series are available in four distinct symmetrical distributions. 15° 30°, 60° and 120° beam angles are available.

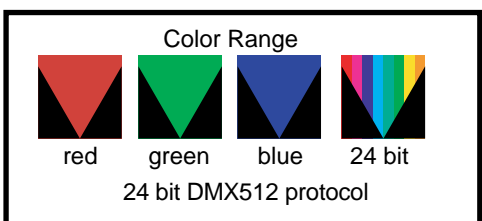
Electrical

TRE'O® luminaires are pre-wired and sealed for ease of installation and factory authorized maintenance. Insight UL Listed remote power supplies are provided in 120V AC / 24V DC. TC Series are compatible with UL dry location approved enclosures for remote placement. All power supplies must be ordered separately.

Two year limited warranty.

Control Options

Full range dimming control (white and static RGB) and DMX512 (24 Bit color mixing) controllers are available. Contact factory for specifications and performance data.



LED White Light & Static Colors

TRE'O Lumen Output

	Temperature °K			
	28/29	32/34	41/42	55/56
15 W/ft	480	510	540	600
12 W/ft	384	408	432	480
6 W/ft	192	204	216	240
Lumens/Foot				





ome

Organic Cottons

Organic cotton chambray:

Organic cotton chambray is a soft, durable shirt fabric made with a plain weave of colored warp threads and white weft threads. It has a comfortable drape, and a weathered, rustic look. It is often sold alongside denims, and is used to make shirts, kid's clothes, Western wear, skirts and dresses. Easy to sew.

Care: Machine wash and dry.

Colors: Solid colors: Whitened. Stripes: natural brown and white, natural green and white. Checks: natural brown and white.

Price: Organic cotton chambray: 60" wide: \$14.95 per yd.



Organic cotton canvas:

We carry a light weight 100% organic cotton canvas. It is stiff, with a tight plain weave, and is undyed and untreated as well. Easy to sew, it is most often used for upholstery, slipcovers and tablecloths. Also used for outdoor furniture, awnings, umbrellas, beach bags, and the like. **Be aware** that cotton is not the best fabric for continuous outdoor duty: it is prone to mildew in damp climates and exposure to sunlight for just two weeks can reduce its strength by 50% or more. Bring it in when not needed.

Care: Machine wash and dry.

Price: Organic cotton canvas: 63" wide: \$17.95 per yd.





Extensive Green Patio

Extensive green patio is a simplified version of an extensive green roof without the need for costly membranes for draining water and protecting a roof area below. In a patio the drainage occurs constantly through a geo-textile membrane and then immediately through the drainage spaces between patio boards. The planting is accomplished using a roll out mat impregnated with highly water range tolerant fescue seeds.

Planting media According to green roof specification this is a woven mat mad up of natural or artificial fibers that bind organic layers of material that become the growing medium for the seed. This matt is a soil-less matrix with the nutrient supplied for initial growth within the organic medium and subsequent nutrient supplied by watering either with a mixture in a hand watering can or by irrigation methods

Plant types: the fescue should consist of four types suitable for the condition of the area. In this case we have horticultural people advising in the Washington vicinity these plants are already being chosen and set into the matt material with watering occurring for the necessary sprouting to happen before October 2007.

Structural need: The patio must be able to withstand a combined live and dead load of 50 lbs per square foot and consisting of material that is not susceptible to rot and degradation. Our materials are all either galvanized light gauge steel, galvanized gating for the foundation or Trex decking which is a non biodegradable deck material made of recycled plastic.

Installation method: The geo-textile membrane is placed over the deck first and cut to the appropriate size. The matt is then rolled out after being delivered to the site with the plant material ready to be used. Watering will commence immediately to make sure the plants survive unless there is precipitation already taking place.



STP170-24/Ab-1

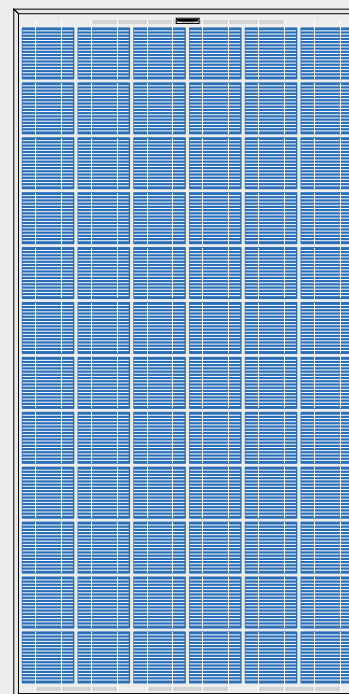
STP165-24/Ab-1 STP175-24/Ab-1
STP180-24/Ab-1

Suntech's STPAb-1 is designed and built to deliver highest efficiency and reliable power for on-grid residential and commercial systems worldwide. Relying on Suntech's well-known stringent manufacturing standards and latest PV technology, the module provides the highest possible energy output per Watt with total module efficiency of 14.1%. Superior conversion rate and exceptional low-light performance enable it to deal with the most challenging conditions of military, utility, residential and commercial installations. The module is the perfect choice for those who demand outstanding performance and exceptional uniform appearance.

Features and benefits

- High efficiency
- Nominal 24 V DC for standard output
- Outstanding low-light performance
- High transparent low-iron, tempered glass
- Unique techniques give the panel following features: esthetic appearance, with stands high wind-pressure and snow load, and easy installation
- Unique technology ensure that problems of water freezing and warping do not occur
- Design to meet unique demand of customer
- 25 year module output warranty

High Efficiency, High Euality PV Module



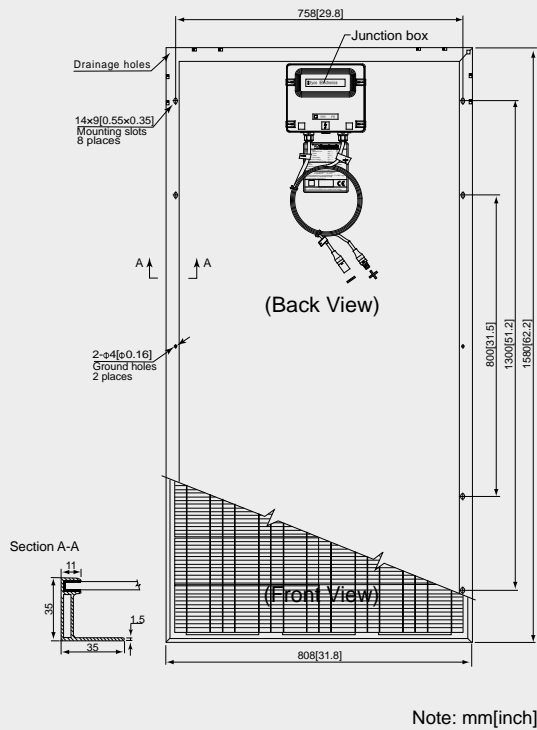
Electrical Characteristics

Model	STP180-24/Ab-1	STP175-24/Ab-1	STP170-24/Ab-1	STP165-24/Ab-1
Open-circuit voltage (Voc)	44.4V	44.2V	43.8V	43.6V
Optimum operating voltage (Vmp)	35.6V	35.2V	35.2V	34.8V
Short-circuit current (Isc)	5.4A	5.2A	5.14A	5.04A
Optimum operating current (Imp)	5.05A	4.95A	4.83A	4.74A
Maximum power at STC (Pmax)	180Wp	175Wp	170Wp	165Wp
Operating temperature	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Maximum system voltage	600V DC	600V DC	600V DC	600V DC

STC: Irradiance 1000W/m², Module temperature 25°C, AM=1.5



Module Diagram



Specifications

Cell	Multicrystalline silicon solar cells 125mm×125mm
No. of cells and connections	72(6×12)
Dimension of module	1580mm×808mm×35mm
Weight	15.5kg

Temperature Coefficients

NOCT	45°C±2°C
Short-circuit current temperature coefficient	0.045 %/K
Open-circuit voltage temperature coefficient	-0.34 %/K
Peak power temperature coefficient	-0.47 %/K
Power tolerance	±3%

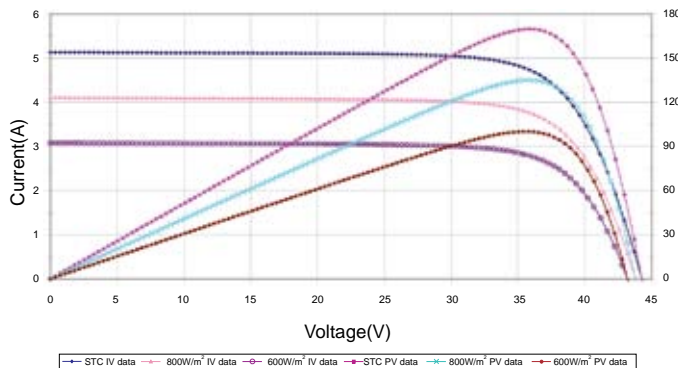
NOCT: Nominal Operating Cell Temperature
(data refer to STP165)

Output

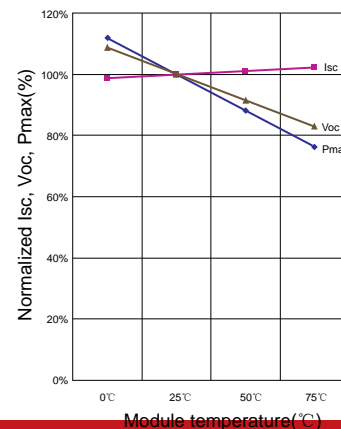
Cable	AIW (12AWG)
Asymmetrical Lengths	1200mm(-) and 800mm(+)
Connection	MC Plug Type IV

Characteristics

Module IV Graph 170W



Normalized Isc, Voc, Pmax vs. module temperature characteristics



STP170S-24/Ab-1

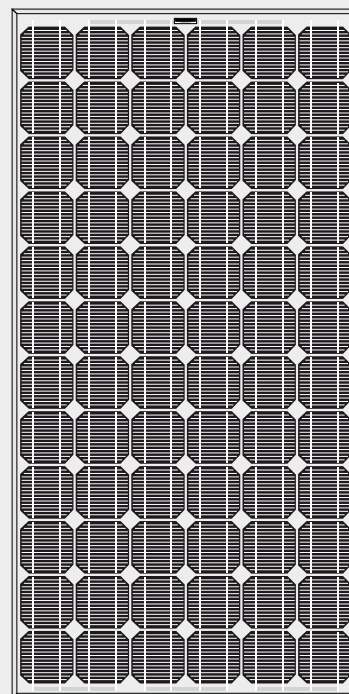
STP165S-24/Ab-1 STP175S-24/Ab-1
STP180S-24/Ab-1

High Efficiency, High Quality
 PV Module

Suntech's STPAb-1 is designed and built to deliver highest efficiency and reliable power for on-grid residential and commercial systems worldwide. Relying on Suntech's well-known stringent manufacturing standards and latest PV technology, the module provides the highest possible energy output per Watt with total module efficiency of 14.1%. Superior conversion rate and exceptional low-light performance enable it to deal with the most challenging conditions of military, utility, residential and commercial installations. The module is the perfect choice for those who demand outstanding performance and exceptional uniform appearance.

Features and benefits

- High efficiency
- Nominal 24 V DC for standard output
- Outstanding low-light performance
- High transparent low-iron, tempered glass
- Unique techniques give the panel following features: esthetic appearance, with stands high wind-pressure and snow load, and easy installation
- Unique technology ensure that problems of water freezing and warping do not occur
- Design to meet unique demand of customer
- 25 year module output warranty



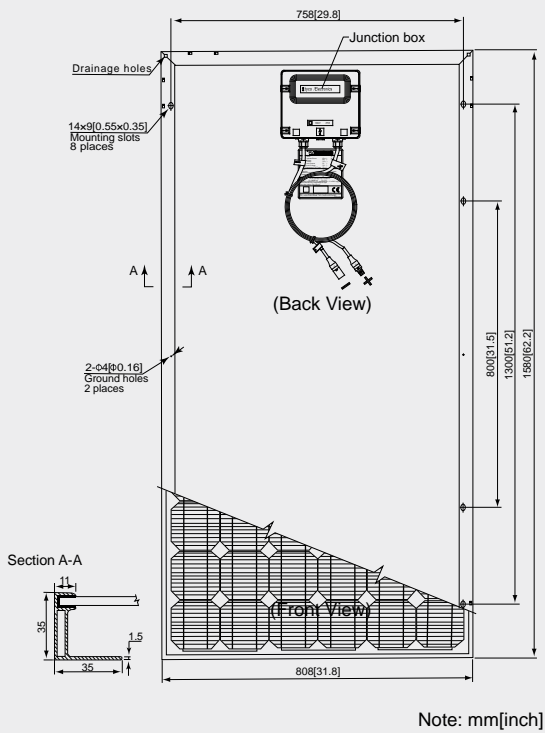
Electrical Characteristics

Model	STP180S-24/Ab-1	STP175S-24/Ab-1	STP170S-24/Ab-1	STP165S-24/Ab-1
Open-circuit voltage (Voc)	44.4V	44.2V	43.8V	43.6V
Optimum operating voltage (Vmp)	35.6V	35.2V	35.2V	34.8V
Short-circuit current (Isc)	5.4A	5.2A	5.14A	5.04A
Optimum operating current (Imp)	5.05A	4.95A	4.83A	4.74A
Maximum power at STC (Pmax)	180Wp	175Wp	170Wp	165Wp
Operating temperature	-40℃ to +85℃	-40℃ to +85℃	-40℃ to +85℃	-40℃ to +85℃
Maximum system voltage	600V DC	600V DC	600V DC	600V DC

STC: Irradiance 1000W/m², Module temperature 25℃, AM=1.5



Module Diagram



Specifications

Cell	Monocrystalline silicon solar cells 125mmx125mm
No. of cells and connections	72(6x12)
Dimension of module	1580mmx808mmx35mm
Weight	15.5kg

Temperature Coefficients

NOCT	48°C±2°C
Short-circuit current temperature coefficient	0.017 %/K
Open-circuit voltage temperature coefficient	-0.34 %/K
Peak power temperature coefficient	-0.48 %/K
Power tolerance	±3%

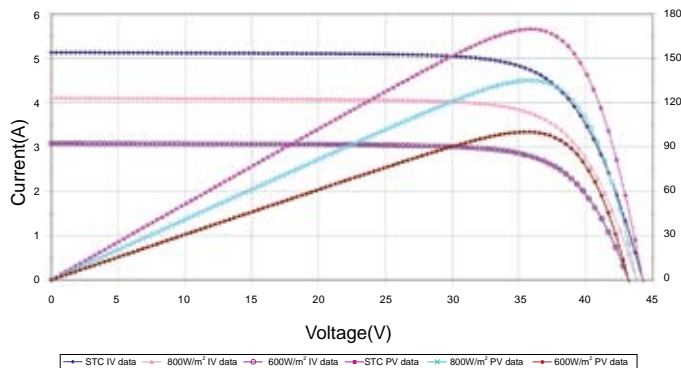
NOCT: Nominal Operating Cell Temperature
(data refer to STP165S)

Output

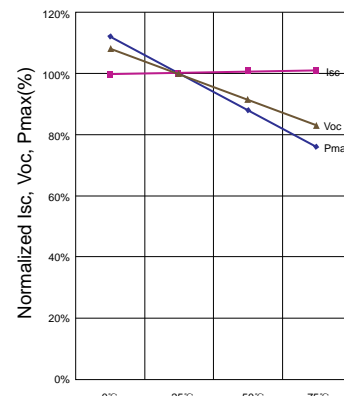
Cable	AIW (12AWG)
Lengths	750mm(-) and 750mm(+)
Connection	MC Plug Type IV

Characteristics

Module IV Graph 170W



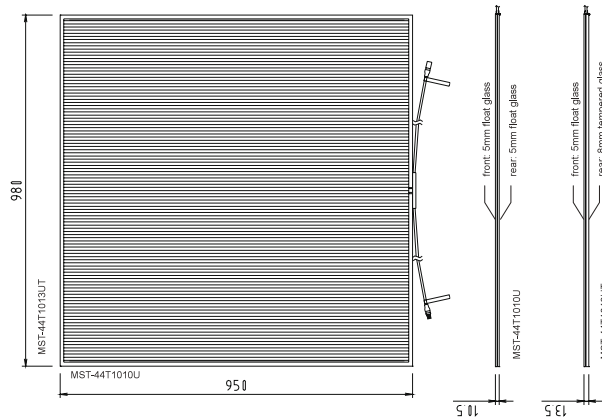
Normalized Isc, Voc, Pmax vs. module temperature characteristics



PHOTOVOL GLASS

MST-44T1010U / MST-44T1013UT

Two thicknesses are available: 10.5mm (Top, Bottom: 5t annealed) and 13.5mm (Top: 5t annealed, Bottom: 8t tempered). Developed by MSK with Kaneka Corporation and the Japanese architects Taiyo Kogyo. 20 year power output guarantee. IEC and UL certified.



ELECTRICAL DATA

Transmittance	10%	5%	1%
Output power	44.0W	50.W	55.0W
Max power voltage	59.6V	64.4V	68.0V
Max power current	0.74A	0.78A	0.81A
Open circuit voltage	91.8V	91.8V	91.8V
Short circuit current	0.97A	1.09A	1.14A

Measured at standard test conditions of 1000W/m² irradiance, AM1.5 spectrum, 25°C. Values stabilize after a few months, initial values may exceed stabilized values shown by up to 18%.

OPTICAL DATA

visible light	transmitted	10.6%
	reflected	9.7%
total solar energy	transmitted	10.0%
	reflected	20.0%
	absorbed	70.0%
UV	rejected	98.9%

THERMAL DATA

solar heat gain coefficient	vertical	0.24
	at 45°	0.25
shading coefficient	horizontal	0.25
	at 45°	0.28
U-value (exterior to interior)	horizontal	0.29
	vertical	6.0 W/m ² K
U-value (interior to exterior)	at 45°	6.5 W/m ² K
	horizontal	6.5 W/m ² K
U-value (interior to exterior)	vertical	6.0 W/m ² K
	at 45°	5.6 W/m ² K
U-value (interior to exterior)	horizontal	4.8 W/m ² K

MECHANICAL DATA

Length	980mm
Width	950mm
MST-44T1010U depth	10.5mm (float glass)
MST-44T1013UT depth	13.5mm (tempered glass)
MST-44T1010U weight	23kg
MST-44T1013UT weight	30kg
Series cells	108
Parallel cells	1
Cell area	80.95cm ²
Cell length	922mm
Cell width	8.78mm

MSK Headquarters
6F Nishi Shinjuku KS Building
3-6-11 Nishi Shinjuku
Shinjuku-ku, Tokyo
Japan 160-0023
t: +81(0)3 3342 3838
f: +81(0)3 3342 6534
e: staff@msk.ne.jp
w: www.msk.ne.jp

Suntech Headquarters
17-6 Changjiang South Road
New District Wuxi
Jiangsu Province
China 214028
t: +86 (0)510 8531 8000
f: +86 (0)510 8534 3321
e: sales@suntech-power.com
w: www.suntech-power.com

Suntech Europe
Canada House
272 Field End Road
Eastcote
Middlesex HA4 9NA
United Kingdom
t: +44 (0)20 8582 0393
f: +44 (0)20 8582 0394
e: sales@suntecheurope.com

Suntech America Inc.
4996 Camelback Lane
Frederick
Maryland
MD 21703
USA
t: +1(0)301 473 4619
f: +1(0)301 473 5661
e: Lmay@suntechamerica.com

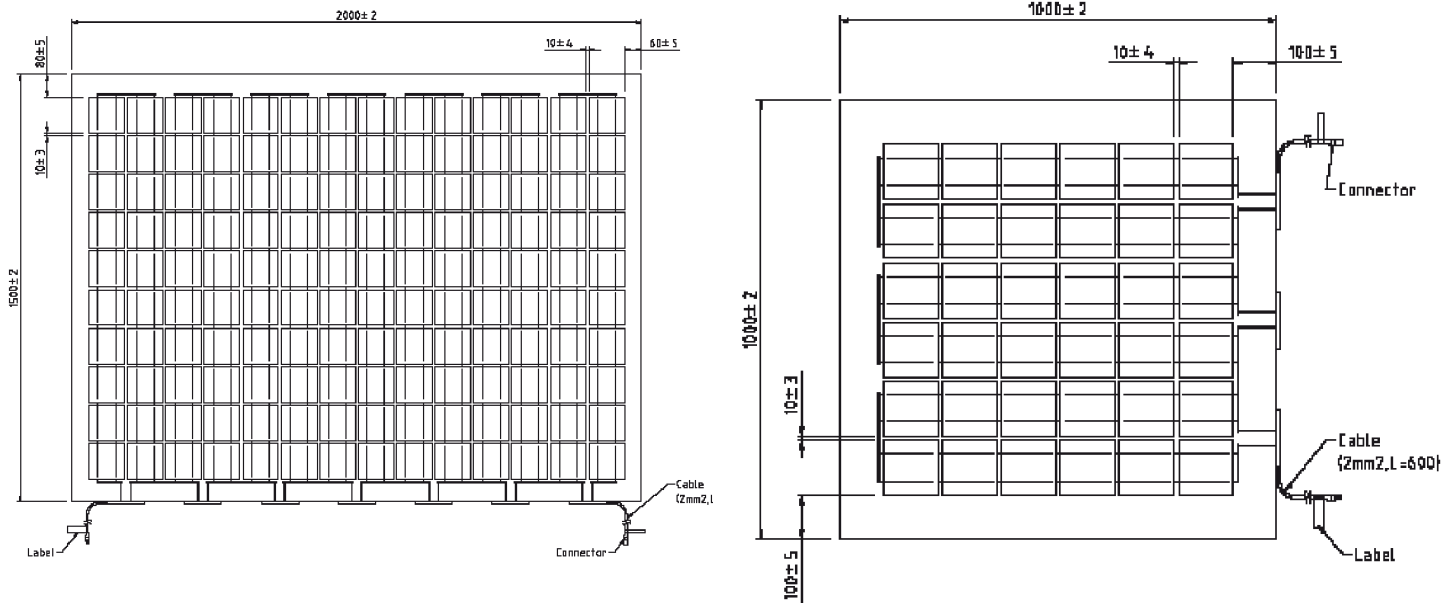
Distributor's Stamp

DISCLAIMER: The products provided by Suntech are provided on an "as is" basis. Suntech makes no representation and gives no warranties of any kind, express or implied, in respect of the products provided by it, including, but not limited to, the warranties of merchantability or fitness for a particular purpose. There is no warranty by Suntech that the operation of the products will be uninterrupted or error-free. IN NO EVENT SHALL SUNTECH, ITS EMPLOYEES OR AFFILIATES BE LIABLE FOR ANY LOST PROFITS, REVENUE, OR COSTS OF PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, PROPERTY DAMAGE, PERSONAL INJURY, INTERRUPTION OF BUSINESS, OR FOR ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL, ECONOMIC, COVER, PUNITIVE, SPECIAL, OR CONSEQUENTIAL DAMAGES, HOWEVER CAUSED AND WHETHER ARISING UNDER CONTRACT, TORT, NEGLIGENCE, OR OTHER THEORY OF LIABILITY ARISING OUT OF THE USE THE PRODUCTS.



