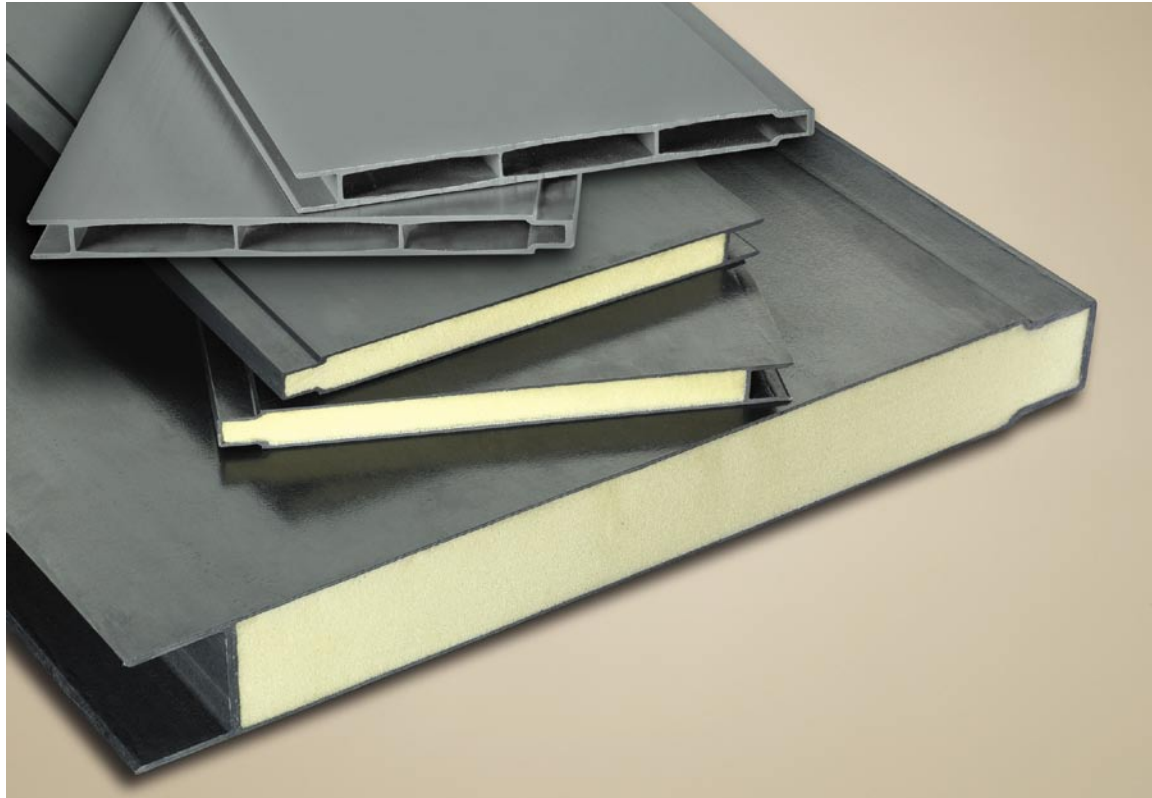


STRONGWELL®

DURASHIELD® and DURASHIELD HC®
FIBERGLASS FOAM AND HOLLOW CORE BUILDING PANELS



DURASHIELD® Fiberglass Foam Core Building Panels



DURASHIELD® panels are used as plant roofs and chemical tank covers in corrosive environments, such as the covers (16,800 s.f.)(1,560 m²) over anaerobic digester units pictured above.



Airtight enclosure for Dow Chemical protects workers in adjacent areas against accidental escape of phosgene gas.



Compaq Computer chose a foam core panel building to assure RFI/EMI compliance for attenuation.

Features

The DURASHIELD® panel is a tongue-and-groove fiberglass pultruded panel comprised of a pultruded skin over a foam core. The panel provides these features:

- Integral Insulation
- Corrosion Resistant
- Strong
- Transparent to Electromagnetic Emissions
- Lightweight
- Low in Conductivity
- Flame Retardant

Sizes

DURASHIELD® panels are available in 1" x 12" (25.4mm x 304.8mm) and 3" x 24" (76.2mm x 609.6mm) sizes. Special thicknesses or widths are possible if the quantity warrants. The panels can be produced in any length that is practical. Typical lengths would be in the 12' (3.7m) to 32' (9.8m) range.

Materials of Construction

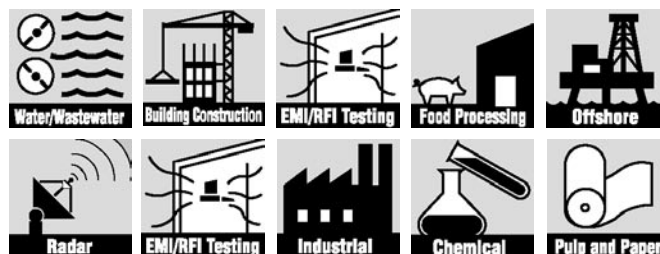
The pultruded fiberglass skin is available in either an isophthalic polyester or a vinyl ester resin. Both resin systems provide flame retardance (UL94 VO). The vinyl ester is utilized in extreme corrosive applications. A synthetic surfacing veil is incorporated into the skin to improve weathering, corrosion resistance and resistance to degradation from ultraviolet rays. Resistance to weathering can be further enhanced by the application of a polyurethane paint. The core material is a rigid closed-cell urethane foam. The ends of the panels must be encapsulated or coated with a resin similar to the skin resin to maintain the corrosion and weather resistant qualities of the total panel.

Applications

DURASHIELD® panels are designed to be used as walls, roofs and covers. Typical applications are:

- Radar, Microwave, Radio and TV Antenna Enclosures
- Enclosures for Electrical Equipment
- Enclosures of Chemical Processing Operations
- Buildings for EMI Testing (Computer Testing)
- Chemical Pit Covers
- Roofs on Wet-End Pulp and Paper Manufacturing
- Modular Buildings
- Walls/Flooring for Food Processing Operations

DURASHIELD® Roofing and Siding Load Tables



1" (25.4mm) Panel Allowable Uniform Load (psf) (kPa)

SPAN (ft.) (m)	@Δ=span/60			@Δ=span/120			@Δ=span/180		
	(IN.) Δ (mm)	Siding	Roofing	(IN.) Δ (mm)	Siding	Roofing	(IN.) Δ (mm)	Siding	Roofing
4 (1.22)	.8 (20.3)	*138 (6.6)	*136 (6.5)	.4 (10.2)	*138 (6.6)	*136 (6.5)	.27 (6.9)	90 (4.3)	88 (4.2)
5 (1.52)	1.0 (25.4)	*88 (4.2)	*86 (4.1)	.5 (12.7)	72 (3.4)	70 (3.4)	.33 (8.4)	40 (1.9)	38 (1.8)
6 (1.83)	1.2 (30.5)	*61 (2.9)	*59 (2.8)	.6 (15.2)	38 (1.8)	36 (1.7)	.40 (10.2)	20 (1.0)	18 (0.9)
7 (2.13)	1.4 (35.6)	45 (2.2)	43 (2.1)	.7 (17.8)	22 (1.1)	20 (1.0)	.47 (11.9)	12 (0.6)	10 (0.5)
8 (2.44)	1.6 (40.6)	32 (1.5)	30 (1.4)	.8 (20.3)	14 (0.7)	12 (0.6)	.53 (13.5)	8 (0.4)	6 (0.3)
9 (2.74)	1.8 (45.7)	22 (1.1)	20 (1.0)	.9 (22.9)	8 (0.4)	6 (0.3)	.60 (15.2)	4 (0.2)	2 (0.1)
10 (3.05)	2.0 (50.8)	14 (0.7)	12 (0.6)	1.0 (25.4)	6 (0.3)	4 (0.2)	—	—	—
11 (3.35)	2.2 (55.9)	10 (0.5)	8 (0.4)	1.1 (27.9)	4 (0.2)	2 (0.1)	—	—	—
12 (3.66)	2.4 (61.0)	8 (0.4)	6 (0.3)	—	—	—	—	—	—