For more information, visit www.msk.ne.jp
or call our head office, +81(0)3 3342 3838





Light Thru modules are made to custom order (refer to page 4 for options). Examples of typical characteristics are given as a guide.

LENGTH (m)	1	1.5	2	1.5	2
WIDTH (m)	1	1	1	1.5	1.5
Cells (No) (125mm polycrystalline cells)	6x6	10x6	14x6	10x10	14x10
Pmax (W)	78	129	181	215	301
Vpm (V)	18.6	30.8	43.2	51.4	71.9
Ipm (A)	4.19	4.19	4.19	4.19	4.19
Voc (V)	22.0	36.6	51.2	61.0	85.4
Isc (A)	4.63	4.63	4.63	4.63	4.63
Wind load (Pa)	27,563	18,375	13,781	12,250	9,188
Snow load (Pa)	18,375	12,250	9,188	8,167	6,125

Loads assume module is fixed on all four sides. Glass thickness 5mm+5mm tempered glass.

MSK Headquarters

6F Nishi Shinjuku KS Building
3-6-11 Nishi Shinjuku
Shinjuku-ku, Tokyo
Japan 160-0023
t: +81(0)3 3342 3838
f: +81(0)3 3342 6534
e: staff@msk.ne.jp
w: www.msk.ne.jp

Suntech Headquarters

17-6 Changjiang South Road
New District Wuxi
Jiangsu Province
China 214028
t: +86(0)510 8531 8000
f: +86(0)510 8534 3321
e: sales@suntech-power.com
w: www.suntech-power.com

Suntech Europe

Canada House
272 Field End Road
Eastcote
Middlesex HA4 9NA
United Kingdom
t: +44(0)20 8582 0393
f: +44(0)20 8582 0394
e: sales@suntecheurope.com

Suntech America Inc.

4996 Camelback Lane
Frederick
Maryland
MD 21703
USA
t: +1(0)301 473 4619
f: +1(0)301 473 5661
e: Lmay@suntechamerica.com

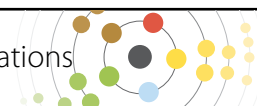
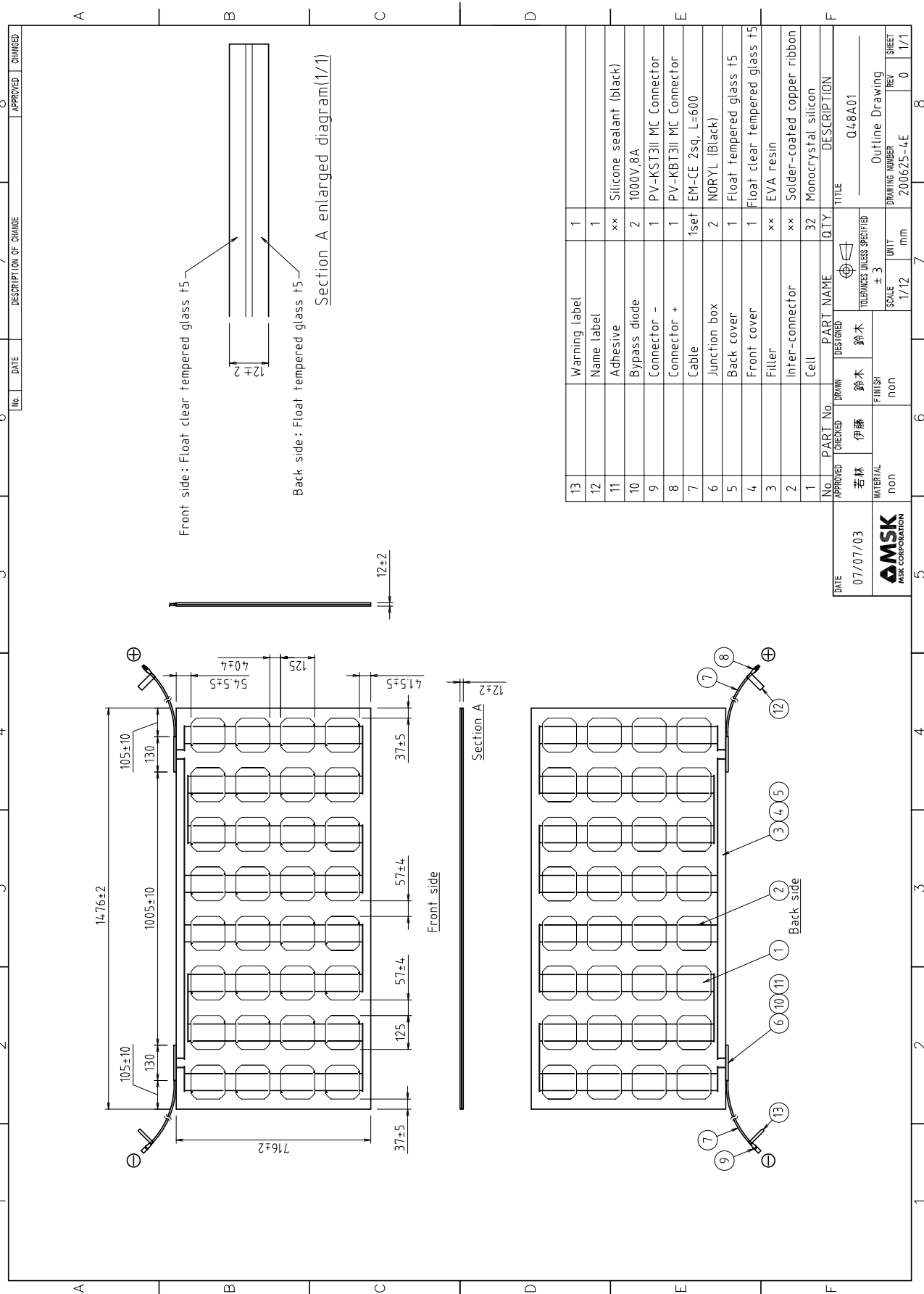
Distributor's Stamp

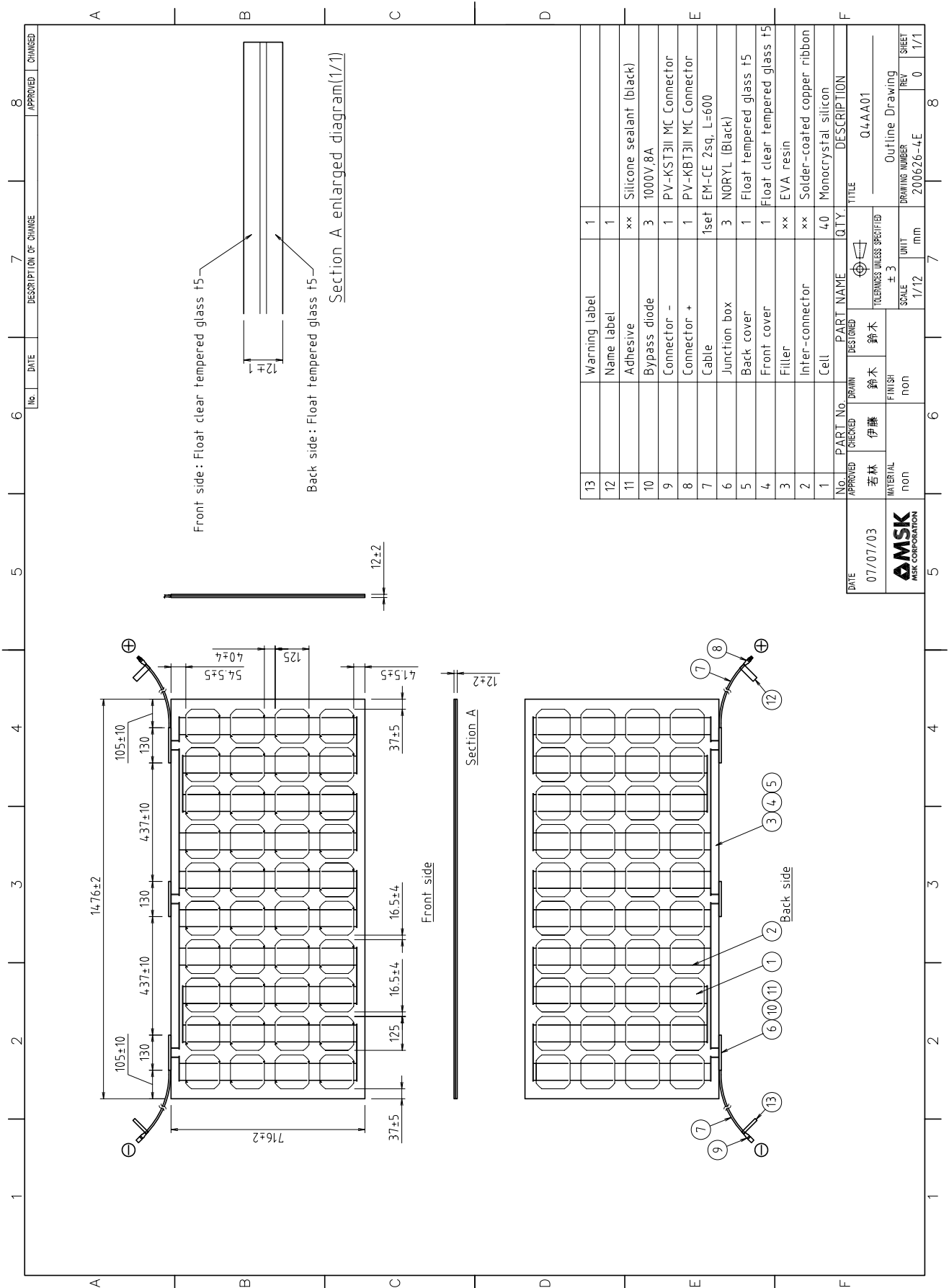
DISCLAIMER: The products provided by Suntech are provided on an "as is" basis. Suntech makes no representation and gives no warranties of any kind, express or implied, in respect of the products provided by it, including, but not limited to, the warranties of merchantability or fitness for a particular purpose. There is no warranty by Suntech that the operation of the products will be uninterrupted or error-free. IN NO EVENT SHALL SUNTECH, ITS EMPLOYEES OR AFFILIATES BE LIABLE FOR ANY LOST PROFITS, REVENUE, OR COSTS OF PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES, PROPERTY DAMAGE, PERSONAL INJURY, INTERRUPTION OF BUSINESS, OR FOR ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL, ECONOMIC, COVER, PUNITIVE, SPECIAL, OR CONSEQUENTIAL DAMAGES, HOWEVER CAUSED AND WHETHER ARISING UNDER CONTRACT, TORT, NEGLIGENCE, OR OTHER THEORY OF LIABILITY ARISING OUT OF THE USE THE PRODUCTS.



For more information, visit www.msk.ne.jp
or call our head office, +81(0)3 3342 3838









DEEP CYCLE-SOLAR SERIES 5000

BATTERY TYPE

VOLTS 2

2 KS 33PS

DIMENSIONS

LENGTH	392 MM	15 7/16	INCHES
WIDTH	211 MM	8 5/16	INCHES
HEIGHT	630 MM	24 13/16	INCHES

WEIGHT DRY

66 KG 145 LBS.

WEIGHT WET

95 KG 208 LBS.

CONTAINER CONSTRUCTION

INNER CONTAINER	POLYPROPYLENE
INNER COVER	POLYPROPYLENE - HEAT SEALED TO INNER CONTAINER
OUTER CONTAINER	HIGH DENSITY POLYETHYLENE
OUTER COVER	HIGH DENSITY POLYETHYLENE SNAP FIT TO OUTER CONTAINER
HANDLES	MOLDED

PLATES PER CELL

33

ELECTROLYTE RESERVE ABOVE PLATES

95 MM 3.75 INCHES

DESIGN CRITREA 10 YEAR WARRANTY

3300 CYCLES 15 YEAR LIFE

POSITIVE PLATE DIMENSION

HEIGHT	432 MM	17.0	INCHES
WIDTH	143 MM	5.625	INCHES
THICKNESS	6.99 MM	0.275	INCHES

NEGATIVE PLATE DIMENSION

HEIGHT	432 MM	17.0	INCHES
WIDTH	143 MM	5.625	INCHES
THICKNESS	4.57 MM	0.180	INCHES

SEPARATOR

SEPARATOR THICKNESS 0.105 INCH

INSULATION

POSITIVE PLATE DOUBLE WRAPPED WITH SLYVER 0.020 HEAVY GLASS MAT AND ENVELOPED WITH HEAVY DUTY SEPARATOR

TERMINALS

FLAG WITH STAINLESS STEEL NUTS AND BOLTS

COLD CRANK

CCA 0°F / -17.8°C 4952
MCA 32°F / 0°C 6190

RESERVE

MINUTES AT 25A

4915

CAPACITY

20 HR RATE 1766

CAP / AH CURRENT / AMPS

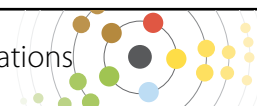
CAPACITY AT THE 100 HOUR RATE	1.265 SP. GR.	2490	24.90
CAPACITY AT THE 72 HOUR RATE	1.265 SP. GR.	2349	32.62
CAPACITY AT THE 50 HOUR RATE	1.265 SP. GR.	2172	43.44
CAPACITY AT THE 24 HOUR RATE	1.265 SP. GR.	1837	76.5
CAPACITY AT THE 20 HOUR RATE	1.265 SP. GR.	1766	88.3
CAPACITY AT THE 15 HOUR RATE	1.265 SP. GR.	1642	109.5
CAPACITY AT THE 12 HOUR RATE	1.265 SP. GR.	1536	128.0
CAPACITY AT THE 10 HOUR RATE	1.265 SP. GR.	1466	146.6
CAPACITY AT THE 8 HOUR RATE	1.265 SP. GR.	1377	172.2
CAPACITY AT THE 6 HOUR RATE	1.265 SP. GR.	1254	209.0
CAPACITY AT THE 5 HOUR RATE	1.265 SP. GR.	1183	237
CAPACITY AT THE 4 HOUR RATE	1.265 SP. GR.	1095	274
CAPACITY AT THE 3 HOUR RATE	1.265 SP. GR.	989	330
CAPACITY AT THE 2 HOUR RATE	1.265 SP. GR.	848	424
CAPACITY AT THE 1 HOUR RATE	1.265 SP. GR.	600	600

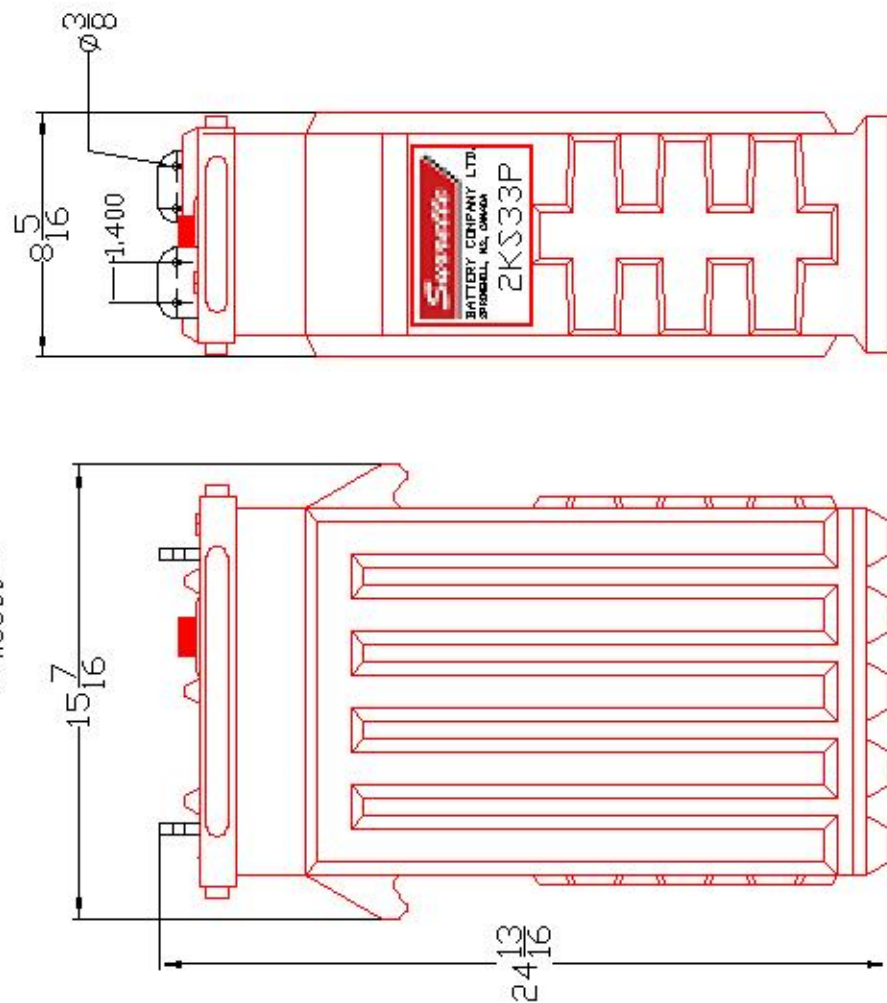
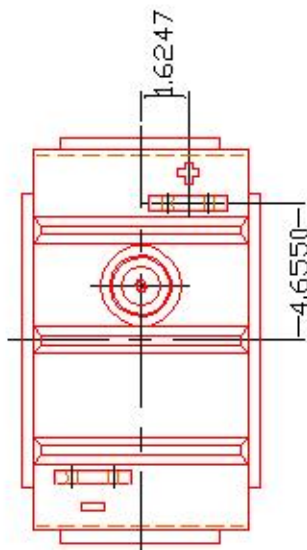
Rev. 0

April - 04

SDSPECS 94

cost: \$470 each number of modules used: 24





PART NUMBER: 2-KS-33P
 WEIGHT WET: 208 LB/ 94 KG
 WEIGHT DRY: 145 LB/ 66 KG
 CAPACITY: 1,448 AH 8 HR
 1,766 AH 20 HR
 2,491 AH 100 HR

OVERALL DIMS: 15 7/16 X 8 5/16 X 24 13/16



MAX HT WITH OPTIONAL 25 1/2" HYDROCAPS



BATTERY COMPANY LTD.
 SPRINGHILL, NOVA SCOTIA, CANADA

TITLE: 2 KS 33P

DESCRIPTION:

2V / 1 CELL 33 PLATE 500/5000 SERIES

CONTACT INFO:

WEB: WWW.SURRETTE.COM
 E-MAIL: SALES@SURRETTE.COM
 PHONE: 1-800-681-9914

SCALE: 1" = 6"
 8.5" X 11"

JPEG:
 NOT TO SCALE

DATE: 20-APR-04 REVISION REV 1

DRAWING NO: DWG 066, BD2KS33P



The OutBack FX series is a modular "building block" sine wave inverter/charger that can be used for both small and large power systems. Each OutBack FX inverter/charger is a complete power conversion system - DC to AC inverter, battery charger and AC transfer switch. Additional FX inverter/chargers can be connected at any time in either parallel (120 VAC), series (120/240 VAC), or three-phase (120Y208 VAC) configurations. This allows a system to be tailored to meet the specific power conversion requirements of the application, both at the time of the installation and in the future. The OutBack FX series is also available in export versions with 230 VAC, 50 hz output that can be connected in parallel (230 VAC) or in three phase (230Y400 VAC) configurations.

The OutBack FX is designed to survive harsh environments anywhere in the world. Our unique sealed, gasketed die-cast aluminum chassis protects and keeps the power conversion components cool - without requiring outside air to be blown through the sensitive electronics. This reduces the major causes of inverter failure - corrosion, dust, insect and animal damage. The FX can be used in high ambient applications up to 60°C with reduced output ratings.

The OutBack FX series inverter/charger system is designed for both residential and commercial stand-alone or back-up power applications with battery energy storage. It is designed to operate as a coordinated system with the other OutBack products i.e. the PSDC, PSAC and PSR enclosures as well as the MX60 MPPT charge controllers and MATE system controller and display.