3" (76.2mm) Panel Allowable Uniform Load (psf) (kPa)

SPAN (ft.) (m)	@Δ=span/60			@Δ=span/120			@Δ=span/180		
	(IN.) Δ (mm)	Siding	Roofing	(IN.) Δ (mm)	Siding	Roofing	(IN.) Δ (mm)	Siding	Roofing
6 (1.83)	1.2 (30.5)	*340 (16.3)	*336 (16.1)	.6 (15.2)	289 (13.8)	285 (13.6)	.40 (10.2)	190 (9.1)	186 (8.9)
7 (2.13)	1.4 (35.6)	*246 (11.8)	*242 (11.6)	.7 (17.8)	188 (9.0)	184 (8.8)	.47 (11.9)	124 (5.9)	120 (5.7)
8 (2.44)	1.6 (40.6)	*189 (9.0)	*185 (8.9)	.8 (20.3)	129 (6.2)	125 (6.0)	.53 (13.5)	85 (4.1)	81 (3.9)
9 (2.74)	1.8 (45.7)	*150 (7.2)	*146 (7.0)	.9 (22.9)	93 (4.5)	89 (4.3)	.60 (15.2)	61 (2.9)	57 (2.7)
10 (3.05)	2.0 (50.8)	*121 (5.8)	*117 (5.6)	1.0 (25.4)	69 (3.3)	65 (3.1)	.67 (17.0)	45 (2.2)	41 (2.0)
11 (3.35)	2.2 (55.9)	100 (4.8)	96 (4.6)	1.1 (27.9)	53 (2.5)	49 (2.3)	.73 (18.5)	35 (1.7)	31 (1.5)
12 (3.66)	2.4 (61.0)	84 (4.0)	80 (3.8)	1.2 (30.5)	41 (2.0)	37 (1.8)	.80 (20.3)	27 (1.3)	23 (1.1)
13 (3.96)	2.6 (66.0)	67 (3.2)	63 (3.0)	1.3 (33.0)	33 (1.6)	29 (1.4)	.87 (22.1)	22 (1.1)	18 (0.9)
14 (4.27)	2.8 (71.1)	55 (2.6)	51 (2.4)	1.4 (35.6)	27 (1.3)	23 (1.1)	.93 (23.6)	18 (0.9)	14 (0.7)
15 (4.57)	3.0 (76.2)	45 (2.2)	41 (2.0)	1.5 (38.1)	22 (1.1)	18 (0.9)	1.00 (25.4)	15 (0.7)	11 (0.5)
16 (4.88)	3.2 (81.3)	38 (1.8)	34 (1.6)	1.6 (40.6)	18 (0.9)	14 (0.7)	1.07 (27.2)	12 (0.6)	8 (0.4)
17 (5.18)	3.4 (86.4)	32 (1.5)	28 (1.3)	1.7 (43.2)	16 (0.8)	12 (0.6)	1.13 (28.7)	10 (0.5)	6 (0.3)
18 (5.49)	3.6 (91.4)	27 (1.3)	23 (1.1)	1.8 (45.7)	13 (0.6)	9 (0.4)	1.20 (30.5)	9 (0.4)	5 (0.2)
19 (5.79)	3.8 (96.5)	23 (1.1)	19 (0.9)	1.9 (48.3)	11 (0.5)	7 (0.3)	1.27 (32.3)	8 (0.4)	4 (0.2)
20 (6.10)	4.0 (101.6)	20 (1.0)	16 (0.8)	2.0 (50.8)	10 (0.5)	6 (0.3)	1.33 (33.8)	7 (0.3)	3 (0.1)

*Controlled by stress with a factor of safety of 1.50

PERFORMANCE: These tables are offered as a guide only. The effects of sustained impact or dynamic loads, the particular corrosive environment and/or elevated temperatures have not been factored into these tables. Please consult the Strongwell *Design Manual* at www.strongwell.com for guidance and design considerations when applications include any of the above effects.

DURASHIELD® Applications



DURASHIELD® panels were used to help Roth-Käse, an award-winning cheese manufacturer, comply with USDA sanitation standards. Three-inch(76.2mm) and 1"(25.4mm) DURASHIELD® panels were used to create interior walls, a ceiling, and exterior walls because they are lightweight and can easily be removed for cleaning and moving equipment within the factory. The panels were also quick and easy to install, eliminating the need for insulation, paneling or painting.



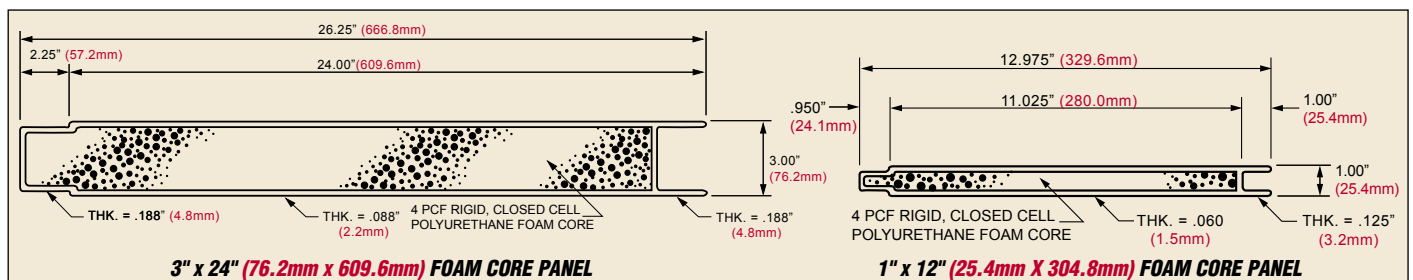
Electrical power companies use DURASHIELD® in non-conductive battery enclosures. Several containers were placed in the mountain ranges of Chile where power lines cannot run. This particular enclosure holds approximately 72 batteries, prevents battery acid leakage and meets NEMA 3R standards.

Physical Properties (nominal)

Property	1" Panel (25.4mm)	3" Panel (76.2 mm)
Weight (lbs/linear ft)(kg/m)	1.99 (2.96)	7.85 (11.68)
Panel Width (in.)(cm)	12 (30.5)	24 (60.9)
"R" Factor(approximate)	7	19
Foam Density (#/cu ft)(kg/m³)	4 (64.1)	4 (64.1)
Minimum thickness of fiberglass composites skin (in)(cm)	.060 (.152)	.088 (.224)
Coefficient of Thermal Exp. (10 ⁻⁶ in/in/F°)(10 ⁻⁶ mm/mm/°C)	5.2 (9.4)	5.2 (9.4)
Flame Spread Rating (ASTM E-84)	Max 25	Max 25
Water Absorption	<.3% if properly sealed	<.3% if properly sealed

Mechanical Properties (nominal)

Property	ASTM	1" Panel (25.4mm)	3" Panel (76.2 mm)
LW Flexural Strength (psi)(N/mm²)	D790	1,750 (12.1)	869 (6.0)
LW Flexural Modulus (10 ⁶ psi)(10 ³ N/mm²)	D790	.2 (1.4)	.17 (1.2)
LW Short Beam Shear (psi)(N/mm²)	D2344	113 (0.8)	90 (0.6)
Pullout Test (pull through) (lbs.)(kg)			
• Std. washer (1" (25.4 mm) dia. w/ 3/8" (9.5 mm) hole)		650 (295)	730 (331)
• Fender washer (2" (50.8 mm) dia. w/ 1/2" (12.7 mm) hole)		1,300 (590)	1,620 (735)
Crush Test (6" x 6" load plate) (lbs.)(kg)		5,600 (2,540)	6,750 (3,062)
Crush Test (full width) (lbs.)(kg)			
• 1" (25.4 mm) dia. bar		5,200 (2,359)	
• 2-1/2" (63.5 mm) dia. bar			18,800 (8,528)



Product consistency assures trouble free assembly.