SPECIFICATIONS	FX2024	FX2548
Continuous Power Rating at 25°C	2000 VA	2500 VA
Nominal DC Input Voltage	24 VDC	48 VDC
Nominal AC Voltage / Frequency	120 VAC / 60 Hz	120 VAC / 60 Hz
Continuous Output at 25°C	17 amps AC RMS	21 amps AC RMS
Idle Power (with AC output / no load)	18 to 20 watts DC (<i>typical</i>)	21 to 23 watts DC (<i>typical</i>)
Efficiency (<i>typical at 25°C & 75% load</i>)	92% (<i>powering 1500 watts of resistive load</i>)	93% (<i>powering 1875 watts of resistive load</i>)
Total Harmonic Distortion (<i>voltage</i>)	2% typical / 5% maximum	2% typical / 5% maximum
Output Voltage Regulation	+/- 2% typical (<i>steady state load conditions</i>)	+/- 2% typical (<i>steady state load conditions</i>)
Surge Power Capability - AC output		
Peak (<i>1mSec</i>)	45 amps AC	56 amps AC
RMS (<i>100mSec</i>)	32 amps AC	40 amps AC
Overload Capability (<i>from 25°C start</i>)		
5 second	3800 VA	4800 VA
5 minutes	3000 VA	3300 VA
30 minutes	2500 VA	2800 VA
continuous	2000 VA	2500 VA
Automatic AC Transfer Relay	60 amps AC @ 120 VAC	60 amps AC @ 120 VAC
AC Input Current	60 amps AC maximum (<i>adjustable</i>)	60 amps AC maximum (<i>adjustable</i>)
AC Input Voltage Range	90-140 VAC (<i>adjustable</i>)	90-140 VAC (<i>adjustable</i>)
Frequency Range - AC input	54 - 66 HZ	54 - 66 HZ
DC Input Voltage Range	20 - 33 VDC (<i>adjustable low battery cut-out</i>)	40 - 66 VDC (<i>adjustable low battery cut-out</i>)
Recommended DC Breaker	OBDC-175 (<i>175 amps DC - 1.5" wide</i>)	OBDC-100 (<i>100 amps DC - 1" wide</i>)
Continuous Battery Charger Output	55 amps DC	30 amps DC
Battery Charging Regulation Method	5 stage (<i>bulk/absorb/float/silent/manual EQ</i>)	5 stage (<i>bulk/absorb/float/silent/manual EQ</i>)
Operating Temperature Range	-40°C to 60°C (<i>derate 20VA/°C over 25°C</i>)	-40°C to 60°C (<i>derate 20VA/°C over 25°C</i>)
Environmental Rating	Waterproof to IEC 529 IP 65	Waterproof to IEC 529 IP 65
Inverter Dimensions	16.25" L x 8.25" W x 11.5"H	16.25" L x 8.25" W x 11.5"H
Shipping Box Dimensions	21.6" L x 12.75" W x 15.5" H	21.6" L x 12.75" W x 15.5" H
Shipping Weight	60 lbs. - 27.2 kg	62lbs. - 29.4 kg
Warranty	Two years (<i>optional extended 5 yr warranty</i>)	Two year (<i>optional extended 5 yr warranty</i>)
Suggested Retail Price	\$ 1,795.00	\$2,245.00

Specifications subject to change without notice



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).



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



Main Office:

19009 62nd Avenue NE
Arlington, WA 98223 USA
Phone: (360) 435.6030
Fax: (360) 435.6019

European Office:

Urb. Garraf II Buzón 214
08860 Les Botigues de Sitges
Barcelona, ESPAÑA
Phone: (+34) 600.843.845

Available From:



www.outbackpower.com



DeltaSol Plus

Digital differential controller with four temperature sensor inputs and two standard relay outputs. Ideal for controlling and monitoring a solar installation having one or two storage tanks, East & West collectors, one or two circulating pumps (valves), or two separate control loops. Features include:

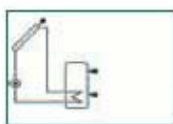


- 2-line illuminated LC digital display with up to (9) integrated system schematics
- Flashing symbols for sensors, pumps and valves
- Easy adjustment of control parameters via three button keypad
- Frost protection, system cooling, and special evacuated tube collector operating functions
- Energy measurement capability
- Thermostat function (to divert excess heat or supply back-up heat)
- Real time clock for time based control functions
- VBus® capable for data communication and remote service, bidirectional communication to remote modules, PCs, and data loggers. The controller can be configured comfortably by PC with the RESOL Service Center Software.

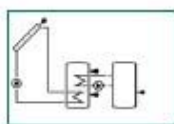
Dimensions: 173 x 110 x 47 mm

Power: 115 VAC / 60 Hz

Controller sold with (4) four Pt1000 temperature sensors.



Arr 1



Arr 2

System survey:

Arr 1 : standard solar system

Arr 2 : solar system with heat exchange

Arr 3 : solar system with after-heating

Arr 4 : solar system with store charge in layers

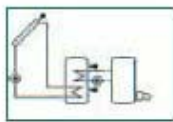
Arr 5 : 2-store solar system with valve logic

Arr 6 : 2-store solar system with pump logic

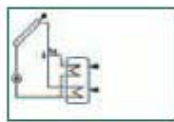
Arr 7 : solar system with 2 collectors and 1 store

Arr 8 : solar system with after-heating by solid hot fuel boilers

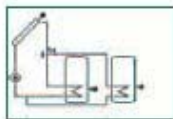
Arr 9 : solar system with heating circuit reverse raising



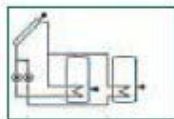
Arr 3



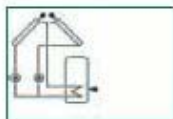
Arr 4



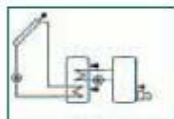
Arr 5



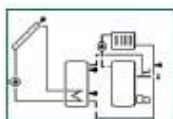
Arr 6



Arr 7

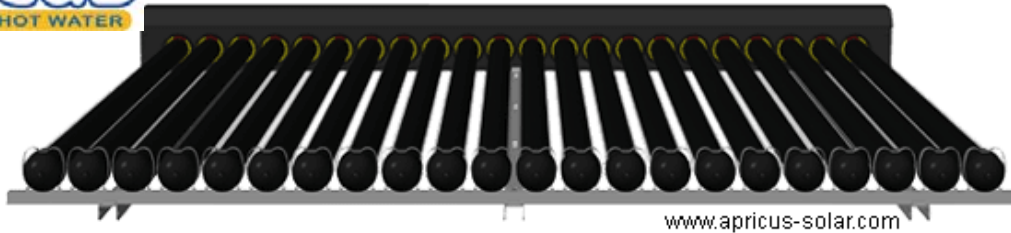


Arr 8



Arr 9





Main Features Overview



Place your mouse on the pictures above to see what each represents
Click on picture to jump to detailed explanation



The Apricus solar collector is designed to be used with pressure up to **8 bar/116psi**. This means it is compatible with all low pressure, and most mains pressure domestic hot water systems. In closed loop or sealed (dead water) thermal store systems an expansion vessel is often used to prevent pressure buildup as the water expands. A pressure release valve should also be used as a safety backup.



In areas where freezing is not of concern, open loop systems are often used. Open-loop systems are also appropriate for cold regions when used in combination with a **Delta-T controller** that incorporates a freeze protection feature. Closed loop systems usually incorporate the use of a heat exchanger, either inside or outside the hot water storage tank. Apricus solar collector are suitable for both open or closed systems, as long as pressure, heat and freezing are controlled.



The Apricus solar collector does not have a built-in tank, in fact the manifold of the 20 tube solar collector only contains about 510ml/1pint of water. A circulation pump is required to circulate the water through the manifold and back to the solar storage tank. Generally a **Delta-T controller** is used to control the pump. A flow rate of only **2L/min** is required for most domestic installations, and therefore a low wattage pump is sufficient. Larger pumps are only necessary when several solar collectors are connected in series, or when the pump is required to overcome head pressure. The pressure drop at low flow rates is very minimal, only 700 Pa @ 3.3L/min for 20 tube manifold, and so is not a major consideration when sizing pumps.



Thick glass wool surrounds the Apricus solar collector's copper header, providing excellent insulation. The piping to and from the collector are however still susceptible to freezing, and therefore traditional freeze protection should be employed (low temp controller setting, or glycol/water closed loop). Solar tubes and heat pipes are able to withstand extremely cold conditions without being damaged. ([click here for heat pipe details](#)).



The advantage of solar tubes is that they insulate the inner tube from heat loss. This means that once heat is absorbed, it is transferred to the water in the manifold, and not lost to the outside environment. This is the key difference between solar tubes and flat plate solar collectors: the insulative properties. Combined with the heat transfer efficiency of the heat pipe, the Apricus solar collector can deliver excellent heat output all year round. The IAM (Incidence Angle Modifier) values of the Apricus are also very different to solar collectors with flat absorbers. The positive (>1) IAM values mean that the solar collector actually performs best mid morning and mid afternoon, resulting in a more stable heat output throughout the day. [Click here](#) to learn more about efficiency.





When installing a solar collector on your roof, how it looks is certainly important. The Apricus solar collector is designed to be low profile, sitting close to the surface of the roof. The tubes are black and so blend in nicely with most roof colours. The manifold is available in black, dark brown, or silver powder coated aluminium, and with either rear (R) or end (E) port models. The rear port manifold allows the plumbing to be hidden behind the solar collector manifold. In addition by using rear ports, two or more solar collectors may be connected side by side without a gap in between. End ports may be preferred for large scale applications for ease of connection in series, and reduction of pressure drop through the piping. Click here to see some [installation photos](#).



Corrosion is always a consideration for any system that involves water and high temperatures. In warm environments, heavily chlorinated water can become a strong corrosive agent. In order to provide maximum corrosion resistance, the Apricus solar collector uses high purity (99.93%) copper piping and silver braze for the header. Copper provides excellent corrosion resistance and is commonly used in household plumbing. If corrosive liquids are to be used in the system, then a closed loop is highly recommended, thus allowing a non-corrosive liquids to be used in the solar collector loop.

If installed in open flow with a dead water thermal store style tank, corrosion and scale are almost eliminated as the system accepts almost no fresh water supply.



The high cost of solar tube style collectors, and in fact all solar collectors, has been a major obstacle to their popularity and wide scale use. The Apricus solar collector is a high quality system that provides excellent heat output and reliable operation. As a result of clever product design and low manufacturing costs, Apricus solar collectors are now very affordable, providing fast payback times.*

Please contact your [local distributor](#) for retail pricing in your area.

*Depends on factors such as total system cost, energy costs and solar insolation levels.



Scale formation is an issue in many regions, as it gradually blocks up plumbing particularly in hot water systems. With the high temperatures that the Apricus solar collector produces, scale formation in the manifold may occur. If water supply is very hard there are two main options:

1. Use an electric or magnetic water softener on plumbing
2. Use a closed loop system
3. Use an dead water thermal store configuration. Option 1 may still be required to protect the rest of the system.

A closed loop requires a more complicated system design and added cost. If there is no other reason to use a closed loop than to avoid scale, then it is advisable to use one of the widely available water softening devices.



Apricus solar collectors are ideal for large scale solar water heating applications, able to be used in hotels, airports, apartment buildings or anywhere where hot water or heating is required. The economics of large scale applications are generally more favorable than domestic, as instead of having a pump and tank for every one or two solar collectors, a single tank and pump can be used for 50 solar collectors. Apricus solar collectors can accept mains pressure, are corrosion resistant and can be installed in series and/or parallel, thus are suited to a wide range of large and small scale applications.



The cost involved in repairing a household appliance is increasing all the time, not due so much to spare part costs, but rather the labour cost involved in having a technician visit. With this in mind the Apricus solar collector is designed to be maintenance free, but if for some reason a solar tube should ever be damaged, it can be replaced quickly and easily by any person possessing basic trade skills.



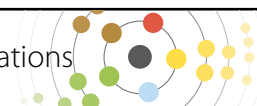


Apricus Solar Collector General Specifications	
Manifold Casing Material	Aluminium (grade 3A21)
Frame Material	1.5mm 304 Stainless Steel
Header Pipe Material	99.93% pure Copper & lead free 45% silver brazing
Insulation	Compressed Glass Wool - K = 0.043W/mK
Rubber Seals and Rings	HTV grade silicone rubber
Optimal installation angle	20-70° Vertical, -5° to +5° Horizontal
Maximum Operating Pressure	8bar - 116psi
Optimal flow rate	0.1L/min/tube - 0.026G/min/tube
Performance Data (SPF)	Conversion Factor: ho = 0.717 Loss Coefficients: a1 = 1.52, a2 = 0.0085

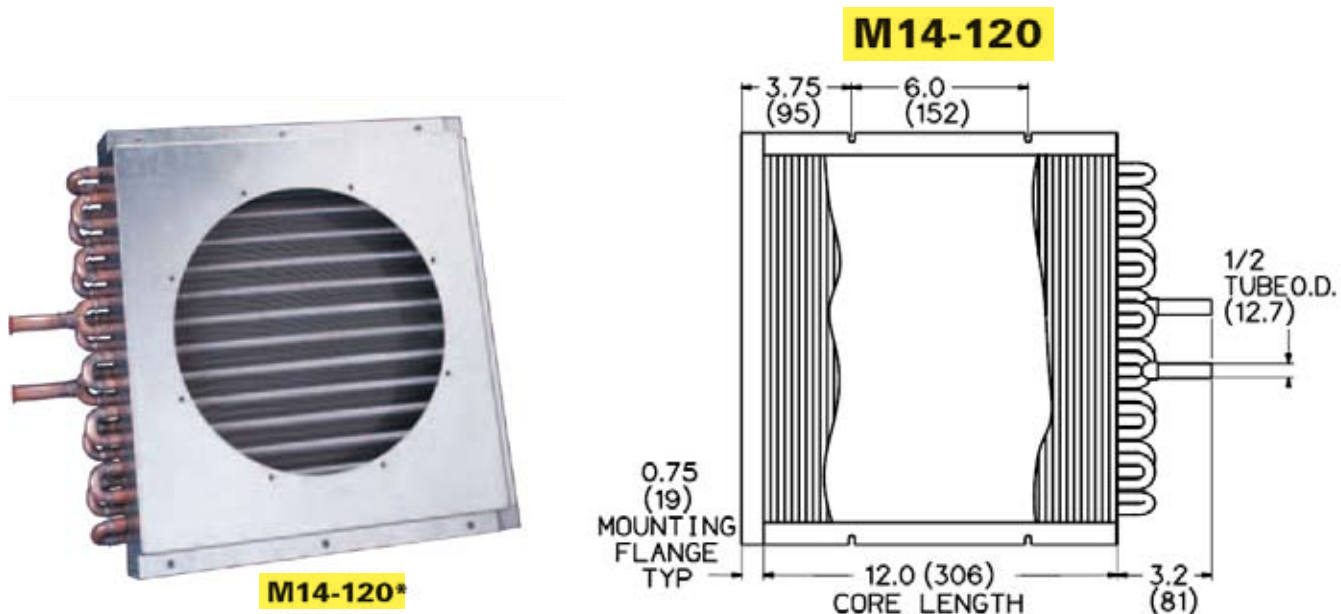
Model Specifications					
Model	AP-Demo	AP-10	AP-20	AP-22	AP-30
Overall Length (mm / inch) 1	660 / 25.9"	1980 / 77.9"			
Overall Width (mm / inch)	376 / 14.8"	796 / 31.3"	1496 / 58.8"	1636 / 64.4"	2196 / 86.4"
Overall Height (mm / inch)	156 / 6.1" (including flush roof mounting frame)				
Absorber Area (m ² / ft ²) 2	0.08 / 0.86	0.8 / 8.6	1.6 / 17.2	1.76 / 18.9	2.4 / 25.8
Fluid Capacity (ml / ounces)	190 / 6.4	290 / 9.8	510 / 17.2	550 / 18.6	833 / 28.2
Gross Area (m ² / ft ²) 3	0.25 / 2.67	1.57 / 16.95	2.96 / 31.8	3.24 / 34.8	4.35 / 46.8
Dry Weight (kg / pounds)	8 / 18	35 / 77	64 / 140	71 / 157	95 / 209

- Length and width do not include the inlet and outlet which protrude from either the rear or ends of the manifold.
- Absorber area calculated as: D x L x N where:
.....D = diameter of the absorber tube, in this case 0.047m
.....L = exposed length of tube: For 1.8m tubes this is 1.72m
.....N = number of tubes (4, 10, 20, 22, 30)
.....Eg. 0.047 x 1.72 x 20 = 1.6m² absorber area (1m² = 10.76ft²)
- Calculated simply as overall length (including frame) x overall width.
- AP Models are named as follows:
AP(Manifold Casing Colour)(Port Location) - (Tube Number)
Manifold Casing Material: K = Black, S = Silver
Port Location: R = Rear, E = End
Tube Number: 4, 10, 20, 22, 30
Eg. APKR-20 = black rear port 20 tube manifold.

Note: Depending on region certain colour/port options may not be available.



COPPER HEAT EXCHANGERS - OEM COILS



Lytron's OEM Coils are ideal for the price sensitive customer who does not require the additional features of the 6000 Series. Compatible with ordinary water, EGW, and other common coolants, these coils are ideal for industrial applications.

To maintain the lowest cost while ensuring excellent performance, Lytron's OEM Coils use aluminum fin, and galvanized steel side rails and tube sheets. Tube spacing was increased to balance the air and liquid-side capacities. The result is fewer tubes per heat exchanger for a lower total cost—all without compromising performance.

We have incorporated almost 50 years of manufacturing experience into the design of these extremely reliable, leak-free heat exchangers. OEM Coils use seamless copper tubing expanded into aluminum fins for an effective thermal connection. We silver braze the liquid circuit and assemble the finned tubes into a rugged, galvanized steel frame. The standard unit is unpainted but, if specified, the heat exchanger can be painted black. Finally, all units are then pressure tested to 150 psi (10.3 bar) to ensure leak-free operation.

Six standard configurations are available with beaded, straight tube, or 37° flare nut fluid connections. For orders of more than 100 units, OEM Coils are available in customer-specified lengths from 6 to 48 inches, with single or dual circuit tubing configurations of 5 to 16 tubes. Lytron also offers the 6000 Series high performance copper heat exchangers which are described on page 44. For OEM quantities, an overview of our custom heat exchanger capabilities is presented on page 68.



OEM Coil shown with fan, finger guard and hose connections.

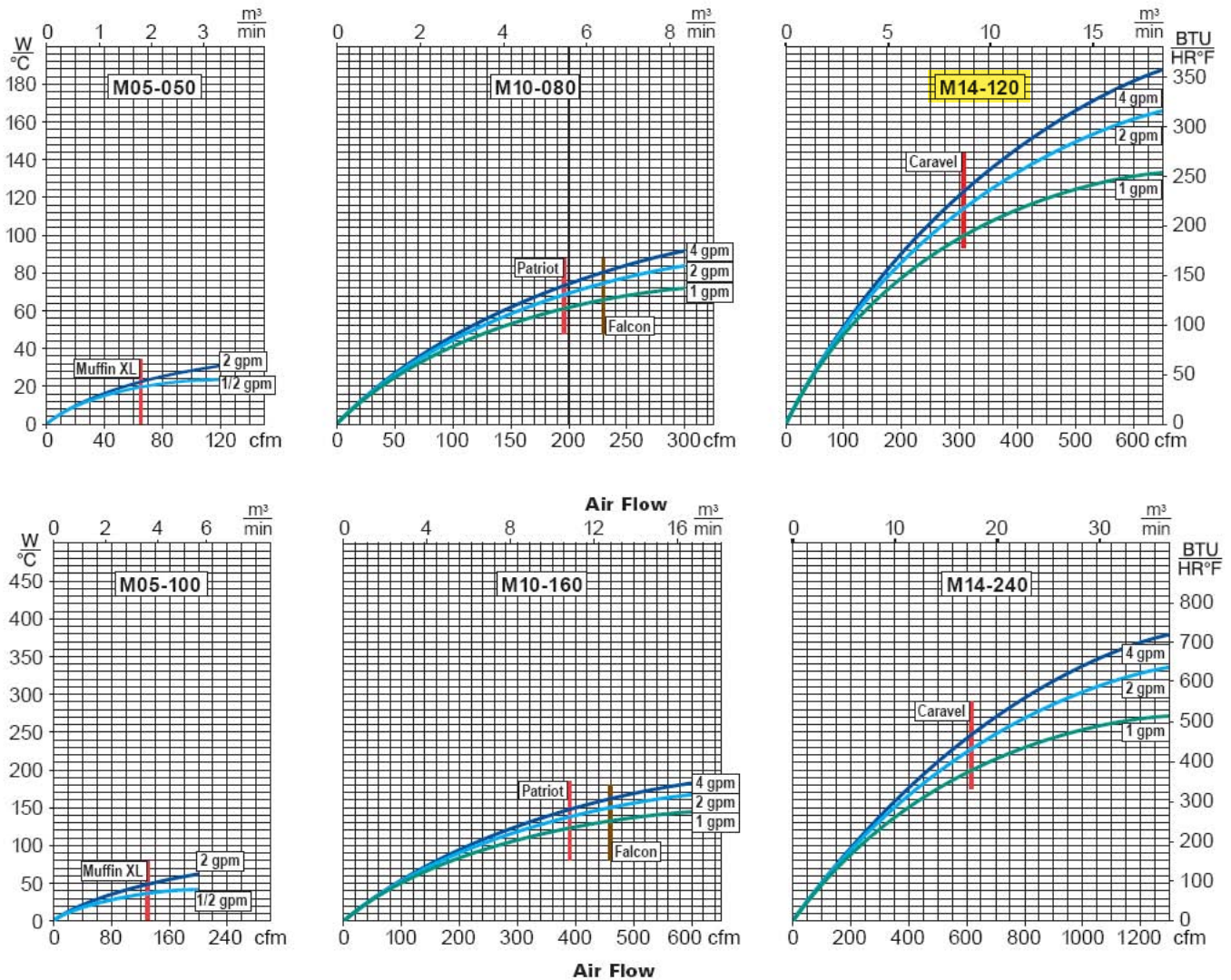
Applications:

- Electronic Cooling
- Power Supply Cooling
- Compressor Cooling
- RF Generator Cooling
- High-Speed Spindle Cooling
- Cooling for Solder Reflow Ovens
- Analytical Sample Cooling



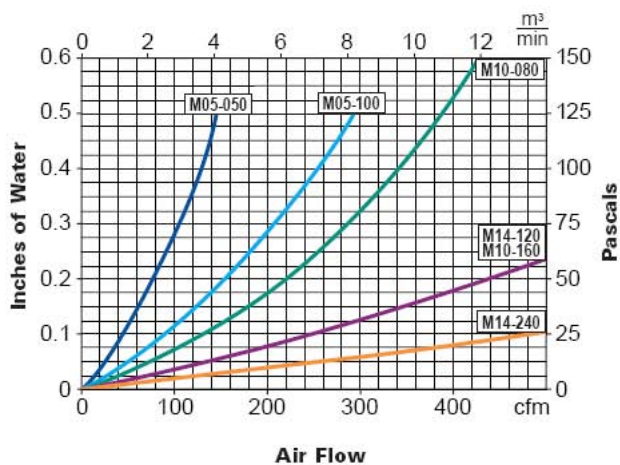
TECHNICAL INFORMATION

Thermal Performance for Water

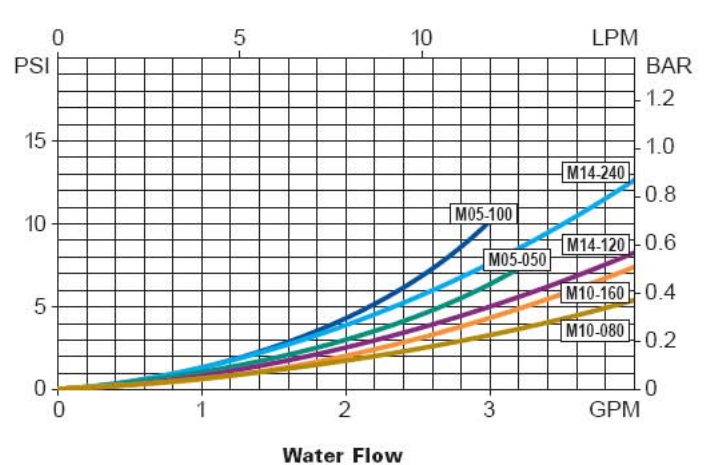


Notes: The vertical lines indicate the performance provided by our standard fans at 60Hz and 70°F. For 50 Hz fan performance, contact Lytron application engineering. For higher resolution performance charts, see www.Lytron.com. Maximum operating temperature 400°F (200°C). Refer to page 70 for thermal calculations for heat exchangers. To select the appropriate heat exchangers for your application, see the Product Selector on our web site: www.Lytron.com.