DURASHIELD HC® Fiberglass Hollow Core Building Panels



DURASHIELD HC® panels can be used in many of the same applications as DURASHIELD® when projects do not require insulation. The intermediate ribs also provide extra stiffness.



DURASHIELD HC® panels are assembled using the simple tongue-and-groove connection. The panels are easy to install, withstand corrosive environments and can even be ordered in various colors.



DURASHIELD HC® panels are commonly used in the construction of cooling tower interior partition walls.

Features

DURASHIELD HC® is a cost-effective alternative to DURASHIELD® because the building panel has a hollow-core. The panel is a sensible choice for any type of roofing, flooring, enclosures or screening that does not require insulation. It is a custom designed tongue-and-groove building panel for quick assembly and easy installation in various applications. The panel provides these features:

- Lightweight
- Rot, Rust & Mildew Resistant
- Strong
- Low in Maintenance
- Easy to Install
- Low in Conductivity
- Flame Retardant

The pultruded panel's unique hollow core and intermediate ribs provide extra stiffness for uses such as decking, cladding or tank covers. The panels can be bonded together with standard adhesives and attached to structural shapes with bolts or screw fasteners. These standard polyester panels will not rot, rust or mildew, which makes them ideal for high moisture environments including saltwater.

Sizes

DURASHIELD HC® is available in standard 1" x 12" (25.4mm x 304.8mm) panels. The panels can be produced in any length that is practical.

Materials of Construction

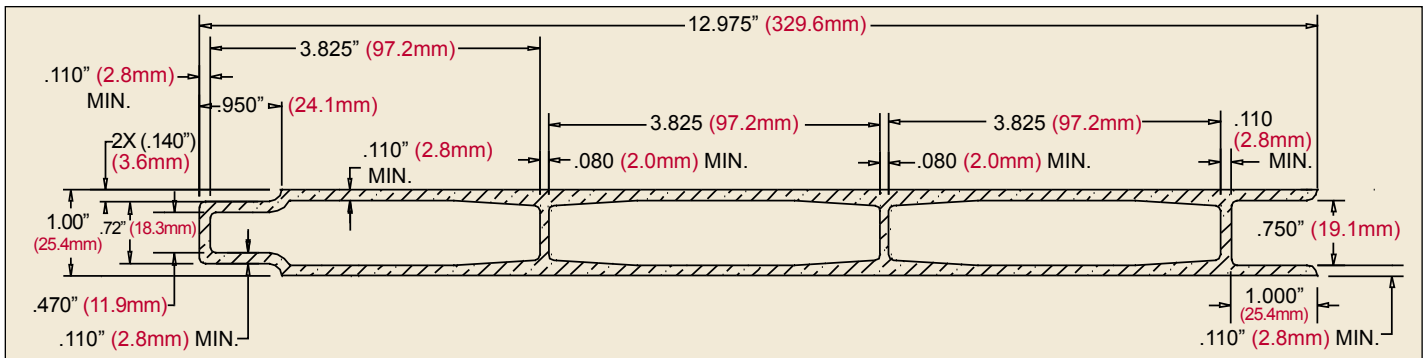
A synthetic veil is incorporated into the surface to improve weathering, corrosion and UV resistance. The standard resin system of DURASHIELD HC® is polyester; however, it can be custom ordered with a vinyl ester resin for highly corrosive applications. Both resin systems include flame retardants and meet the requirements of a Class 1 flame spread per ASTM E84 and the self-extinguishing requirements of ASTM D-635.