Air Side Pressure Drop



Liquid Side Pressure Drop



AC Wire-In Smoke Alarm

• 1235E

Test/Reset Button

Tests smoke alarm circuitry and horn

Red LED

Alarm mode

Green LED

Presence of AC power



Description

The Kidde 1235E is an AC powered, ionization smoke alarm that operates on a 120V power source. The 1235E offers a quick connect power harness making installation fast and easy. This smoke alarm includes an ionization sensor that detects best against fast flaming and other types of fires. The 1235E smoke alarm is easy to install and is suitable for all living areas and has a 5-year limited warranty.

Consumer Benefits

The Kidde 1235E AC powered, wire-in smoke alarm gives you and your family an early warning of smoke and fire in your home. The 1235E can be used as a single station unit or it can be interconnected to up to 24 Kidde devices in a multiple station arrangement. The interconnect system should not exceed the NFPA interconnect limit of 12 smoke alarms and/or 18 initiation alarms. With 18 alarms interconnected, it is still possible to interconnect up to a total of 6 strobe and/or relay devices.

Features and Benefits

- **Interconnectable** – Interconnect up to 24 Kidde devices.
- **Test Button** – Tests unit's electronic circuitry and horn.
- **Red LED** – Alarm mode.
- **Green LED** – Steady on presence of AC power.
- **Quick Connect Power Harness** – Makes installation fast and easy.



Architectural and Engineering Specifications

The smoke alarm shall be Kidde Unit 1235 or approved equal. It shall be powered by a 120VAC, 60Hz source. The unit shall incorporate an ionization sensor with nominal sensitivity of 0.64%/ft. The temperature operation range shall be between 40°F (4°C) to 100°F (38°C) and the humidity operating range shall be 5% - 95% relative humidity.

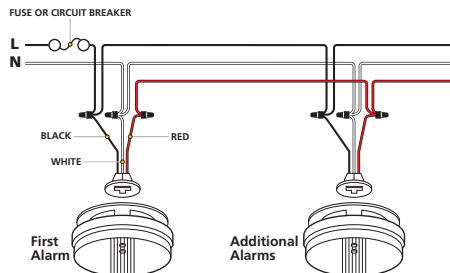
The smoke alarm can be installed on any standard single gang electrical box, up to a 4" octagon junction box. The electrical connection (to the alarm) shall be made with a plug-in connector. A maximum of 24 Kidde devices can be interconnected in a multiple station arrangement. The interconnect system must not exceed the NFPA (National Fire Protection Association) limit of 18 initiating devices, of which 12 can be smoke alarms. With 18 initiating devices (Smoke, heat, CO, etc.), interconnected, it is still possible to interconnect 6 strobe lights and/or relay modules. The alarm shall provide optional tamper resistance that deters removal of the unit from the wall or ceiling.

The alarm shall include a piezoelectric horn that is rated at 85 decibels at 10 feet. The unit shall incorporate 2 LED's. A green LED will be constantly "ON" when AC power is present and will flash until reset (alarm memory) to indicate which alarm was the originating alarm at the last incident. Pressing the test button will reset the alarm memory condition. A red LED will flash once every 30-40 seconds to indicate the alarm is operating properly and will flash once per every 1.5 seconds when the unit is alarming and will remain so until the air is cleared.

The unit shall at a minimum meet the requirements of UL217, NFPA72, (chapter 11 2002 edition) The State of California Fire Marshall, NFPA101 (One and two family dwellings), Federal Housing Authority (FHA, Housing and Urban Development (HUD).

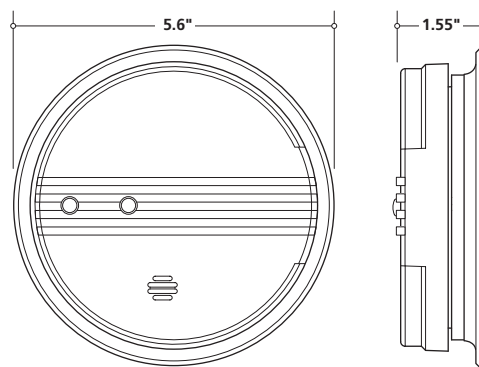
Installation of Smoke Alarm

The smoke alarm should be installed to comply with all local codes having jurisdiction in your area, Article 760 of the National Electric Code, and NFPA 72. Make certain all alarms are wired to a single, continuous (non-switched) power line, which is not protected by a ground fault interrupter. A maximum of 1000 ft. of wire can be used in the interconnect system. Use standard UL listed household wire (18 gauge or larger as required by local codes).



Technical Specifications

Unit Number:	1235E
UPC:	0-25417-12351-7
Power Source:	120VAC
Sensor:	Ionization
Audio Alarm:	85dB at 10ft
Temperature Range:	40°F (4.4°C) to 100°F (37.8°C)
Humidity Range:	5%-95% relative humidity (RH)
Size:	5.6" in diameter x 1.55" depth
Weight:	.6lbs
Interconnects:	Up to 24 Kidde devices
LED:	Green, receiving ac power Red, alarm mode
Warranty:	5 year limited



Ordering Information

Gift Box UPC: 0-25417-12351-7

Part Number	I 2 of 5	Pack Quantity	Dimensions (w x d x h inches)	Weight	Case/Skid	Layers/Skid	Skid Weight
1235**	N/A	Individual	5.75 x 1.75 x 5.75	.6lbs	N/A	N/A	N/A
1235E	200 25417 12351 1	Master Pack (12 units)	5.25 x 10.5 x 10.75	7.2lbs	128	16	921.6lbs

**Not for sale by individual unit



Distributed by:



CONTEGO INTUMESCENT LATEX (THIN FILM)

Description

Contego Passive Fire Barrier is a heavy-bodied, single-part latex designed for use on construction materials such as Oriented Strand Board (OSB), Structural Insulated Panels (SIPS), framing lumber, plywood, trusses, drywall, doors, and more. May also be used on aluminum and steel sheets, round and box steel columns.

Method

When activated by heat or flame, a dense carbon char is formed separating and shielding the substrate from heat while off gassing displaces oxygen from the treated surface; thus eliminating two of the three components needed for combustion.

Features

- Protects from heat and fire
- Smooth, thin, decorative finish
- All components are non-toxic latex
- Economically priced
- Fast curing times
- Easy repair
- Fast drying
- May be sprayed, brushed, or rolled
- Water clean up

Area Calculator

[Click here](#)

Specifications

Color	White
VOC(Less Water)	24.4 Grams/Litre
Weight/US Gallon	10.25 lbs
Hazardous Ingredient	N/A
WHMIS Class	Not Controlled
Flammability	Not Flammable
Weight Solids	56.2 %
Volume Solids	43.7 %
Specific Gravity	1.29
pH Range	8.0-8.5

Application

APPLICATION & HANDLING INSTRUCTIONS CONTEGO PASSIVE FIRE BARRIER INTUMESCENT LATEX PAINT

If you purchased this product palletized – immediately check all containers for damage; opened paint cannot be 'salvaged' and a carrier claim will need to be filed for replacement.

HANDLING INSTRUCTIONS:

- DO NOT allow this product to freeze. If frozen the intumescent properties of this product may be adversely affected.
- Do not allow storage temperature to exceed 100 degrees F (38 C).
- If possible, store this product above 65 degrees F (18 C) for 48 hours prior to application – this will aid you during the application process.
- Do not reuse opened paint after 48 hours; the curing process has begun and may affect the product's performance.
- If you wish to set some paint aside for future touch-up work fill a small clean container completely with fresh paint from a 5 gallon bucket after it has been mixed as described in the 'Application' section below and then seal tightly.

APPLICATION INSTRUCTIONS:

1. CAUTIONS

- Apply only in a well-ventilated environment with adequate respiratory protection as prescribed by OSHA for all latex paints.
- Do not ingest; induce vomiting if this happens.
- Avoid contact with eyes; if this happens flush eyes freely with water until all traces of paint are removed.
- Avoid prolonged contact with skin; paint can be removed with warm water & soap.



2. APPLICATION PREPARATION & RECOMMENDED EQUIPMENT

- **VERY IMPORTANT:** This product must be mixed thoroughly before application. We recommend using a mixing paddle with power drill for a minimum of three (3) minutes at highest speed. Concentrate on the bottom of the bucket periodically moving to the middle and top areas. Product is properly mixed when: (1) there are no solids attached to the paddle after mixing at the bottom and (2) the paint shows a uniform consistency when mixed at the surface.
- **DO NOT** dilute or thin this product with any other liquid.
- This product may be applied as any other high quality latex based paint: brush, roller, airless spray - either gravity feed or suction, or compressed air sprayers.
- Surfaces must be clean, dry, and free of any grease, oils or other contaminants. Previous layers of paint must be solidly adhered to the surface with no flaking, chipping, or cracks. Bare steel should be primed with red oxide primer or its equivalent.
- Spraying is the recommended method of application. The minimum recommended spray setup is 2500 psi (172 bar) with a .015 inch tip (.38 mm). All Contego test applications are performed using a Graco XR5 with a .017 inch tip (.43 mm).
- Optimal application temperature is 85 degrees F (29 C); do not attempt application below 55 degrees F (13 C).

3. SPECIFIC APPLICATION INSTRUCTIONS

- **Coverage:** All coverage rates (except steel, below) are expressed on a 'per coat' basis. A single coat is applied at a rate of 130 sq feet (12 sqm) per gallon. This is equivalent to a wet coat of 12 mil (.30 mm) that will cure to a dry coat 7 mil thick (.18 mm). While under ideal conditions it is possible to apply a single coat of up to 20-22 mil (.50-.55 mm) wet, two thin coats are recommended to prevent the possibility of cracking while curing.
- **Sheetrock (gypsum), OSB (orientated strand board), plywood, structural lumber, and SIPs (structural insulated panels):** Requires two coats; the second can be applied when the first is dry to the touch. Full curing of both coats takes 72 hours.
- **Polyurethane foam insulation (PUF):** Also requires two coats but special consideration needs to be given to the condition of the foam's surface prior to application. Age, type, and method of application affects the surface porosity of PUF. Field testing has shown that unless the foam is newly installed and uncut it can absorb a significant quantity of paint. In these cases priming with a quality latex primer/sealer such as Zinnser's Bullseye 123 is recommended.
- **Structural steel:** A final dry film coating of 70 mil (1.8 mm) is recommended for adequate protection. Under proper conditions it is possible to achieve this with 6 coats of 20 mil (.50 mm) wet. Under less than ideal conditions, it may be necessary to apply more than 6 coats at a lesser thickness until a total of 120 mil wet (3mm) is achieved. In all cases the next coat may be applied when the prior is dry to the touch.
- **Top coating is optional.** To add color or sheen to surfaces Contego PFB may be top coated using virtually any alkyd, or enamel paint as soon as the intumescent coating is dry to the touch. To top coat with acrylic or latex spray or roll initial color coat **DO NOT RE ROLL OR TOUCH UP** until initial color coat is dry. Failure to wait for first color coat application of acrylic/latex to dry may result in the color coat smearing or rolling off on the roller. Once first color coat of latex/acrylic is dry apply second coat. Top coating does not reduce intumescent capability.
- Tinting is possible to pastel shades only. Limit tint to 10% of paint volume.



UNIVERSAL FABRIC SHIELD™

F-2000, LC-2001, NS-2002



APPLICATION:

Treat all materials as specified on container label or as to manufacture direction. Some materials require testing before treating and is recommended. Please specify material to be treated when ordering. 100% Nylon, Rayon and Acetates etc. require NS-2002™ Nylon and Synthetic Fabric Shield to be treated. Treatment for "canvas, leather and burlaps" please specify LC-2001. When applying to outdoor canvas a water repellent may be added after flame retardant has dried.

TEXTILES AND FABRICS

Average coverage of treatment is up to 300 sq. ft. per US gallon. Apply with a hand or pump sprayer held at 6" to 8" from material surface using an even flow. Cover entire surfaces until feeling damp and allow to dry. Repeat the second application but "do not over saturate", treat both sides when possible and treat until slightly damp. It is always best to apply a two coat application. It is recommended to test a sample of material before and after application. For two coat application allow to dry between applying. Take a sample of material and attempt to set on fire with match or lighter for 8 seconds. This is called a vertical burn test. The fabric or material should and will carbon char from flame, when flame is removed no more than two seconds for after burn. When test is complete material is ready for use. Some materials will take more or less product depending on the type and blend of materials. If a third application is needed do so. **IMPORTANT:** It is recommended to re-apply treatment if deep cleaned.

UPHOLSTERY Apply with hand or electric sprayer. Spray treat until moist. Turn stuffed chairs, couches and seating over and remove back cover. Treat inner and outer surfaces. Allow to dry and repeat with a light spray. Check for color fastness by applying to an area that is obscure. Test before applying to entire surface. Leather, synthetics and liners treat back side. **WALL COVERINGS** Apply a light mist or sponge application. Treat until slightly moist do not over saturate. **DRAPES, CARPETS AND RUGS** Apply with hand or electrical sprayer until moist. For best results lightly brush first application to get chemical deep into the surface, then follow up with a light spray over coat after drying. **IMPORTANT:** It is recommended to re-apply treatment if deep cleaned.

UNIVERSAL PROTECTIVE TECHNOLOGIES AND UNIVERSAL FIRE-SHIELD are dedicated to setting not merely following industry standards through our on going research and development in the fire prevention field. It is our resolve to educate and inform the public and its providers on the significance of fire retardant chemicals and its benefits.

PRODUCT SPECIFICATION AND TECHNICAL DATA

UNIVERSAL FABRIC SHIELD™ (Trade Secret Formulas) MSDS Boric Acid 12%, Sodium Bromide 8%. This aqueous based liquid coating penetrant recommended for Interior usage. Exterior use request LC-2001 must be specified at time of order. Total Solids =20%, weight per gallon= 9.10 lbs., specific gravity =6, PH factor =8.4, Flash Point= Non-flammable, Color =clear at 78 degrees F. Slight haze at 50 degrees F. and lower, Volatility= no petroleum or lead, Fungus= anti-fungus, Bacteria=mildly resistant, Linear shrinkage=None, Moisture absorption=None, Corrosion=None, Preservative=excellent. These chemicals comply with U.S. Federal Regulations: Classified Rating: Interior and Exterior

RECOMMENDED FOR: CARPETS, DRAPES, CURTAINS, LEATHER, NAUGAHIDE BACKS, MATTRESS AND MATTRESS TICKING, TENTS, AWNINGS, UPHOLSTERY, TEXTILES, WALL COVERINGS, CANVAS, COTTON, POLYESTER, BLENDS AND MANY OTHERS.

Classified Fire Rating: PASSED

FABRIC TEST: New York City, ASTM E-162; CFR 1632.4, (FF 4-72); FAR 25.853 (A&B);

California 1237.1, NFPA 701, NFPA 260, NFPA 265, Cal Tech 117- F, NY-NJ Port Authority, Boston and Rhode Island.



©1990 UNIVERSAL FIRE-SHIELD™
Rev. 10/30/06



SOUTHWEST RESEARCH INSTITUTE®

6220 CULEBRA RD. 78238-5166 • P.O. DRAWER 28510 78228-0510 • SAN ANTONIO, TEXAS, USA • (210) 684-5111 • WWW.SWRI.ORG
CHEMISTRY AND CHEMICAL ENGINEERING DIVISION
DEPARTMENT OF FIRE TECHNOLOGY
WWW.FIRE.SWRI.ORG
FAX (210) 522-3377

January 31, 2005



Mr. Tony Scott
Contego International, Inc.
923 Jackson Blvd.
Rochester, IN 46975

FINAL REPORT (Consisting of 26 Pages)

Subject: SwRI® Project No.: 01.10084.01.705f, Screening Test of Intumescent Fire Protection Coating In General Accordance with ASTM E 119-00 *Standard Method of Fire Tests of Building Construction and Materials*

Dear Mr. Scott:

This letter and enclosures are submitted as the final report for the screening tests of Contego International, Inc.'s intumescent fire protection coating. Various material samples with the intumescent fire protection coating were tested at Southwest Research Institute's® (SwRI®) Department of Fire Technology located in San Antonio, Texas, on January 4, 2005. This report only documents the test on the sample described below. Testing was conducted in general accordance with ASTM E 119. The test deviated from the requirements of ASTM E 119 in sample size, number of unexposed temperature measurements, and application of the hose stream test.

The results presented in this report apply only to the material tested, in the manner tested, and not to any similar materials or material combinations.

SAMPLE DESCRIPTION

SwRI received one 32- × 60-in. sample on November 4, 2004, identified by Contego International, Inc. as V-338. The sample was received in a ready-to-test condition with the intumescent fire protection coating applied to one side.

The side with the intumescent fire protection coating was exposed to the furnace conditions. The sample was tested simultaneously with other samples not included in this report. Selected photographs of the test samples installed in the test frame during, and after the test, and are located in Appendix A.

INSTRUMENTATION

Instrumentation consisted of three thermocouples (TCs) constructed with No. 20 B & S gage, Type K (Chromel Alumel) welded TCs, placed under flexible, dry, felted mineral fiber pads. The wire leads of the TCs terminated under the pads and were in contact with the unexposed surface. The pads were attached firmly to the surface to minimize any heat loss from the sides. Temperature levels were monitored continuously at 15-sec intervals throughout the test and recorded with computer data acquisition equipment for subsequent data reduction. The location of the unexposed surface TCs is provided in Appendix B, Test Assembly Drawings.

This report is for the information of the client. It may be used in its entirety for the purpose of securing product acceptance from duly constituted approval authorities. This report shall not be reproduced except in full, without the written approval of SwRI. Neither this report nor the name of the Institute shall be used in publicity or advertising.



DETROIT, MICHIGAN (248) 353-2550 • HOUSTON, TEXAS (713) 977-1377 • WASHINGTON, DC (301) 881-0226



TEST RESULTS

The test sample was installed onto a test wall fixture and tested for 1 hr 44 min 45 sec on SwRI's large vertical furnace. Ambient conditions at the start of the test were 78°F and 61% relative humidity. The fire exposure closely approximated standard fire curve specified in ASTM E 119. Sustained flaming on the unexposed side was observed at 1 hr 39 min 55 sec.

The sample exceeded the ASTM E 119 temperature criteria at 1 hr 25 min 15 sec into the test. Appendix C includes the temperature versus time curve for the measured furnace average and the standard curve plotted together. The graphical and tabular test data collected is also located in Appendix C.

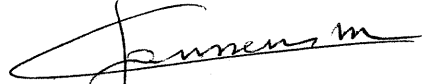
Enclosed please find the photographic documentation of the tests on a compact disc and video documentation on VHS tape. If I can be of further assistance, please contact me by telephone (210) 522-3971, by fax (210) 522-3377, or by e-mail at barry.badders@swri.org.

Sincerely,



Barry Badders, P.E.
Research Engineer
Fire Resistance Section

Approved:



Marc L. Janssens, Ph.D.
Director
Department of Fire Technology

BLB/mcg
C:\wpdata\badders\vr10084.01.705f

Enclosures: 1 Photo CD (Reports b, c, d, e, f)
2 VHS Tapes (Reports b, c, d, e, f)

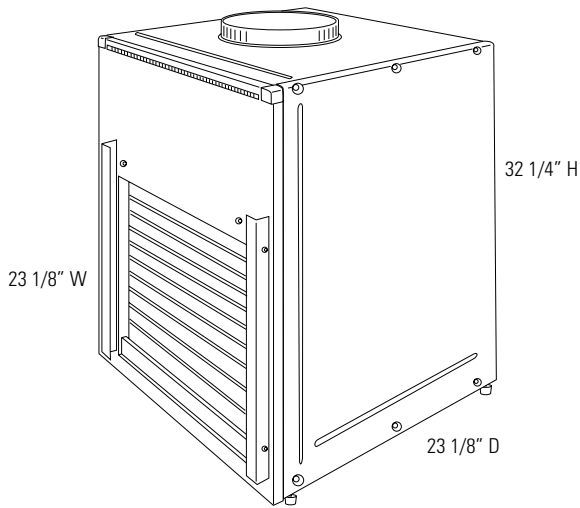
cc: Record Copy A - Dept. File (w/o enclosure)
Record Copy B - IQS (w/o enclosure)





AZ75H12DAC – GE Vertical Packaged Terminal Heat Pump

Overall Unit Dimensions



230/208 Volt	Line Cord Connected Units		
Power Connection Kit	RAK3152	RAK3202	RAK3302
Heater KW	2.55/2.09	3.45/2.82	5.00/4.09
Min. Circuit Amps	15	20	30
Recommended Protective Device	15 Amp Time Delay Fuse or Breaker	20 Amp Time Delay Fuse or Breaker	30 Amp Time Delay Fuse or Breaker

Specification Created 8/02

Minimum Clearances:

Front

- Allow 4 inches in front of unit. When determining closet depth, note that plenum may protrude into closet up to 4 inches, depending on wall depth.