Applications

DURASHIELD HC® panels are designed to be used as walls, roofs and covers. Typical applications are:

- Cladding
- Decking
- Cellular Enclosures and Screening
- Tank Covers
- Cooling Tower Partition Walls
- Buildings and Enclosures when Insulation is Not Required

DURASHIELD HC® Dimensional Details



Physical Properties (nominal)

Property	1" Panel (25.4mm)
Depth (in.)(cm)	1 (2.54)
Panel Width (in.)(cm)	12 (30.5)
Weight(lbs/linear ft)(kg/m)	3.27 (4.87)
Area (in ²)(cm ²)	3.914 (25.25)
Coefficient of Thermal Exp. (10 ⁻⁶ in/in/F°)(10 ⁻⁶ mm/mm/°C)	4.4 (7.9)
Flame Spread Rating (ASTM E-84)	Max 25
Water Absorption	<.6%

Mechanical Properties (nominal)

Property	ASTM	1" Panel (25.4mm)
LW Compressive Strength (psi)(N/mm ²)	D645	50,000 (345)
LW Compressive Modulus (10 ⁶ psi)(10 ³ N/mm ²)	D645	3.5 (24.1)
LW Tensile Strength (psi)(N/mm ²)	D2344	58,000(400)
LW Tensile Modulus (10 ⁶ psi)(10 ³ N/mm ²)	D645	3.5 (24.1)
LW Short Beam Shear (psi)(N/mm ²)	D645	4,500 (31)

PERFORMANCE: Table below is offered as a guide only. The effects of sustained impact or dynamic loads, the particular corrosive environment, and/or elevated temperatures have not been factored into these tables. Please consult the Strongwell *Design Manual* at www.strongwell.com for guidance and design considerations when applications include any of these effects.

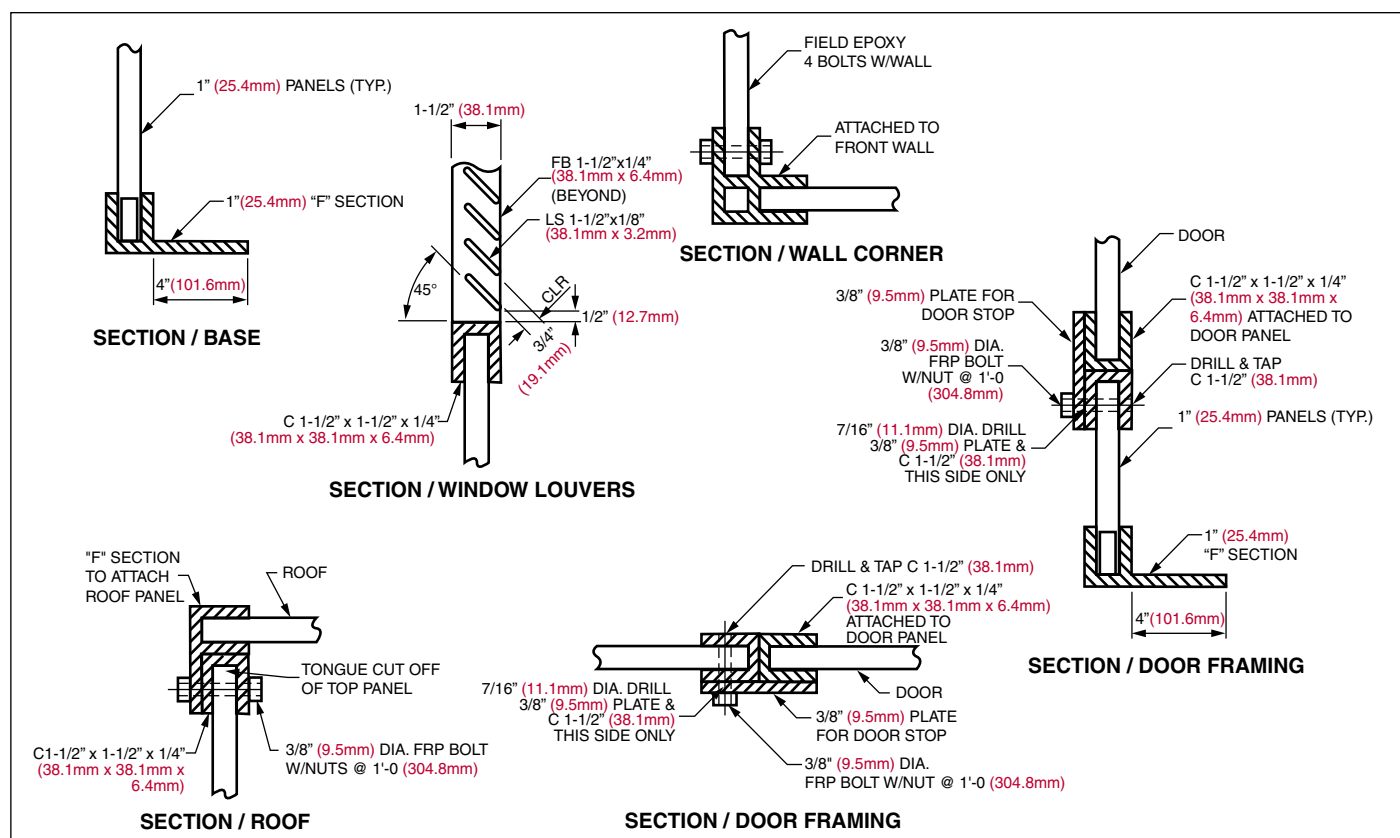


DURASHIELD HC® 1" (25.4 mm) Panel Allowable Uniform Load (psf)

SPAN (ft.)(m)	@Δ=span/60		@Δ=span/120		@Δ=span/180		@Δ=span/240		@Δ=span/300		@Δ=span/360	
	LOAD (lbs/ft ²)(kg/m ²)	Δ (in.)(cm)	LOAD (lbs/ft ²)(kg/m ²)	Δ (in.)(cm)	LOAD (lbs/ft ²)(kg/m ²)	Δ (in.)(cm)	LOAD (lbs/ft ²)(kg/m ²)	Δ (in.)(cm)	LOAD (lbs/ft ²)(kg/m ²)	Δ (in.)(cm)	LOAD (lbs/ft ²)(kg/m ²)	Δ (in.)(cm)
2.0 (0.6)	1727 (8432)	0.40 (1.0)	863 (4214)	0.20 (0.5)	576 (2812)	0.13 (0.3)	432 (2109)	0.10 (0.3)	345 (1684)	0.08 (0.2)	288 (1406)	0.07 (0.2)
2.5 (0.8)	1045 (5102)	0.50 (1.3)	523 (2554)	0.25 (0.6)	348 (1699)	0.17 (0.4)	261 (1274)	0.13 (0.3)	209 (1020)	0.10 (0.3)	174 (850)	0.08 (0.2)
3.0 (0.9)	671 (3276)	0.60 (1.5)	335 (1636)	0.30 (0.8)	224 (1094)	0.20 (0.5)	168 (820)	0.15 (0.4)	134 (654)	0.12 (0.3)	112 (547)	0.10 (0.3)
3.5 (1.1)	451 (2202)	0.70 (1.8)	225 (1099)	0.35 (0.9)	150 (732)	0.23 (0.6)	113 (552)	0.18 (0.5)	90 (439)	0.14 (0.4)	75 (366)	0.12 (0.3)
4.0 (1.2)	315 (1538)	0.80 (2.0)	157 (767)	0.40 (1.0)	105 (513)	0.27 (0.7)	79 (386)	0.20 (0.5)	63 (308)	0.16 (0.4)	52 (254)	0.13 (0.3)
4.5 (1.4)	226 (1103)	0.90 (2.3)	113 (552)	0.45 (1.1)	75 (366)	0.30 (0.8)	57 (278)	0.23 (0.6)	45 (220)	0.18 (0.5)	38 (186)	0.15 (0.4)
5.0 (1.5)	168 (820)	1.00 (2.5)	84 (410)	0.50 (1.3)	56 (273)	0.33 (0.8)	42 (205)	0.25 (0.6)	34 (166)	0.20 (0.5)	28 (137)	0.17 (0.4)
5.5 (1.7)	127 (620)	1.10 (2.8)	64 (312)	0.55 (1.4)	42 (205)	0.37 (0.9)	32 (156)	0.28 (0.7)	25 (122)	0.22 (0.6)	21 (103)	0.18 (0.5)
6.0 (1.8)	99 (483)	1.20 (3.0)	49 (239)	0.60 (1.5)	33 (161)	0.40 (1.0)	25 (122)	0.30 (0.8)	20 (98)	0.24 (0.6)	16 (78)	0.20 (0.5)
6.5 (2.0)	78 (381)	1.30 (3.3)	39 (190)	0.65 (1.7)	26 (127)	0.43 (1.1)	20 (98)	0.33 (0.8)	16 (78)	0.26 (0.7)	13 (63)	0.22 (0.6)
7.0 (2.1)	63 (308)	1.40 (3.6)	31 (151)	0.70 (1.8)	21 (103)	0.47 (1.2)	16 (78)	0.35 (0.9)	13 (63)	0.28 (0.7)	10 (49)	0.23 (0.6)
7.5 (2.3)	51 (249)	1.50 (3.8)	26 (127)	0.75 (1.9)	17 (83)	0.50 (1.3)	13 (63)	0.38 (1.0)	10 (49)	0.30 (0.8)	9 (44)	0.25 (0.6)
8.0 (2.4)	43 (210)	1.60 (4.1)	21 (103)	0.80 (2.0)	14 (68)	0.53 (1.3)	11 (54)	0.40 (1.0)	9 (44)	0.32 (0.8)	7 (34)	0.27 (0.7)