Sides

- Allow 3 inches on each side of unit.
- For side access closets only: Allow 5 inches on the side where access is required.

Platform

- An 8"-12" high, field-supplied platform is recommended for drain access.

ZONELINE® WARRANTY

WHAT IS COVERED

FULL ONE-YEAR WARRANTY

For one year from date of original purchase, we will provide, free of charge, parts and service labor on site to repair or replace **any part of the Zoneline** that fails because of a manufacturing defect.

ADDITIONAL FOUR-YEAR WARRANTY

For an additional four years from the date of original purchase, we will provide, free of charge, parts and on-site service labor to repair or replace **any part of the sealed refrigerating system** (the compressor, condenser, evaporator and all connecting tubing) that fails because of a manufacturing defect.

*SEE WRITTEN WARRANTY FOR DETAILS

LIMITED 2ND THROUGH 5TH YEAR PARTS WARRANTY

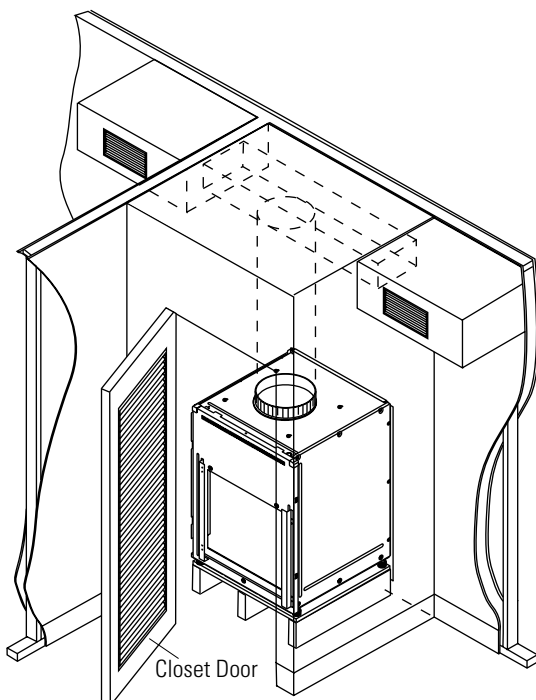
For the second through the fifth year from date of original purchase, General Electric will provide, free of charge, parts that fail as a result of a manufacturing defect. Parts covered are fan motors, switches, heater, heater protectors, compressor overload, solenoids, circuit boards, auxiliary controls, thermistors, frost controls, capacitors and varistors. This is a limited parts-only warranty, and does not include labor or transportation to and from the service shop.

All warranty service will be provided by our Factory Service Centers or by our authorized Customer Care® servicers during normal working hours.

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.

Features and Benefits

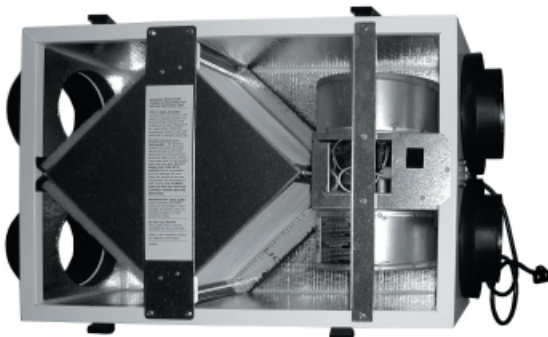
- 11,700/11,500 BTUH Cooling Capacity
- 10,900/10,700 BTUH Heating Capacity
- 10.7/10.7 E.E.R. (BTUH/Watt)
- Vertical Design Optimizes Floor Space – Unique Sleeve Design Makes Easier to Install
- Freeze Sentinel™ Protects Unoccupied Rooms Against Freeze-Up
- Three-Way, Slide-Out Chassis with Specially Designed Case Makes Maintenance and Service Quick and Easy
- Full Corrosion Treatment on Outside Coils and Other Components is Standard



EV70



Indoor Unit

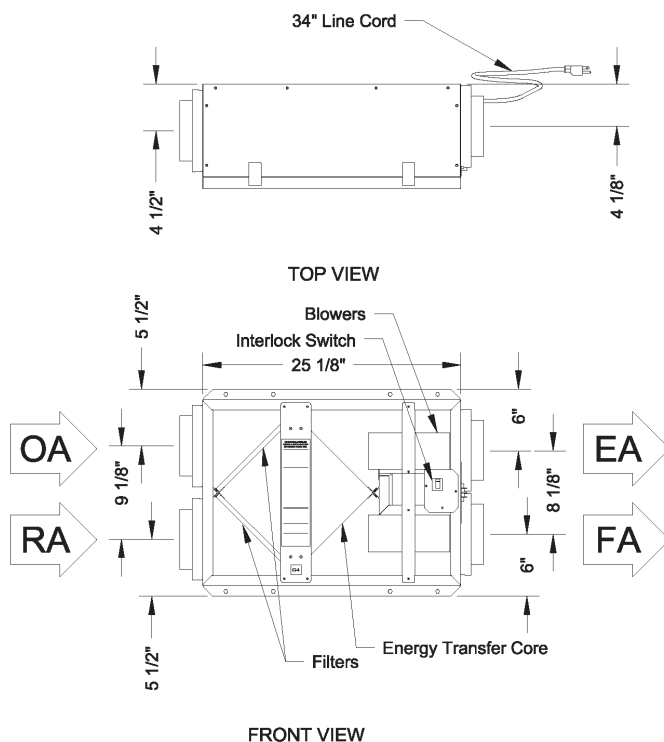


G4 Performance

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).

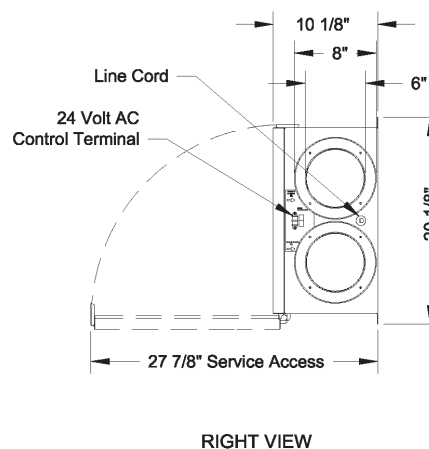
Dimensions



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				

EA: Exhaust Air to outdoors
OA: Outdoor Air intake
RA: Room Air to be exhausted
FA: Fresh Air to inside





DEHUMIDIFIERS

Drain Hose Connection

Threaded drain hose connection allows for easy external drainage.

Water Bucket

A convenient handle allows the bucket to be easily removed, carried, or emptied.

Washable Filter

For maximum performance, dust is kept away from the dehumidifier by a washable filter.

Large Bucket Size

21 pint front bucket size.

Easy-Roll Casters

Convenient roller-caster wheels make the unit easily portable from room to room.



LHD65EBL

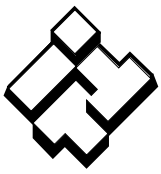
- 65 Pint Capacity
- Electronic Controls
- 2 Fan Speeds
- Automatic Humidistat Control
- Automatic Shut-Off System
- Automatic Defrost Control
- Low Temperature Operation
- Removable Bucket
- External Drain Connector
- Washable Air Filter
- Easy-Roll Casters
- Energy Star

LHD65EBL

Pints	65
Electronic Controls	•
Energy Factor	1.6
Energy Star	•
CAPACITY	
Dehumidification (pts/day)	65
Power Rating	115V/60Hz
Watts	800
Amps	7.6
Circuit Size (Amps)	15
Compressor Type	Rotary
Refrigerant Weight (oz)	8.64
Refrigerant Weight (g)	245
dB Noise Level (High/Low) @ Front	52/50
(High/Low) @ Back	54/52
FEATURES	
LED Display (Set Humidity)	•
Touch Pad Button	•
Energy Timer	•
Auto Restart	•
Automatic Humidistat Control	•
Fan Speed Selection Switch	Touch Pad Button
Fan Speeds	2
Air Flow CFM (High/Low)	131/120
CMM	3.7/3.4
Fan Type	Turbo
Removable Bucket	•
Bucket Loading Direction	Front
Bucket Full Indicator Light	•
Bucket Pints	21
Automatic Shut-Off System	•
Automatic Defrost Control	•
Low Temperature Operation	42
External Drain Connector	•
Washable Air Filter	•
APPEARANCE	
Color	Black
Easy-Roll Casters	•
DIMENSIONS AND WEIGHTS	
Width (inches)	15 5/32
Height (inches)	21 1/4
Depth (inches)	13 3/8
Net Weight (lbs)	49.6
Carton Width (inches)	17 9/16
Carton Height (inches)	22 1/4
Carton Depth (inches)	15 1/8
Shipping Weight (lbs)	54
WARRANTY	
	5 Years Carry-in Parts and Labor
UPC CODE	
LHD65EBL	048231 355285

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





ITT

Residential Water Systems

Goulds Pumps

JRS Shallow Well Jet Pumps
1/2, 3/4 and 1 HP (60 Hz)

JRS5, JRS5H, JRS7 and **JRS10**



FEATURES

- **Compact:** Design has an integral shallow well jet built into the casing, which eliminates the need for a separate shallow well adapter.
- **Serviceable:**
 - Back pullout design allows disassembly of pump for service without disturbing piping.
 - Two compartment motor for easy access to motor wiring and replaceable components.
 - Nozzle clean out plug in pump casing.
 - Corrosion resistant, engineered plastic tubing and fittings are easily removed for cleaning. Premium O-ring design fittings need only be hand tight to seal.
 - O-ring casing seal.
- **Drain Plug:** For ease of winterizing and maintenance.
- **Seal Housing:** Engineered composite. Corrosion and abrasion resistant.
- **Impeller:** F.D.A. compliant, glass filled Noryl®. Corrosion and abrasion resistant.
- **Diffuser (Guidevane):** F.D.A. compliant, injection molded, food grade, glass filled Lexan® for durability and abrasion resistance.
- **Tubing and Fittings:** F.D.A. compliant engineered plastic is corrosion and U.V. resistant.
- **Powered for Continuous Operation:** Pump ratings are within the motor manufacturer's recommended working limits. Can be operated continuously without damage.
- **Corrosion Resistant:** Electro-coated paint process is applied inside and out, then baked on.
- **Excellent Air Handling Ability:** After initial priming the pump has the ability to reprime itself even when air gets into the system. Pumping resumes once the water level rises above the foot valve.



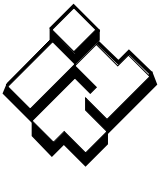
GOULDS PUMPS

Goulds Pumps is a brand of ITT Water Technology, Inc.
- a subsidiary of ITT Industries, Inc.

www.goulds.com

Engineered for life





ITT

GOULDS PUMPS Residential Water Systems

APPLICATIONS

Specifically designed for:

- Homes
- Cottages
- Booster service

- 3500 RPM.
- Built-in overload with automatic reset.
- Stainless steel shaft.
- Rotation: clockwise when viewed from motor end.

Maximum temperature: 140°F.

SPECIFICATIONS

Pump:

- Pipe connections:
1 1/4" suction, 1" discharge.
- Pressure switch:
AS4FX preset (30-50 PSI).

Motor:

- NEMA service factors.
- 60 Hz.
- 1/2 – 1 HP, 115/230 V capacitor start.
- Single phase.

SYSTEM COMPONENTS

■ **Basic Pump Unit:** Includes pump with integral shallow well jet (nozzle and venturi), motor, pressure switch and tubing.

AGENCY LISTINGS



Canadian Standards Association
LR38549

Goulds Pumps is ISO 9001 Registered.

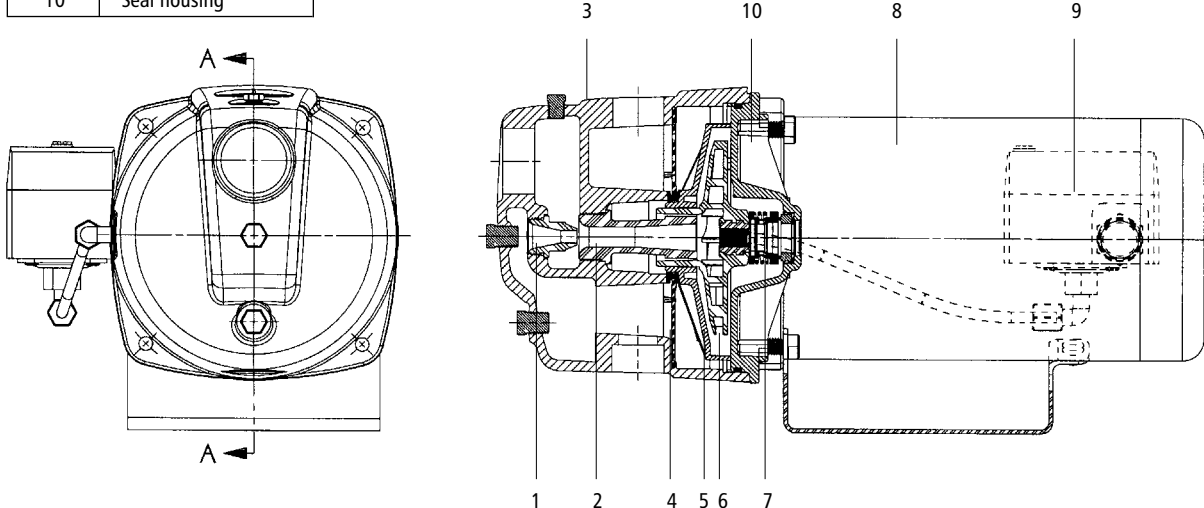
COMPONENTS

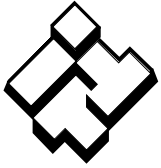
Item No.	Description
1	Nozzle
2	Venturi
3	Cast iron casing
4	Separator plate
5	Diffuser (Guidevane)
6	Impeller
7	Mechanical seal
8	Motor
9	Pressure switch
10	Seal housing

DIMENSIONS AND WEIGHTS

Order No.	HP	(Inches)			Wt. (lbs.)
		Length	Width	Height	
JRS5(H)	1/2	16 13/16	8 3/4	8 1/4	30
JRS7	3/4	17 5/16	8 3/4	8 1/4	32
JRS10	1	18 5/16	8 3/4	8 1/4	34

(All dimensions are in inches and weights in lbs. Do not use for construction purposes.)





ITT

GOULDS PUMPS Residential Water Systems

PERFORMANCE RATINGS – SHALLOW WELL

HP/Order No.	½ HP – JRS5					¾ HP – JRS7				1 HP – JRS10				
Nozzle	AN018					AN018				AN018				
Venturi	AD3330					AD3336				AD3339				
Total Suction Lift (feet)	Discharge Pressure – PSI					Discharge Pressure – PSI				Discharge Pressure – PSI				
	20	30	40	50	Max. Shut-off (PSI)	30	40	50	Max. Shut-off (PSI)	30	40	50	60	Max. Shut-off (PSI)
	Gallons per minute					Gallons per minute				Gallons per minute				
5	14.1	13.3	10.5	5.8	64	22.5	17.9	12.4	69	27.0	22.4	15.7	9.6	72
10	12.4	12.0	9.2	4.2	59	20.3	16.3	11.5	65	24.5	20.5	14.8	7.5	69
15	10.5	10.0	8.0	2.4	56	17.8	15.3	9.0	63	21.2	19.2	12.6	5.1	66
20	8.6	8.5	6.6	1.2	53	14.8	13.6	7.3	61	17.6	16.8	11.1	3.3	63
25	6.7	6.5	5.0	0.6	51	11.5	10.8	5.2	58	13.4	13.0	8.7	–	61

PERFORMANCE RATINGS – SHALLOW WELL, HIGH PRESSURE

HP/Order No.	½ HP – JRS5H							
Nozzle	AN020							
Venturi	AD3325							
Total Suction Lift (feet)	Discharge Pressure – PSI							
	20	30	40	50	60	70	80	Max. Shut-off (PSI)
	Gallons per minute							
5	6.7	6.4	6.2	5.8	4.2	2.5	0.8	84
10	5.8	5.6	5.3	5.1	3.7	2.0	NA	82
15	4.8	4.7	4.6	4.5	3.3	1.5	NA	79
20	4.0	3.8	3.7	3.6	3.1	1.3	NA	75
25	3.0	2.9	2.9	2.8	2.3	0.8	NA	74





MANUFACTURERS CERTIFICATE OF COMPLIANCE

Encore Wire Corporation type NM-B insulated 600-volt building wire is produced in the United States of America using accepted practices and quality assurance procedures to comply with specifications of regulatory agencies.

Products Description: NM-B Style Cable

Specifications: American Society for Testing & Materials - ASTM B-3, B-8
Underwriters Laboratories UL-83, UL-719, UL-1581
American National Standards Institute
Federal Specification A-A-59544
NFPA 70: National Electrical Code
New York State DOS-16120-87-1222-1050

I certify that the above listed material complies with requirements including applicable standards set forth in this certification. If you have any question or comments, please contact me at (800) 962-9473.

Respectfully yours,

Rogers Hester

Rogers Hester
Quality & Process Engineering Manager



What is CeeLite?

CeeLite's LEC technology encompasses proprietary shielded three wire panels, highly advanced cUL listed inverters and packaging options. Compared to early stage and standard electroluminescent (EL) products, CeeLite's LEC-based commercial quality lighting offers vastly superior reliability, brightness and long life.

SYLVANIA has co-branded with CeeLite to promote their premium phosphors in the LEC panels. SYLVANIA's phosphors are powdered substances that emit light when electrified and have typically been used in traditional light sources such as fluorescent, high pressure mercury vapor lamps (high output lamps used for street and parking lot lighting) and UV lamps.

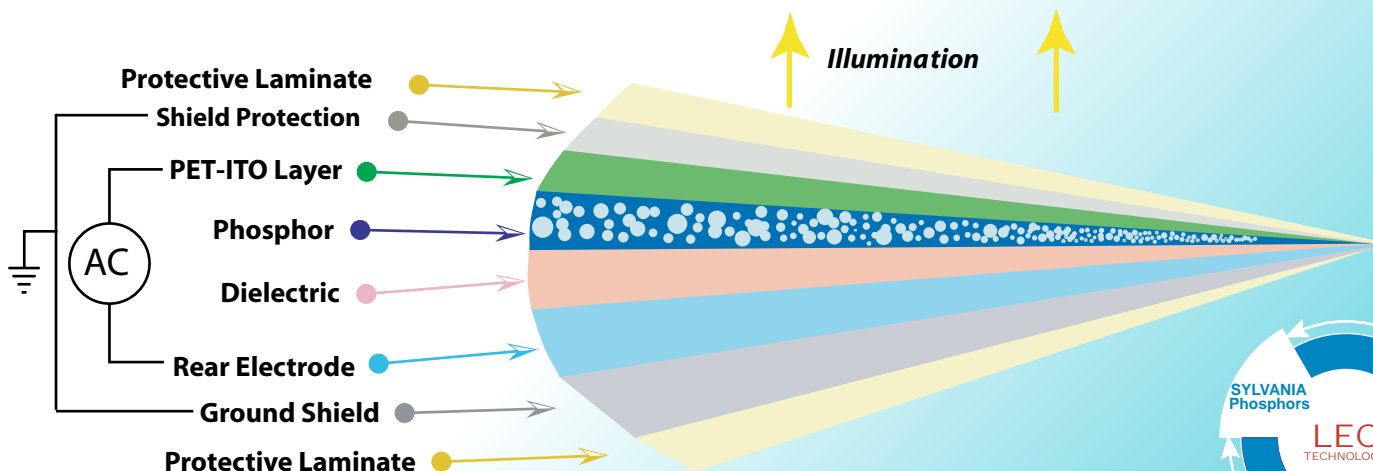
As a result of years of research and development complimented by key product advancements, CeeLite products do not suffer from de-lamination, heat spots or bad connections – a common problem with similar EL technology. Furthermore, the chemicals used in CeeLite panels are very environmentally friendly and degradable. The polymer-based laminates are the same as shrink-wrapped polymer-based laminate products.

CeeLite's cutting-edge light emitting capacitor (LEC) technology makes it possible to apply lighting as never before imagined: indoors or out; on floors, walls, around columns and pillars; upon unconventional objects and surfaces.



CeeLite's illuminated panels come in many sizes, yet can be customized to fit different needs.

Cross-section of CeeLite LEC Panel



CeeLite is essentially a capacitor sandwich with a SYLVANIA phosphor layer in between. The application of an AC voltage generates a changing field within the phosphor which causes the phosphor to emit light.



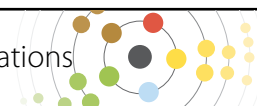
CeeLite 7501 Panels

CeeLite panels are offered in a variety of standard sizes in indoor and outdoor, portrait and landscape formats. The standard panel sizes and environmental specifications are listed below. Larger sizes are under development. Custom shapes and sizes are available with minimum order quantities. Your distributor can provide more information based on your needs.

Standard Sizes			
Product Code	Outer Dimensions	Illuminated Area Dimensions	Panel Weight (ounces)
US 100	8.5" x 11"	7.71" x 10.21"	2.9
US 200	8.5" x 14"	7.71" x 13.21"	3.7
US 300	11" x 17"	9.74" x 15.74"	5.5
US 400	16" x 20"	14.66" x 18.66"	9.5
US 500	20.25" x 20.25"	18.91" x 18.91"	12.2
US 600	12" x 36"	10.66" x 34.66"	12.8
US 700	18" x 24"	16.66" x 22.66"	12.8
US 800	22" x 28"	20.66" x 26.66"	18.9
US 900	24" x 36"	22.66" x 34.66"	25.5
US 1000	36" x 48"	34.43" x 46.42"	53.9
11.5-C	11.5" Diameter	10"	5.7
24.0-C	24" Diameter	22.66"	12.8

Life Hours	
Brightness	Hours
50 cd/m ²	15000
100 cd/m ²	10000
150 cd/m ²	8000
200 cd/m ²	5000

Environmental Specifications	
Operating Temperature	Storage Temperature
-40 F to 150 F	-40 F to 176 F
-40 C to 65 C	-40 C to 80 C



Inverters

The power source for CeeLite™ lighting, CeeLite's UL, cUL, and FCC approved Inverters convert AC or DC electrical current to meet the required panel voltage and frequency needs. CeeLite's Inverters provide the control that delivers an unrivaled surface illumination quality with higher brightness and longer life.

Features

- Brightness Control Knob (50 - 200 cd/m²)
- Flashing and Fading Options
- Compatible with DMX Protocol
- External sensing jacks for photo and motion sensors
- One year limited warranty



CeeLite's Inverters are available for CeeLite's standard panel sizes and will run multiple panels of varying sizes

The chart below details the total square inches of LEC panels that each CeeLite Inverter can power as well as the physical dimensions of each Inverter.

Inverter Specifications					
Product Code	Total in ² Powered @ 200 cd/m ²	Total ft ² Powered @ 200 cd/m ²	Physical Dimensions (in inches)		
			Width	Height	Length
INV-US 007	16	0.11	2.13	0.75	4.00
INV-US 050	50	0.35	1.50	1.31	4.00
INV-US 052	50	0.35	1.50	1.31	4.00
INV-US 100	93	0.65	2.75	1.75	6.50
INV-US 200	119	0.83	2.75	1.75	6.50
INV-US 300	187	1.30	2.75	1.75	6.50
INV-US 400	320	2.22	3.35	3.00	9.85
INV-US 500	410	2.85	3.35	3.00	9.85
INV-US 600	432	3.00	3.35	3.00	9.85
INV-US 700	432	3.00	3.35	3.00	9.85
INV-US 800	616	4.28	3.35	3.00	12.60
INV-US 900	864	6.00	3.35	3.00	12.60
INV-US 1000	1728	12.00	3.35	3.00	19.70



CeeLite's LEC product line includes:

- Panels - The flat, flexible lightbulb
- Inverters - AC/DC power source
- Controllers - Allow users to operate multiple illuminated panels to create interactive lighting displays



ZURN PEX HOT/COLD TUBING – MANUFACTURED TO ASTM F-876, F-877



Pressure Ratings: 160 PSI (11 BAR) at 73°F (23°C), 100 PSI (7 BAR) at 180°F (82°C),
80 PSI (5.5 BAR) at 200°F (93.3°C).

Zurn PEX Storage – Warning

Like most plastic materials, all cross-linked polyethylene is subject to ultraviolet (UV) deterioration and must not be exposed to sunlight. Storage outside is not recommended but if this becomes necessary, the tubing must be covered with a material which will protect it from ultraviolet light. Failure to do so will void the warranty. For complete installation recommendations, see the ZURN PEX PLUMBING SYSTEM INSTALLATION GUIDE (Form No. ZPM03103). A copy may be obtained at no charge by calling 1-800-872-7277.

Cutting Zurn PEX

Zurn PEX is easy to cut with many types of cutting tools. Hacksaws, pruning shears, molding shears, and pocket knives are often used for an occasional cut. The tube surface must be cut, not indented (as with a dull tool). Professional and production work is best handled with recommended cutters. NOTE: Copper tube rotary cutters will not cut cross-linked polyethylene unless equipped with a special blade for cutting plastic pipe. All cuts should be reasonably straight, even, and free of chips and slivers.

General Information – ZURN PEX Hot/Cold Tubing – SDR 9 ASTM-F-876, F-877

ZURN DESIGNATION	NOM. SIZE (CTS)	AVG. O.D.	AVG. I.D.	MIN. WALL	WT. PER 100 FT.
Q1P	1/4"	.375	.225	.062	3.06
Q2P	3/8"	.500	.350	.062	4.09
Q3P	1/2"	.625	.475	.062	5.40
Q4P	3/4"	.875	.671	.097	10.20
Q5P	1"	1.125	.862	.125	16.62
Q6P	1-1/4"	1.375	1.054	.153	25.67



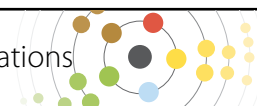
Copper Tube Size – Coils - PEX - White

Product No.	Nom. Size I.D.	O.D.	Weight		Category
			lb	kg	
Q1PC100X	1/4" x 100' (30.5 m) Roll	3/8"	3.1	1.39	1
Q3PC100X	1/2" x 100' (30.5 m) Roll	5/8"	5.4	2.45	1
Q3PC300X	1/2" x 300' (91.4 m) Roll	5/8"	16.2	7.35	1
Q3PC500X	1/2" x 500' (152.4 m) Roll	5/8"	27.0	12.25	1
Q3PC1000X	1/2" x 1000' (304.8 m) Roll	5/8"	54.0	24.50	1
Q4PC100X	3/4" x 100' (30.5 m) Roll	7/8"	10.2	4.63	1
Q4PC300X	3/4" x 300' (91.4 m) Roll	7/8"	30.6	13.88	1
Q4PC500X	3/4" x 500' (152.4 m) Roll	7/8"	51.0	23.13	1
Q4PC1000X	3/4" x 1000' (304.8 m) Roll	7/8"	102.0	46.27	1
Q5PC100X	1" x 100' (30.5 m) Roll	1-1/8"	16.6	7.54	1
Q5PC300X	1" x 300' (91.4 m) Roll	1-1/8"	49.9	22.63	1
Q5PC500X	1" x 500' (152.4 m) Roll	1-1/8"	83.1	37.69	1
Q6PC100X	1-1/4" x 100' (30.5 m) Roll	1-3/8"	26.0	12.05	1
Q6PC300X	1-1/4" x 300' (91.4 m) Roll	1-3/8"	77.01	34.93	1



Copper Tube Size – Coils - PEX - Red

Product No.	Nom. Size I.D.	O.D.	Weight		Category
			lb	kg	
Q2PC100XRED	3/8" x 100' (30.5 m) Roll	1/2"	4.1	1.89	1
Q2PC500XRED	3/8" x 500' (152.4 m) Roll	1/2"	20.5	9.28	1
Q2PC1000XRED	3/8" x 1000' (304.8 m) Roll	1/2"	40.9	18.56	1
Q3PC100XRED	1/2" x 100' (30.5 m) Roll	5/8"	5.4	2.45	1
Q3PC500XRED	1/2" x 500' (152.4 m) Roll	5/8"	27.0	12.25	1
Q3PC1000XRED	1/2" x 1000' (304.8 m) Roll	5/8"	54.0	24.50	1
Q4PC100XRED	3/4" x 100' (30.5 m) Roll	7/8"	10.2	4.63	1
Q4PC500XRED	3/4" x 500' (152.4 m) Roll	7/8"	51.0	23.13	1
Q4PC1000XRED	3/4" x 1000' (304.8 m) Roll	7/8"	102.0	46.27	1
Q5PC100XRED	1" x 100' (30.5 m) Roll	1-1/8"	16.6	7.54	1
Q5PC300XRED	1" x 300' (91.4 m) Roll	1-1/8"	49.9	22.63	1
Q5PC500XRED	1" x 500' (152.4 m) Roll	1-1/8"	83.1	37.69	1



Submittal Data Information Model 0010 Cartridge Circulator

Submittal Data # 101-033
Supersedes: 09/01/03

Effective: 06/14/07

Features

- Standard high capacity output - Compact design
- Quiet, efficient operation
- Direct drive - Low power consumption
- Unique Replaceable Cartridge design (Field serviceable)
- Self Lubricating
- No mechanical seal
- Unmatched reliability - Maintenance free
- Universal flange to flange dimensions
- Cast Iron, Bronze or Stainless Steel construction

Materials of Construction

Casing (Volute): Cast Iron, Bronze or 304 Stainless Steel
Stator Housing: Aluminum
Cartridge: Stainless Steel
Impeller: Non-metallic
Shaft: Ceramic
Bearings: Carbon
O-Ring & Gaskets: EPDM

Model Nomenclature

F – Cast Iron, Flanged
BF – Bronze, Flanged
SF – 304 Stainless Steel, Flanged

Variations:

Z – Zoning Circulator
J – Bronze Cartridge with Cast Iron casing

Performance Data

Flow Range: 0 – 32 GPM
Head Range: 0 – 10 Feet
Minimum Fluid Temperature: 40°F (4°C)
Maximum Fluid Temperature: 230°F (110°C)
Maximum Working Pressure: 125 psi
Connection Sizes: 3/4", 1", 1-1/4", 1-1/2" Flanged



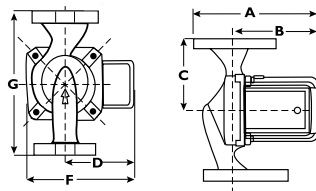
FOR INDOOR USE ONLY

Application

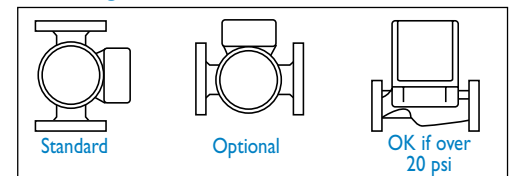
The Taco 0010 is designed for a wide range of large residential/light commercial water circulating applications. Typical uses include hydronic heating, radiant heating, primary-secondary loops, indirect water heaters, chilled water cooling, and potable hot water systems. The Bronze or Stainless Steel 0010 is designed for all open-loop, fresh water systems. The unique replaceable cartridge contains all of the moving parts and allows for easy service, instead of replacing the entire circulator. Compact, direct-drive, low power consumption design makes it ideal for high-efficiency jobs.

Pump Dimensions & Weights

		A		B		C		D		F		G		Ship Wt.	
Model	Casing	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	Kg
0010-F3	Cast Iron	7-1/4	184	5-5/16	135	3-3/16	81	3-5/16	84	5-3/8	137	6-3/8	162	10	4.5
0010-BF3	Bronze	7-1/4	184	5-5/16	135	3-3/16	81	3-5/16	84	5-3/8	137	6-3/8	162	10	4.5
0010-SF3	St. Steel	7-1/4	184	5-5/16	135	3-3/16	81	3-5/16	84	5-3/8	137	6-3/8	162	9	4



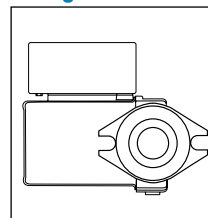
Mounting Positions



Electrical Data

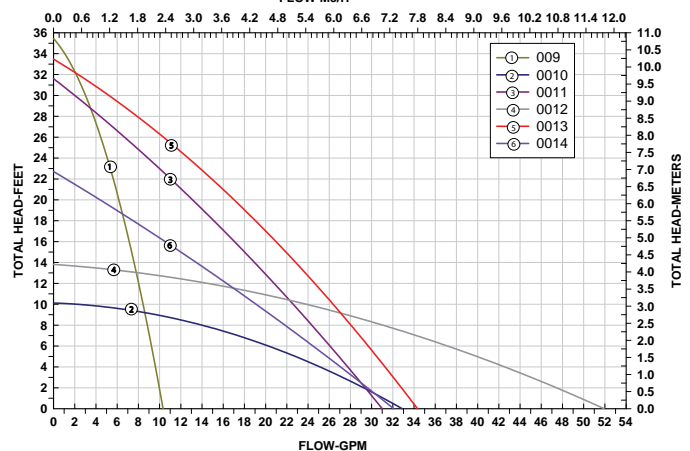
Model	Volts	Hz	Ph	Amps	RPM	HP
0010-F3	115	60	1	1.10	3250	1/8
0010-BF3/SF3	115	60	1	1.17	3250	1/8
Motor Type	Permanent Split Capacitor Impedance Protected					
Motor Options	220/50/1, 220/60/1, 230/60/1, 100/110/50/60/1					

Flange Orientation



Performance Field - 60Hz

Taco 00° CIRCULATORS
FLOW-M3/H



Taco Inc., 1160 Cranston Street, Cranston, RI 02920 / (401) 942-8000 / Fax (401) 942-2360
Taco (Canada) Ltd., 6180 Ordan Drive, Mississauga, Ontario L5T 2B3 / (905) 564-9422 / Fax (905) 564-9436
www.taco-hvac.com



Myers Diaphragm Tank Features

SHELL is constructed of light-weight drawn steel with epoxy finish for extra corrosion resistance.

REPLACEABLE AIR CHARGE VALVE is conveniently located and pliable for safe, easy operation.

BUTYL DIAPHRAGM is strong and flexible to assure dependable tank service over entire pressure range.



Base Rotates For Easy Alignment To Pipe Connection

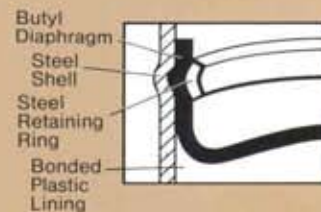
Corrosion Resistant Base



DIAPHRAGM SEAL consists of locking retainer ring for positive separation of air and water.

PLASTIC LINING is permanently bonded to inner shell for protection against rust in water reservoir.

BASE made of high-impact material and designed for strength and stability. Rotates for easy alignment to pipe connection.



PRESSURE TANK SIZING

To properly size a diaphragm pressure tank, this formula should be used:

$$\frac{\text{Pump GPM} \times \text{Min. Run Time}}{\text{Drawdown Multiplier}} = \text{Diaphragm Tank Size}$$

PUMP GPM is the rated gpm of a pump.

MINIMUM RUN TIME is the minimum length of time you want the pump to run while refilling the pressure tank. MYERS recommends at least 1 minute run time.

DRAWDOWN MULTIPLIER is a number that is obtained from the **DRAWDOWN VOLUME MULTIPLIER CHART** by matching the pressure tank start-up and shut-off pressure. For example, if your system starts the pump when the tank pressure drops to 20 psi and shuts the pump off when it reaches 40 psi, then the **DRAWDOWN MULTIPLIER** is .35.

To select a tank for an 11 GPM pump with a one minute run time and a 20-40 tank pressure range, the formula would look like this:

$$\frac{11 \text{ GPM} \times 1 \text{ Min. Run Time}}{.35 \text{ Drawdown Multiplier}} = 31.4 \text{ Gal. Diaphragm Tank Size}$$

Using the chart on the next page, you would select the tank that is closest in size (usually the next largest size). In this case the MPD36, a 36 gallon tank with a 13.3 gallon drawdown would be the correct choice. The 13.3 gallon drawdown means that when the tank is full, you have that amount of water available before the tank pressure drops to 20 psi and turns on the pump to refill the tank.

As you can see, a larger tank gives you more drawdown which means that you would have more water available before the pump is needed. This can be especially important if you live in an area that is subject to frequent power outages. A larger tank also means the pump will cycle (turn on & off) fewer times and will run for longer periods of time which adds to pump life.

DRAWDOWN VOLUME MULTIPLIER CHART (APPROXIMATE)

TANK PRES. AT SHUT-OFF PSI (KPa)	TANK PRESSURE AT START-UP—PSI(KPa)					
	10 (69)	20 (138)	30 (207)	40 (276)	50 (345)	60 (414)
20 (138)	.26					
30 (207)	.41	.20				
40 (276)	.51	.35	.17			
50 (345)	.57	.42	.29	.14		
60 (414)	.61	.49	.37	.25	.12	
70 (483)	.65	.54	.43	.32	.22	.10
80 (552)	.68	.58	.52	.39	.29	.19
90 (621)	.70	.61	.56	.44	.35	.26

To assume dependable drawdown volumes, and in keeping with the present industry practice, drawdowns are based on Boyle's Law.

MYERS TANK CONVERSION TABLE

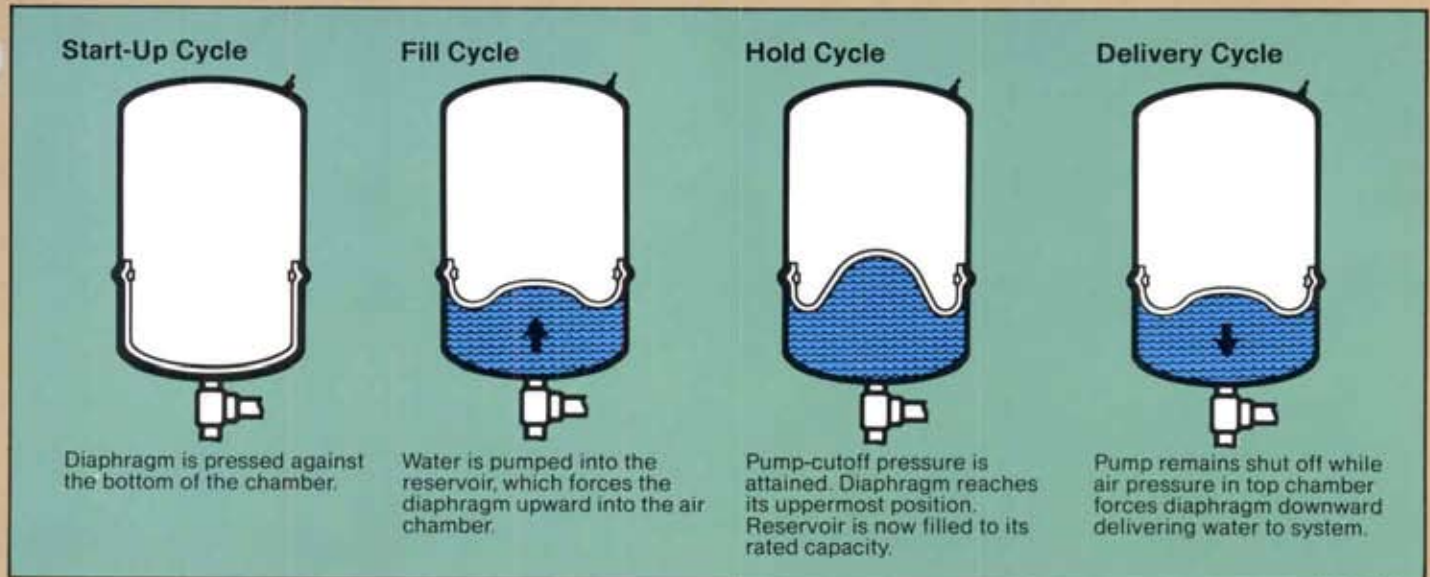
MYERS	WELL-X-TROL	A.O. SMITH	STA-RITE	CLAYTON MARK	WELL-RITE	GALVANIZED*
MIL2	WX101	V-6P	CA-8	CM1001	JR6-01	6 Gal.
MIL5	WX102	V-15P	N/A	CM1002	JR15-02	11 Gal.
MIL7	WX103	V25P	CA-15	CM1003	JR25-03	21 Gal.
MIL14	WX200	V-45P	N/A	N/A	N/A	42 Gal.
MPD14	WX201	V-45P	N/A	CM3001	WR45-01	42 Gal.
MPD20	WX202	V-60	CA-42	CM4202	WR60-02	42 Gal.
MPD31	WX203	V-100	CA-82	CM8003	WR100	82 Gal.
MPD36	WX-205	N/A	N/A	N/A	N/A	82 Gal.
MPD52	WX251	V-200	CA-120	CM12051	WR140-01	120 Gal.
MPD86	WX302	V-260	CA-220	CM17002	WR260-03	220 Gal.
MPD96	N/A	N/A	N/A	N/A	N/A	300 Gal.
MPD119	WX350	V-350	N/A	CM22050	WR360-03	375 Gal.
MPDH7	WX103PS	N/A	CA-15H	CM12H	JR25-03S	21 Gal.
MPDH14	WX200PS	N/A	N/A	CM30H	JR44HS	42 Gal.
MPDH20	N/A	N/A	CA-42H	CM40H	N/A	42 Gal.

* Standard Atmospheric Installation

MYERS PRESSURIZED DIAPHRAGM TANK SELECTION TABLE

Pump Capacity		Pressure Switch Setting - PSI (KPa)								
		20-40 (138-276)			30-50 (207-345)			40-60 (276-414)		
		Minimum Pump Run Time								
		1 Min.	1½ Min.	2 Min.	1 Min.	1½ Min.	2 Min.	1 Min.	1½ Min.	2 Min.
GPM	(lpm)	MPD14	MPD14	MPD14	MPD14	MPD14	MPD20	MPD14	MPD20	MPD20
2½ (9.5)		MPD14	MPD20	MPD36	MPD20	MPD36	MPD36	MPD20	MPD36	MPD52
5 (19)		MPD20	MPD36	MPD52	MPD36	MPD36	MPD52	MPD36	MPD52	MPD86
7 (26.6)		MPD31	MPD52	MPD86	MPD31	MPD52	MPD86	MPD52	MPD86	MPD86
10 (38)		MPD36	MPD52	MPD86	MPD52	MPD86	MPD86	MPD52	MPD86	MPD86
12 (45.6)		MPD36	MPD52	MPD86	MPD52	MPD86	MPD86	MPD52	MPD86	MPD96
15 (57)		MPD52	MPD86	MPD86	MPD52	MPD86	MPD119	MPD86	MPD96	MPD119
20 (76)		MPD86	MPD86	MPD119	MPD86	MPD119	MPD86 (2)*	MPD86	MPD119	MPD86 (2)*
25 (95)		MPD86	MPD119	MPD86 (2)*	MPD86	MPD86 (2)*	MPD86 (2)*	MPD96	MPD86 (2)*	MPD96

How Myers Diaphragm Tanks Operate



DRAWDOWN, DIMENSIONS & WEIGHTS

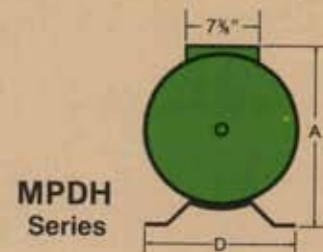
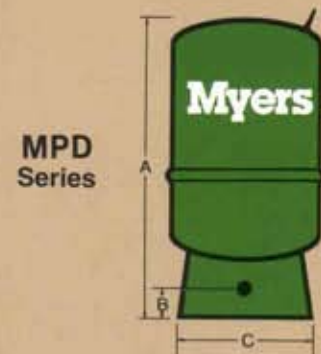
Model No.	Vol. - Gal. (liters)	Drawdown - Gal. (liters)			Precharge Pressure PSI (Kpa)	Dimension - inches (cm)			Weight Lbs. (kg)
		20-40 PSI (138-276KPa)	30-50 PSI (207-345KPa)	40-60 PSI (276-414KPa)		A	B	C	
MIL2	2.0 (7.6)	0.7 (2.6)	0.6 (2.3)	---	20 (138)	12-9/16 (32)	---	8-3/8 (21)	4-1/2 (2.0)
MIL5	4.6 (17.4)	1.7 (6.1)	1.4 (5.3)	---	20 (138)	14-11/16 (37)	---	11-3/8 (28)	7-1/2 (3.4)
MIL7	7.3 (27.7)	2.7 (10.2)	2.3 (8.7)	---	30 (207)	21-1/8 (53)	---	11-3/8 (28)	10-1/2 (4.8)
MIL14	14.0 (53)	5.2 (19.8)	4.3 (16.3)	3.8 (14.5)	30 (207)	21-3/4 (54)	---	15-3/8 (39)	22 (10)
MPD14	14.0 (53)	5.2 (19.8)	4.3 (16.3)	3.8 (14.5)	30 (207)	24-3/4 (62)	2-1/4 (5.6)	15-3/8 (39)	25 (11.4)
MPD20	20.0 (76)	7.4 (28.1)	6.2 (23.5)	5.4 (20.5)	30 (207)	32-3/4 (82)	2-1/4 (5.6)	15-3/8 (39)	30 (13.6)
MPD31	31.0 (117.8)	11.5 (43.7)	9.6 (36.5)	8.4 (31.9)	30 (207)	45-1/2 (115)	2-1/4 (5.6)	15-3/8 (39)	40 (18.2)
MPD36	36.0 (136)	13.3 (50.5)	11.2 (42.3)	9.7 (36.8)	30 (207)	32-5/8 (80)	2-1/4 (5.6)	20 (50)	44 (20.0)
MPD52	52.0 (197.6)	19.2 (72.9)	16.1 (61.2)	14.0 (53.2)	40 (276)	38-5/8 (97)	2-1/4 (5.6)	23-3/8 (60)	77 (35.0)
MPD86	86.0 (325)	31.8 (120)	26.7 (101)	23.2 (87)	40 (276)	58-3/4 (149)	2-1/4 (5.6)	23-3/8 (60)	105 (48)
MPD96	96.0 (363)	35.5 (134)	29.7 (112)	25.9 (98)	40 (276)	63-3/8 (161)	2-1/4 (5.6)	23-3/8 (60)	111 (51)
MPD119	119.0 (450)	44.2 (167)	37 (140)	32.3 (122)	40 (276)	76-1/2 (194)	2-1/4 (5.6)	23-3/8 (60)	160 (73)

MIL Series connection 3/4" Male.
MPD14, 20, 36 connection 1" Female.
MPD52, 86, 96, 119 connection 1-1/4" Female.