NOTE: Figures controlled by stress with a safety factor of 1.50.

DURASHIELD® and DURASHIELD HC® Connections



Supporting Fiberglass Structural Shapes

DURASHIELD® and DURASHIELD HC® panels are made for use with Strongwell's EXTREN® line of structural shapes. EXTREN® is available in more than 100 standard shapes. Typical additional supporting shapes are shown below.

Use	1" (25.4mm) DURASHIELD®/DURASHIELD HC® Supporting Shapes Description	3" (76.20mm) DURASHIELD®/DURASHIELD HC® Supporting Shapes Description
Section/Base	5-1/2" x 1-1/2" x 1/4" F Section (139.7mm x 38.1mm x 6.4mm F Section)	Standard EXTREN® Angle
Corner Post	3-1/2" x 1/4" Custom Corner Post (88.9mm x 6.4mm Custom Corner Post)	Standard EXTREN® Angles Inside & Outside
Roof Joiner	5-1/2" x 1-1/2" x 1/4" F Section (139.7mm x 38.1mm x 6.4mm F Section) 1-1/2" x 1-1/2" x 1/4" EXTREN® Channel (38.1mm x 38.1mm x 6.4mm EXTREN® Channel)	90° Custom Angle
Door Framing	1-1/2" x 1-1/2" x 1/4" EXTREN® Channel (38.1mm x 38.1mm x 6.4mm EXTREN® Channel)	3-1/2" x 2" x 7/32" EXTREN® Channel (88.9mm x 50.8mm x 5.6mm EXTREN® Channel)
Window Louvers	1-1/2" x 1-1/2" x 1/4" EXTREN® Channel (38.1mm x 38.1mm x 6.4mm EXTREN® Channel)	3-1/2" x 2" x 7/32" EXTREN® Channel (88.9mm x 50.8mm x 5.6mm EXTREN® Channel)
Fasteners	3/8" (9.5mm) dia. FIBREBOLT® Stud & Nut Stainless Steel (optional)	1/2" (12.7mm) dia. FIBREBOLT® Stud & Nut Stainless Steel (optional)



BRISTOL DIVISION*

400 Commonwealth Ave., P. O. Box 580, Bristol, VA 24203-0580
(276) 645-8000 FAX (276) 645-8132

**DURASHIELD® and DURASHIELD HC® manufacturing location*

CHATFIELD DIVISION

1610 Highway 52 South, Chatfield, MN 55923-9799
(507) 867-3479 FAX (507) 867-4031

www.strongwell.com