NOTE: All tanks may be used up to 90°F.
MAXIMUM WORKING PRESSURE 100 PSI.
NOTE: Install a pressure relief valve on any installation where the pump pressure can exceed the tank's maximum pressure.

Model No.	Vol.-Gal. (liters)	Drawdown-Gal. (liters)			Precharge Pressure-PSI (KPa)	Dimensions-Inches (cm)				Weight-Lbs. (kg)
		20-40 PSI (138-276KPa)	30-50 PSI (207-345KPa)	40-60 PSI (276-414KPa)		A	B	C	D	
MPDH7	7.3 (27.7)	2.5 (9.5)	2.1 (7.9)	---	30 (207)	12-5/8 (32)	21-1/8 (53)	11-3/8 (28)	12-1/2 (31)	16 (7.3)
MPDH14	14.0 (53)	5.2 (19.8)	4.3 (16.3)	3.7 (14.1)	30 (207)	17-3/8 (43)	21-3/4 (54)	15-3/8 (39)	14 (35)	25-1/2 (11.6)
MPDH20	20.0 (76)	7.4 (28.1)	6.2 (23.5)	5.4 (20.5)	30 (207)	17-3/8 (43)	27-1/8 (68)	15-3/8 (39)	14 (35)	30 (13.6)

MPDH7 connection 3/4" Male.
MPDH14, 20 connection 1" Female.



RESIDENTIAL ELECTRIC LOWBOY

6-Year Tank Warranty

6-Year Parts Warranty

- **Fused Ceramic Shield**

A tough, thick durable coat of blue cobalt ceramic is fused to the tank's interior surfaces at 1600°F, forming a corrosion-resistant lining for years of dependable protection and use.

- **Dual Heating Elements**

Screw-in, direct immersion, 4500-watt, 240-volt heating elements for maximum efficiency. Available in multiple wattages and voltages for every job.

- **Non-CFC Foam Insulation**

The tank is surrounded by a thick coat of non-CFC polyurethane foam to trap heat inside the tank, saving energy.

- **Heat Traps**

Provided for inlet and outlet to reduce heat loss through the inlet and outlet during standby.

- **Dip Tube**

Carries cold inlet water deep into the tank to minimize temperature dilution of hot water.

- **T&P Valve**

Conveniently located on the side of the tank to facilitate piping to a drain or external to the building. Also available with top T&P opening for field-installed top T&P valve.

- **3/4" Water Connections**

Located on top.

- **Anode Rod**

Top-mounted, heavy-duty anode for added tank protection, extending the life of the tank.

- **Built-In Electric Junction Box**

Top-located, convenient junction box, ready for 1/2" or 3/4" conduit.

- **Thermostat/High Limit Control**

Combination control allows adjustment of water temperature while preventing overheat protection.

- **Code Approvals**

Listed to UL 174, 1987 NAECA 2004 requirements, BOCA and ASHRAE 90.1-1999. All models are certified at 300 PSI test pressure and 150 PSI working pressure.

- **Drain Valve**

Child-resistant, corrosion-resistant drain valve.



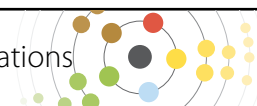
6-Year Limited Tank Warranty

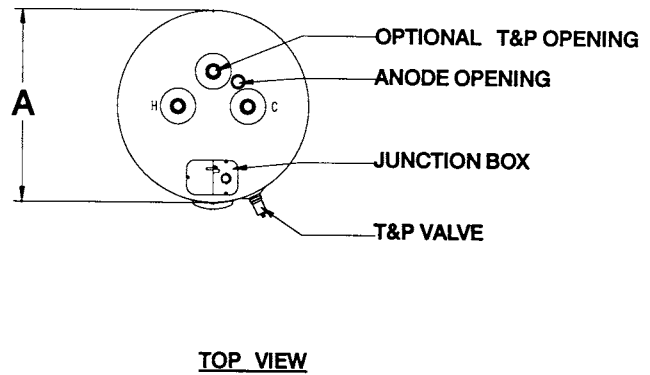
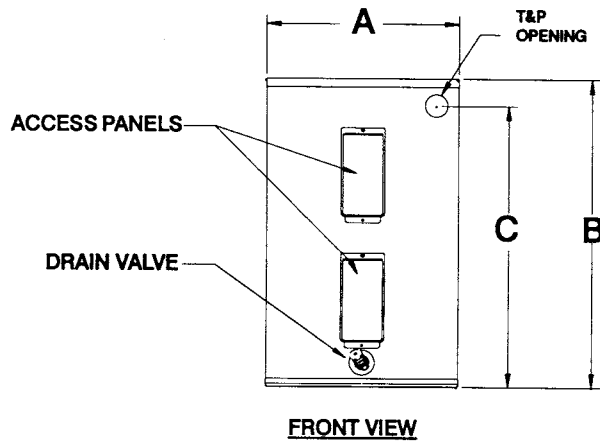
Heavy gauge steel is automatically formed, rolled and welded to assure continuous seams for Fused Ceramic Shield lining. Each tank is triple tested to ensure quality.

6-Year Parts Warranty

Original factory parts warranted for 6 years.

For complete warranty information consult the written warranty of American Water Heater Company at (800) 999-9515.





Residential Electric Lowboy

MODEL NUMBER	GALLON CAPACITY	GPH RECOVERY 90° RISE	EF	JACKET DIAMETER A	HEIGHT TO TOP OF HEATER B	HEIGHT TO SIDE T&P VALVE C	APPROX. SHIPPING WEIGHT
E61-40L-045DV***	38	20.7	0.92	22	31-5/8	24-1/4	113
E61-50L-045DV***	46.5	20.7	0.91	24	31-5/8	24-1/4	133
E62-30L-045DV	28	20.7	0.93	22	29-1/2	22-1/2	84
E62-40L-045DV	38	20.7	0.92	24	31-5/8	24-1/4	113
E62-50L-045DV	46.5	20.7	0.91	26	31-5/8	24-1/4	133

***Supplied with insulating jacket.

To order single element substitute "S" for "D" in model number. Delete "V" from model number for top T&P option, T&P opening on top of the heater with the valve shipped in the box for field installation. All models include internal heat traps. Dimensions and specifications subject to change without notice in accordance with our policy of continuous product improvement. Dimensions on all charts shown in inches. All models are wired for non-simultaneous element operation. 3/4" water connection located on top. Top water connections are on 8" centers.

Specification

Residential electric water heater(s) shall be Lowboy model _____ as manufactured by American Water Heater Company, or an approved equal, and shall have a _____-year tank warranty and a _____-year parts warranty, when installed in a residential application. Heater(s) shall have a storage capacity of _____ gallons and shall have a rated input of _____ KW at _____ Volts, single phase, 60 cycle AC, and shall be designed, tested and listed in accordance with Underwriter's Laboratories standard UL 174. Heaters shall meet or exceed the requirements of the Federal "National Appliance Energy Conservation Act of 1987" and shall comply with ASHRAE Standard 90.1-1999. The interior of the storage tank shall be lined with a Fused Ceramic Shield lining, fused to the tank at 1600°F, forming a corrosion-resistant lining; polymer linings are not acceptable. Each tank shall be furnished with an internal anode for anodic protection. The unit must be equipped with a built-in electrical junction box. Electrical heating elements shall be screw-in, direct immersion, resistance type. Element operation shall be controlled by a thermostat for each element. A high temperature cut-off shall be supplied as an integral part of the heater. Element access panels shall be provided on the front of the heater for each element. A corrosion-resistant drain valve shall be provided on the front of each unit. The tank shall be totally encased in a metal jacket and insulated with a non-CFC foam to reduce stand-by heat loss. The tank must be design certified for 300 PSI test pressure and 150 PSI working pressure.

Order Entry and Sales

P.O. Box 4056, 500 Princeton Road
Johnson City, TN 37602-4056
(800) 937-1037
(800) 581-7224 fax

Product Service and Support

P.O. Box 1597, 500 Princeton Road
Johnson City, TN 37605-1597
(800) 999-9515
(800) 999-5210 fax

Distributed By



Material Safety Data Sheets

Sherwin-Williams All Surface Enamel
Sherwin-Williams Harmony Latex Paint
Battery Acid
Lead/Acid Battery



MATERIAL SAFETY DATA SHEET

A11W200
05 00

Section 1 -- PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER

A11W200

HMIS CODES

Health	2*
Flammability	2
Reactivity	0

PRODUCT NAME

ALL SURFACE ENAMEL - Oil Base Gloss, White

MANUFACTURER'S NAME

THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

EMERGENCY TELEPHONE NO.
(216) 566-2917

DATE OF PREPARATION

01-APR-07

INFORMATION TELEPHONE NO.
(216) 566-2902

Section 2 -- COMPOSITION/INFORMATION ON INGREDIENTS

% by WT	CAS No.	INGREDIENT	UNITS	VAPOR PRESSURE
35	64742-88-7	Mineral Spirits		
		ACGIH TLV	100 ppm	2 mm
		OSHA PEL	100 ppm	
0.1	100-41-4	Ethylbenzene		
		ACGIH TLV	100 ppm	7.1 mm
		ACGIH TLV	125 ppm STEL	
		OSHA PEL	100 ppm	
		OSHA PEL	125 ppm STEL	
3	14807-96-6	Talc		
		ACGIH TLV	2 mg/m3 as Resp. Dust	
		OSHA PEL	2 mg/m3 as Resp. Dust	
24	13463-67-7	Titanium Dioxide		
		ACGIH TLV	10 mg/m3 as Dust	
		OSHA PEL	10 mg/m3 Total Dust	
		OSHA PEL	5 mg/m3 Respirable Fraction	

Section 3 -- HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION of vapor or spray mist.

EYE or SKIN contact with the product, vapor or spray mist.

EFFECTS OF OVEREXPOSURE

EYES: Irritation.

SKIN: Prolonged or repeated exposure may cause irritation.

INHALATION: Irritation of the upper respiratory system.

May cause nervous system depression. Extreme overexposure may result in unconsciousness and possibly death.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Headache, dizziness, nausea, and loss of coordination are indications of excessive exposure to vapors or spray mists.

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

Continued on page 2



=====

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

=====

Section 4 -- FIRST AID MEASURES

EYES: Flush eyes with large amounts of water for 15 minutes.

Get medical attention.

SKIN: Wash affected area thoroughly with soap and water.

Remove contaminated clothing and launder before re-use.

INHALATION: If affected, remove from exposure. Restore breathing.

Keep warm and quiet.

INGESTION: Do not induce vomiting.

Get medical attention immediately.

=====

Section 5 -- FIRE FIGHTING MEASURES

FLASH POINT

105 F PMCC

LEL

1.0

UEL

6.0

FLAMMABILITY CLASSIFICATION

Combustible, Flash above 99 and below 200 F

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode when exposed to extreme heat.

Application to hot surfaces requires special precautions.

During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.

Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

=====

Section 6 -- ACCIDENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate the area.

Remove with inert absorbent.

=====

Section 7 -- HANDLING AND STORAGE

STORAGE CATEGORY

DOL Storage Class II

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Contents are COMBUSTIBLE. Keep away from heat and open flame.

Consult NFPA Code. Use approved Bonding and Grounding procedures.

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

Continued on page 3



Section 8 -- EXPOSURE CONTROLS/PERSONAL PROTECTION

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.

Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.

Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m³ (total dust), 3 mg/m³ (respirable fraction), OSHA PEL 15 mg/m³ (total dust), 5 mg/m³ (respirable fraction).

Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other 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 more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Wear gloves which are recommended by glove supplier for protection against materials in Section 2.

EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

OTHER PRECAUTIONS

Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal.

Section 9 -- PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT WEIGHT	9.47 lb/gal	1135 g/l
SPECIFIC GRAVITY	1.14	
BOILING POINT	300 - 395 F	148 - 201 C
MELTING POINT	Not Available	
VOLATILE VOLUME	54 %	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	N.A.	
VOLATILE ORGANIC COMPOUNDS	(VOC Theoretical - As Packaged)	
3.50 lb/gal	420 g/l	Less Water and Federally Exempt Solvents
3.50 lb/gal	420 g/l	Emitted VOC

Continued on page 4



=====
 Section 10 -- STABILITY AND REACTIVITY
 =====

STABILITY -- Stable
 CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

=====
 Section 11 -- TOXICOLOGICAL INFORMATION
 =====

CHRONIC HEALTH HAZARDS

Ethylbenzene is classified by IARC as possibly carcinogenic to humans (2B) based on inadequate evidence in humans and sufficient evidence in laboratory animals. Lifetime inhalation exposure of rats and mice to high ethylbenzene concentrations resulted in increases in certain types of cancer, including kidney tumors in rats and lung and liver tumors in mice. These effects were not observed in animals exposed to lower concentrations. There is no evidence that ethylbenzene causes cancer in humans.

Prolonged overexposure to solvent ingredients in Section 2 may cause adverse effects to the liver and urinary systems.

Rats exposed to titanium dioxide dust at 250 mg./m3 developed lung cancer, however, such exposure levels are not attainable in the workplace.

Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage.

=====

TOXICOLOGY DATA

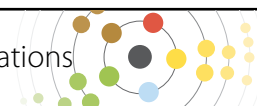
CAS No.	Ingredient Name				
64742-88-7	Mineral Spirits				
		LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
100-41-4	Ethylbenzene				
		LC50	RAT	4HR	Not Available
		LD50	RAT		3500 mg/kg
14807-96-6	Talc				
		LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
13463-67-7	Titanium Dioxide				
		LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available

=====
 Section 12 -- ECOLOGICAL INFORMATION
 =====

ECOTOXICOLOGICAL INFORMATION

No data available.

Continued on page 5



=====
 Section 13 -- DISPOSAL CONSIDERATIONS
 =====

 WASTE DISPOSAL METHOD

Waste from this product may be hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.

Waste must be tested for ignitability to determine the applicable EPA hazardous waste numbers.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

=====
 Section 14 -- TRANSPORT INFORMATION
 =====

 US Ground (DOT)

May be Classed as a Combustible Liquid for U.S. Ground.
 UN1263, PAINT, 3, PG III, (ERG#128)

DOT (Dept of Transportation) Hazardous Substances & Reportable Quantities
 Xylenes (isomers and mixture) 100 lb RQ

Bulk Containers may be Shipped as (check reportable quantities):
 UN1263, PAINT, COMBUSTIBLE LIQUID, PG III, (ERG#128)

Canada (TDG)

May be Classed as a Combustible Liquid for Canadian Ground.
 UN1263, PAINT, CLASS 3, PG III, (ERG#128)

IMO

UN1263, PAINT, CLASS 3, PG III, (41 C c.c.), EmS F-E, S-E

=====
 Section 15 -- REGULATORY INFORMATION
 =====

 SARA 313 (40 CFR 372.65C) SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
100-41-4	Ethylbenzene	0.1	

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

=====
 Section 16 -- OTHER INFORMATION
 =====

 This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.



MATERIAL SAFETY DATA SHEET

B5W951
10 00

Section 1 -- PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NUMBER

B5W951

HMIS CODES

Health	1*
Flammability	0
Reactivity	0

PRODUCT NAME

HARMONY* Interior Flat Finish, Extra White

MANUFACTURER'S NAME

THE SHERWIN-WILLIAMS COMPANY
101 Prospect Avenue N.W.
Cleveland, OH 44115

EMERGENCY TELEPHONE NO.

(216) 566-2917

DATE OF PREPARATION

19-JUL-07

INFORMATION TELEPHONE NO.

(216) 566-2902

Section 2 -- COMPOSITION/INFORMATION ON INGREDIENTS

% by WT	CAS No.	INGREDIENT	UNITS	VAPOR PRESSURE
4	1332-58-7	Kaolin		
		ACGIH TLV	2 mg/m3	as Resp. Dust
		OSHA PEL	10 mg/m3	Total Dust
		OSHA PEL	5 mg/m3	Respirable Fraction
3	12001-26-2	Mica		
		ACGIH TLV	3 mg/m3	as Resp. Dust
		OSHA PEL	3 mg/m3	as Resp. Dust
6	471-34-1	Calcium Carbonate		
		ACGIH TLV	10 mg/m3	as Dust
		OSHA PEL	15 mg/m3	Total Dust
		OSHA PEL	5 mg/m3	Respirable Fraction
15	13463-67-7	Titanium Dioxide		
		ACGIH TLV	10 mg/m3	as Dust
		OSHA PEL	10 mg/m3	Total Dust
		OSHA PEL	5 mg/m3	Respirable Fraction

Section 3 -- HAZARDS IDENTIFICATION

ROUTES OF EXPOSURE

INHALATION of vapor or spray mist.

EYE or SKIN contact with the product, vapor or spray mist.

EFFECTS OF OVEREXPOSURE

EYES: Irritation.

SKIN: Prolonged or repeated exposure may cause irritation.

INHALATION: Irritation of the upper respiratory system.

SIGNS AND SYMPTOMS OF OVEREXPOSURE

Redness and itching or burning sensation may indicate eye or excessive skin exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE

None generally recognized.

CANCER INFORMATION

For complete discussion of toxicology data refer to Section 11.

Continued on page 2



=====
Section 4 -- FIRST AID MEASURES
=====

EYES: Flush eyes with large amounts of water for 15 minutes.
Get medical attention.
SKIN: Wash affected area thoroughly with soap and water.
INHALATION: If affected, remove from exposure. Restore breathing.
Keep warm and quiet.
INGESTION: Do not induce vomiting.
Get medical attention immediately.

=====
Section 5 -- FIRE FIGHTING MEASURES
=====

FLASH POINT	LEL	UEL
Not Applicable	N.A.	N.A.

FLAMMABILITY CLASSIFICATION

Not Applicable

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical, Alcohol Foam

UNUSUAL FIRE AND EXPLOSION HAZARDS

Closed containers may explode (due to the build-up of pressure) when exposed to extreme heat.

During emergency conditions overexposure to decomposition products may cause a health hazard. Symptoms may not be immediately apparent. Obtain medical attention.

SPECIAL FIRE FIGHTING PROCEDURES

Full protective equipment including self-contained breathing apparatus should be used.

Water spray may be ineffective. If water is used, fog nozzles are preferable. Water may be used to cool closed containers to prevent pressure build-up and possible autoignition or explosion when exposed to extreme heat.

=====
Section 6 -- ACCIDENTAL RELEASE MEASURES
=====

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Ventilate the area.

Remove with inert absorbent.

=====
Section 7 -- HANDLING AND STORAGE
=====

STORAGE CATEGORY

Not Applicable

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Keep container closed when not in use. Transfer only to approved containers with complete and appropriate labeling. Do not take internally. Keep out of the reach of children.

Continued on page 3



=====
Section 8 -- EXPOSURE CONTROLS/PERSONAL PROTECTION
=====

PRECAUTIONS TO BE TAKEN IN USE

Use only with adequate ventilation.

Avoid contact with skin and eyes. Avoid breathing vapor and spray mist.

Wash hands after using.

This coating may contain materials classified as nuisance particulates (listed "as Dust" in Section 2) which may be present at hazardous levels only during sanding or abrading of the dried film. If no specific dusts are listed in Section 2, the applicable limits for nuisance dusts are ACGIH TLV 10 mg/m³ (total dust), 3 mg/m³ (respirable fraction), OSHA PEL 15 mg/m³ (total dust), 5 mg/m³ (respirable fraction).

Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other 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 more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

VENTILATION

Local exhaust preferable. General exhaust acceptable if the exposure to materials in Section 2 is maintained below applicable exposure limits. Refer to OSHA Standards 1910.94, 1910.107, 1910.108.

RESPIRATORY PROTECTION

If personal exposure cannot be controlled below applicable limits by ventilation, wear a properly fitted organic vapor/particulate respirator approved by NIOSH/MSHA for protection against materials in Section 2.

When sanding or abrading the dried film, wear a dust/mist respirator approved by NIOSH/MSHA for dust which may be generated from this product, underlying paint, or the abrasive.

PROTECTIVE GLOVES

Required for long or repeated contact.

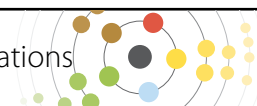
EYE PROTECTION

Wear safety spectacles with unperforated sideshields.

=====
Section 9 -- PHYSICAL AND CHEMICAL PROPERTIES
=====

PRODUCT WEIGHT	12.11 lb/gal	1451 g/l
SPECIFIC GRAVITY	1.46	
BOILING POINT	212 - 213 F	100 - 100 C
MELTING POINT	Not Available	
VOLATILE VOLUME	58 %	
EVAPORATION RATE	Slower than ether	
VAPOR DENSITY	Heavier than air	
SOLUBILITY IN WATER	N.A.	
pH	9.0	
VOLATILE ORGANIC COMPOUNDS	(VOC Theoretical - As Packaged)	
0.05 lb/gal	6 g/l	Less Water and Federally Exempt Solvents
0.02 lb/gal	2 g/l	Emitted VOC

Continued on page 4



=====

Section 10 -- STABILITY AND REACTIVITY

STABILITY -- Stable
CONDITIONS TO AVOID

None known.

INCOMPATIBILITY

None known.

HAZARDOUS DECOMPOSITION PRODUCTS

By fire: Carbon Dioxide, Carbon Monoxide

HAZARDOUS POLYMERIZATION

Will not occur

=====

Section 11 -- TOXICOLOGICAL INFORMATION

CHRONIC HEALTH HAZARDS

Rats exposed to titanium dioxide dust at 250 mg./m3 developed lung cancer, however, such exposure levels are not attainable in the workplace.

TOXICOLOGY DATA

CAS No.	Ingredient Name	LC50	RAT	4HR	Not Available
1332-58-7	Kaolin	LD50	RAT		Not Available
12001-26-2	Mica	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
471-34-1	Calcium Carbonate	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available
13463-67-7	Titanium Dioxide	LC50	RAT	4HR	Not Available
		LD50	RAT		Not Available

=====

Section 12 -- ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

No data available.

=====

Section 13 -- DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD

Waste from this product is not hazardous as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR 261.

Incinerate in approved facility. Do not incinerate closed container. Dispose of in accordance with Federal, State/Provincial, and Local regulations regarding pollution.

Continued on page 5



=====
Section 14 -- TRANSPORT INFORMATION
=====

US Ground (DOT)
Not Regulated for Transportation.

Canada (TDG)
Not Regulated for Transportation.

IMO
Not Regulated for Transportation.

=====
Section 15 -- REGULATORY INFORMATION
=====

SARA 313 (40 CFR 372.65C) SUPPLIER NOTIFICATION

CAS No.	CHEMICAL/COMPOUND	% by WT	% Element
No ingredients in this product are subject to SARA 313 (40 CFR 372.65C) Supplier Notification.			

CALIFORNIA PROPOSITION 65

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

TSCA CERTIFICATION

All chemicals in this product are listed, or are exempt from listing, on the TSCA Inventory.

=====
Section 16 -- OTHER INFORMATION
=====

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

The above information pertains to this product as currently formulated, and is based on the information available at this time. Addition of reducers or other additives to this product may substantially alter the composition and hazards of the product. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information.



MATERIAL SAFETY DATA SHEET**SECTION I - PRODUCT IDENTIFICATION**

Product identifier: Battery Acid **Product use:** Lead/Acid Battery **Chemical family:** Mineral acids.

Supplier's name and address:
Surrette Battery Co. Ltd.
P.O. Box 2020, 1 Station Road
Springhill, N.S.
B0M 1X0 (902) 597-3767

Manufacturer's name and address:
Refer to Supplier

Emergency Telephone #: CANUTEC (613) 996-6666

WHMIS CLASS: D1B, E

HMIS rating: Health 3 Fire 0 Reactivity 1

SECTION II - HAZARDOUS INGREDIENTS

<u>Ingredients</u>	<u>CAS #</u>	<u>wt. %</u>	<u>LC₅₀, ppm (Rat, inh.)</u>	<u>LD₅₀, mg/kg (Rat, oral)</u>
Sulfuric acid	7664-93-9	35-40	510 mg/m ³ /2Hr	2140

SECTION III - PHYSICAL DATA

Physical state, odour and appearance: Clear, colourless, liquid that is odourless unless heated, than odour becomes sharp and choking.

Odour threshold: n/av **Specific gravity (at °C):** 1.265 **Coefficient of water/oil distribution:** n/av

Vapour pressure: n/av **Boiling point:** 110°C **Melting/freezing point:** 0.7°C **pH:** <1

Vapour density (Air=1.0): Low **Evaporation rate (n-BuAc=1.0):** n/av

Volatiles, %: n/av **Solubility in water (w/w):** 100%

SECTION IV - FIRE AND EXPLOSION DATA

Conditions of flammability: Non-flammable liquid.

Means of extinction: Use media appropriate for surrounding fire.

Sensitivity to mechanical impact/static discharge: Not susceptible to mechanical impact or static discharge.

Flash point (Method): None.

Lower/upper flammable limits (% by volume): n/ap

Auto-ignition temperature: n/ap

Hazardous combustion products: Refer to "Hazardous decomposition products" (next section)

Unusual fire and explosion hazards: Sulfur dioxide, sulfur trioxide, sulfuric acid fumes. Evolution of explosive Hydrogen gas on contact with most metals.

SECTION V - REACTIVITY DATA

Stability: Stable. Hazardous polymerization will not occur.

Incompatible materials: Highly reactive with materials such as metals, metal oxides, hydroxides, nitrates, amines, carbohydrates and other alkaline materials. Reactions can generate a great deal of heat as does the dilution of acid with water. Never add water to acid. Acid should always be added slowly to the water.

Conditions of reactivity: Product may decompose if exposed to high temperatures.

Hazardous decomposition products: If heated above 340°C, sulfuric acid will decompose to sulfur trioxide and water.

Updated: 11-May-06



SECTION VI - TOXICOLOGICAL PROPERTIES

Routes of exposure and acute/chronic effects

Exposure limits: ACGIH-TLV 1 mg/m³ or 0.25 ppm expressed as mist or spray.

Inhalation: Mists and vapours are corrosive and can cause severe irritation or damage to the mouth, nose, throat and lungs. Exposure levels can affect symptoms from mild coughing, sneezing, tickling sensation in the nose and throat to bronchitis and pulmonary edema.

Skin contact: Corrosive - causes burns, and destruction of all tissues. Severity of the burns is generally determined by the concentration of the solution and duration of exposure.

Eye contact: Contact with even small amounts can cause severe damage (corneal) burns and/or necrosis which may result in loss of sight.

Ingestion: Harmful or fatal if swallowed. Causes burns to the GI system.

Chronic effects: None known.

Carcinogenicity: Not listed by IARC or ACGIH.

Teratogenicity, mutagenicity, other reproductive effects: None known.

Sensitization to material: Product is not known to cause allergies.

Synergistic materials: None known.

SECTION VII - FIRST AID

Inhalation: Remove victim to fresh air. If breathing difficulty does not improve rapidly, get patient to a doctor.

Skin: Wash skin with mild soap and water. Rinse thoroughly. See a doctor if irritation persists.

Eyes: Flush with plenty of water for at least 20 minutes. Get medical attention immediately.

Ingestion: Get immediate medical attention. Do not induce vomiting.

SECTION VIII - PREVENTIVE MEASURES

Spill, leak or release: Use full protective clothing, including boots and protective equipment. Contain spill in order to prevent contamination of sewage system or waterway. Pump into mark containers for reclamation or disposal. If possible, neutralize on a dry basis with suitable alkali such as lime, soda ash, or sodium bicarbonate, then flush with water in accordance with applicable regulations.

Waste disposal: Consult federal, provincial and local regulations for allowed means of disposal.

PROTECTIVE EQUIPMENT

Respiratory protection: Cartridge type mask or self-contained breathing apparatus approved by NIOSH, depending on exposure.

Engineering controls: Local exhaust is required. Mechanical ventilation (general) - not compulsory.

Protective gloves: PVC or Neoprene.

Eye protection: Chemical splash goggles or face shield.

Other protective equipment: Depending on exposure and on workplace standards. Safety showers and eye wash station should be installed in storage and handling areas.

STORAGE AND HANDLING

Handling procedures and equipment: Avoid contact with skin, eyes and clothing. Protect containers from physical damage. Wear protective equipment during handling. When diluting, slowly add acid to water (never water to acid) while stirring to avoid spattering or boiling. Wash thoroughly after handling. Emptied containers retain vapour and product residue.

Storage requirements: Store in a cool, dry area. Store away from sources of ignition. Keep container closed and protect from contact with water to avoid possible violent reaction.

Special shipping instructions: TDG - Battery fluid, acid, Class 8(9.2), UN2796, P.G. II



SECTION IX - PREPARATION INFORMATION

Prepared by: Surette Battery Co. Ltd.

Telephone #: (902) 597-3767

Preparation date: 01-February-2007

Additional notes or references:

Abbreviations:

ACGIH:	American Conference of Governmental Industrial Hygienists
IARC:	International Agency for Research on Cancer
n/ap	not applicable
n/av:	not available
NIOSH:	National Institute for Occupational Safety and Health
TCC:	Tagliabue Closed Cup
WHMIS:	Workplace Hazardous Materials Information System
TDG:	Transportation of Dangerous Goods Act and Regulations
TLV:	Threshold Limit Values
TWA:	Time Weighted Average

References:

1. Van Nostrand Reinhold, Dangerous Properties of Industrial Materials, Seventh Edition, N. Irving Sax.
2. Canadian Centre for Occupational Health and Safety. RTECS (Registry of Toxic Effects) and CHEMINFO databases.
3. ACGIH, Threshold Limit Values and Biological Exposure Indices for 1997
4. International Agency for Research on Cancer Monographs, Supplement 7, 1988.



MATERIAL SAFETY DATA SHEET

SECTION I - PRODUCT IDENTIFICATION

Product identifier: Lead/Acid Battery

Product use: Lead Acid Storage Battery

Chemical family: Lead Acid Storage Battery

Supplier's name and address:

Surette Battery Co. Ltd.
P.O. Box 2020, 1 Station Road
Springhill, N.S.
B0M 1X0
(902) 597-3767

Manufacturer's name

Refer to Supplier

Emergency Telephone #: CANUTEC (613) 996-6666

WHMIS CLASS

Exempt (Manufactured Article)

SECTION II - HAZARDOUS INGREDIENTS

<u>Ingredients</u>	<u>LC₅₀, ppm</u>	<u>LD₅₀, mg/kg</u>		
	<u>CAS #</u>	<u>wt. %</u>	<u>(Rat, ihl.)</u>	<u>(Rat, oral)</u>
Lead	7439-92-1	34	n/av	n/av
Lead dioxide	1309-60-0	31	n/av	n/av
Sulfuric acid	7664-93-9	34 510 mg/m ³ /2H		2140

SECTION III - PHYSICAL DATA

Physical state, odour and appearance: A transparent to opaque case and sealed cover fitted with side or top terminals and vent caps, odourless.

Odour threshold: n/ap

Coefficient of water/oil distribution: n/ap

Boiling point: n/ap

pH: n/ap

Evaporation rate (n-BuAc=1.0): n/ap

Solubility in water (w/w): n/ap

Specific gravity (at °C): n/ap

Vapour pressure: n/ap

Melting/freezing point: n/ap

Vapour density (Air=1.0): n/ap

Volatiles, %: n/ap

SECTION IV - FIRE AND EXPLOSION DATA

Conditions of flammability: n/ap

Sensitivity to mechanical impact/static discharge: n/ap

Lower/upper flammable limits (% by volume): n/ap

Hazardous combustion products: n/ap

Unusual fire and explosion hazards: For battery acid - Evolution of explosive Hydrogen gas on contact with most metals.

Means of extinction: n/ap

Flash point (Method): None.

Auto-ignition temperature: n/ap

Updated: 11-May-06



SECTION V - REACTIVITY DATA

=====

Stability: n/ap **Incompatible materials:** n/ap **Conditions of reactivity:** n/ap
Hazardous decomposition products: For battery acid - If heated above 340°C, sulfuric acid will decompose to sulfur trioxide and water.

=====

SECTION VI - TOXICOLOGICAL PROPERTIES

=====

Exposure limits: ACGIH-TLV Not applicable for this article.
Inhalation: n/ap
Skin contact: n/ap
Eye contact: n/ap
Ingestion: n/ap
Chronic effects: None known.
 Carcinogenicity: Lead and lead dioxide are listed as carcinogens, however there is not possibility for exposure under normal conditions of use.
 Teratogenicity, mutagenicity, other reproductive effects: n/av
Sensitization to material: Product is not known to cause allergies.
Synergistic materials: None known.

=====

SECTION VII - FIRST AID

=====

Applies to the battery fluid only:
 Inhalation: Remove victim to fresh air. If breathing difficulty does not improve rapidly, get patient to a doctor.
 Skin: Wash skin with mild soap and water. Rinse thoroughly. See a doctor if irritation persists.
 Eyes: Flush with plenty of water for at least 20 minutes. Get medical attention immediately.
 Ingestion: Get immediate medical attention. Do not induce vomiting.

=====

SECTION VIII - PREVENTIVE MEASURES

=====

For the battery fluid only:
 Spill, leak or release: Use full protective clothing, including boots and protective equipment. Contain spill in order to prevent contamination of sewage system or waterway. Pump into mark containers for reclamation or disposal. If possible, neutralize on a dry basis with suitable alkali such as lime, soda ash, or sodium bicarbonate, then flush with water in accordance with applicable regulations.
 Waste disposal: Consult federal, provincial and local regulations for allowed means of disposal.

PROTECTIVE EQUIPMENT

For the battery fluid only:
 Respiratory protection: Cartridge type mask or self-contained breathing apparatus approved by NIOSH, depending on exposure.
 Engineering controls: Local exhaust is required. Mechanical ventilation (general) - not compulsory.
 Protective gloves: PVC or Neoprene.
 Eye protection: Chemical splash goggles or face shield.
 Other protective equipment: Safety shoes worn with rubber/neoprene boots or steel-toed rubber/neoprene boots to be worn over socks. Place pants' legs over boots to keep acid out of boots. Other equipment - Depending on exposure and on workplace standards. Safety showers and eye wash station should be installed in storage and handling areas.

STORAGE AND HANDLING

Handling procedures and equipment: Avoid contact with skin, eyes and clothing. Protect containers from physical damage. Wear protective equipment during handling. When

Updated: 11-May-06



diluting, slowly add acid to water (never water to acid) while stirring to avoid spattering or boiling. Wash thoroughly after handling, Emptied containers retain vapour and product residue.

Storage requirements: Store in a cool, dry area. Store away from sources of ignition. Keep container closed and protect from contact with water to avoid possible violent reaction.

Special shipping instructions: TDG - Batteries, wet filled with acid, Class 8, UN2794, P.G. III

SECTION IX - PREPARATION INFORMATION

Prepared by: Surrette Battery Co. Ltd.

Telephone #: (902) 597-3767

Preparation date: February 1, 2007

Additional notes or references:

Abbreviations:

ACGIH: American Conference of Governmental Industrial Hygienists

IARC: International Agency for Research on Cancer

n/ap not applicable

n/av: not available

NIOSH: National Institute for Occupational Safety and Health

WHMIS: Workplace Hazardous Materials Information System

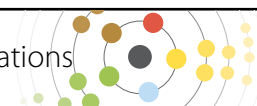
TDG: Transportation of Dangerous Goods Act and Regulations

TLV: Threshold Limit Values

References:

1. Van Nostrand Reinhold, Dangerous Properties of Industrial Materials, Seventh Edition, N. Irving Sax.
2. Canadian Centre for Occupational Health and Safety. RTECS (Registry of Toxic Effects) and CHEMINFO databases.
3. International Agency for Research on Cancer Monographs, Supplement 7, 1988.

Updated: 11-May-06



Extraneous Project Information

Categorized inventory of water requirements

Unlisted Electrical Components and Justifications



Water requirements

1. For domestic usage through the competition (540gal).
2. For solar thermal tank (205gal).
3. For expansion tank (36gal).
4. For water heater (28 gal).
5. Filling pipes and solar thermal manifolds (50gal).
6. For outlaying ponds and reflecting pools (800gal).

Total competition water requirement: **1650 gallons**



Unlisted Electrical Components:

MSK Light-Thru BIPV modules:

Custom BIPV units are not UL listed and must be evaluated on a case-by-case basis for safety. We are using custom BIPV units to create the monocrystalline composition on our south facade that contributes greatly to the overall aesthetic of our building and allows us to demonstrate to the public how photovoltaic technology can be integrated with ornament.

The Light-Thru modules we are employing use two panes of 5 millimeter tempered glass and are housed in an aluminum frame by All Seasons Windows. A Light-Thru module has been UL approved, demonstrating that a similar unit has been deemed safe for use (see literature on pages 101-103 and 158-161).

John Wiles writes:

"If you will send me full descriptive literature on these modules, the mounting system, the method in which you will get the circuits from the roof to your array, and the calculations that you have used to size the various conductors, I may be able to OK their use."



認 証 書

Certificate

JET P V m 認証業務規程第 7 項の規定により、認証登録の要件に適合しているものと認められますので認証します。

I hereby certify that the product mentioned below complies with the Requirements for the Registration of Certification in the Rules for Operation of JET P V m Certification, Section 7.

認 証 書 番 号 : P V 0 9 - 5 3 1 0 1 - 1 0 0 2
Certificate Number:

認 証 登 録 日 : 平成 1 7 年 1 2 月 2 0 日 (初版 : 平成 1 7 年 3 月 3 1 日)
Date of Issue: December 20, 2005 (Original: March 31, 2005)

有 効 期 限 : 平成 2 0 年 3 月 3 0 日
Date of Validity: March 30, 2008

認 証 取 得 者 : 株式会社 MSK
Certificate Recipient: 東京都新宿区西新宿 3 - 6 - 1 1
西新宿 K S ビル 6 F
MSK Corporation

6F NISHISHINJYUKU KS BLDG, 3-6-11 NISHISHINJYUKU
SHINJYUKU-KU TOKYO 160-0023, JAPAN

認証製品製造工場 : 付属書 I のとおり
Factory of Certified Product: As shown in the attachment

試 験 基 準 : IEC61215 First edition 1993-04 (JIS C 8990 2004-06)
Applied Standard for Testing: Crystalline silicon terrestrial photovoltaic modules - Design qualification and type approval

製 品 の 型 名 等 :
Type Name of Product:

認証モデルの名称 : 太陽電池モジュール (単結晶)
Name of Certified Model: PV module (single crystal)

認証モデルの型名 : MPS125-90JH 他 21 機種
Type of Certified Model: As shown in the attachment for details

認証モデルの仕様 : 付属書 II のとおり
Specification of Certified Model:

財団法人 電気安全環境研究所
Japan Electrical Safety & Environment Technology Laboratories

理事長 吉澤 均
President Hitoshi Yoshizawa



東京都渋谷区代々木 5-14-12
5-14-12 Yoyogi, Shibuya-ku, Tokyo



認 証 書 付 属 書

付属書 I - 1

Attachment to the Certificate

この付属書は、認証書の登録内容を補足するために発行します。

This attachment is issued to supplement the registered contents of the Certificate.

財団法人 電気安全環境研究所
Japan Electrical Safety & Environment Technology Laboratories(JEEL)

認 証 書 番 号 : P V 0 9 - 5 3 1 0 1 - 1 0 0 2
Certificate Number:

付 属 書 番 号 : P V 0 9 - P 0 5 T 0 0 2 6
Attachment Number:

付 属 書 発 行 日 : 平成 1 7 年 1 2 月 2 0 日
Date of Issue: December 20, 2005

有 効 期 限 : 平成 2 0 年 3 月 3 0 日
Date of Validity: March 30, 2008

認 証 製 品 製 造 工 場 : 株式会社 MSK 長野プラント
Factory of Certified Product: 長野県佐久市安原 8 2 5 - 1
MSK Corporation Nagano Plant
825-1 Yasuhara, Saku City, Nagano 385-0004, Japan

認 証 製 品 製 造 工 場 : 株式会社 MSK 福岡プラント
Factory of Certified Product: 福岡県大牟田市四箇新町 1 - 5
MSK Corporation Fukuoka Plant
1-5 Shikashinmachi, Omuta City, Fukuoka 837-0907, Japan



認 証 書 付 属 書

Attachment to the Certificate

付属書Ⅱ－１６

この付属書は、認証書の登録内容を補足するために発行します。

This attachment is issued to supplement the registered contents of the Certificate.

財団法人 電気安全環境研究所
Japan Electrical Safety & Environment Technology Laboratories(JET)

認 証 書 番 号 : P V 0 9 - 5 3 1 0 1 - 1 0 0 2
Certificate Number:

付 属 書 番 号 : P V 0 9 - P 0 5 T 0 0 2 6
Attachment Number:

付 属 書 発 行 日 : 平成 1 7 年 1 2 月 2 0 日
Date of Issue: December 20, 2005

有 効 期 限 : 平成 2 0 年 3 月 3 0 日
Date of Validity: March 30, 2008

認 証 モ デ ル の 型 名 : M L S 1 2 5 - 8 6
Type of Certified Model:

認 証 モ デ ル の 仕 様 :
Specification of Certified Model:

最大システム電圧 : 6 0 0 V
Maximum System Voltage:

公 称 最 大 出 力 : 8 6 W
Nominal Maximum power:

公 称 開 放 電 圧 : 2 2 . 3 V
Nominal Open Circuit Voltage:

公 称 短 絡 電 流 : 5 . 4 6 A
Nominal Short Circuit Current:

公称最大出力動作電圧 : 1 7 . 7 V
Nominal Maximum Power Voltage:

公称最大出力動作電流 : 4 . 8 7 A
Nominal Maximum Power Current:

モジュール面積 : 0 . 9 3 1 m²
Module Area:

セルのタイプ : 単結晶シリコン
Type of Cell: Single Crystal silicon

セルの大きさ(面積) : 1 4 8 . 2 5 c m²
Cell Area:

セルの接続数 : 3 6 s e r i e s
Cell's connection number:



Unlisted Electrical Components:

Insight Lighting Digital LED Linear Lights:

These units are not presently UL approved but will be before implementation on the mall. The associated power supply is UL approved.

