VERSAROC®

CEMENT BONDED PARTICLE BOARD

NONCOMBUSTIBLE

STRUCTURAL

DECKING, SHEATHING & CLADDING FOR:

- **FLOORS**
- **ROOFS**
- **WALLS**

RESISTANT TO WEATHER, TERMITES & ABUSE

ANOTHER QUALITY PRODUCT FROM:

U.S. ARCHITECTURAL PRODUCTS, INC.

800-243-6677

INTRODUCTION

VERSAROC® is a cement bonded particle board composed of mineralized wood particles and Portland cement. It is light gray in color and is flat and smooth on both surfaces. VERSAROC® combines the workability of wood with the strength & durability of cement. During the manufacturing and curing process, the wood content in VERSAROC® is mineralized with non-toxic chemical agents to render it fire resistant. These treated mineralized wood elements combine with the Portland cement matrix to add strength and flexibility, giving the panel significant structural characteristics coupled with the qualities contributed by Portland cement:

- fire resistance
- rot resistance
- vermin resistance
- moisture resistance
- weather resistance
- impact resistance

The uniting of wood fiber and Portland cement produces a building panel which is non-toxic, does not contain hazardous volatiles and is free of any asbestos or formaldehyde. VERSAROC® does not present a health hazard and is environmentally safe.

VERSAROC COMPOSITION

- 71% Portland Cement
- 19% Mineralized Wood Fiber
- 9 % Water
- 1 % Bonding Agent

VERSAROC® is a highly fire resistant building material and has superior structural integrity. It will not delaminate in water and is dimensionally stable. VERSAROC® can be sawn, planed, sanded, drilled, routed, nailed, and screwed.

VERSAROC® is supplied in 4' x 8' sheet sizes (4' x 10' sheets available on special factory order) in the following thicknesses:

Metric	Nom.	T&G Avail	Sealer Avail.	Stocked
8mm	5/16"			
10mm	3/8"			
12mm	½"			X
16mm	5/8"	X	X	X
19mm	¾"	X	X	X
22mm	7/8"	X	X	
25mm	1"	X	X	X
28mm	1-1/8"	X	X	
32mm	1-1/4"	X	X	

Square edge boards are standard on thickness 5/16" through ½". Tongue and groove edges (on 2 or 4 edges) are available on thicknesses of 5/8" through 1-1/4" for flooring applications. All 5/8" through 1-1/4" thickness flooring applications are available factory sealed on all sides and edges for dimensional stability and weather resistance for open job site conditions. VERSAROC® is stable when subjected to water immersion without any sealant applied to the boards. VERSAROC® is non-directional and presents no difficulties when installing regardless of panel orientation.

Versaroc's outstanding features make it suitable for structural floor & roof decks, exterior and interior wall construction, ceilings, or as a general purpose building panel. VERSAROC® is distributed in the United States by U.S. Architectural Products, Inc., Lincoln, Rhode Island and shipped from our warehouses located throughout the United States.

VERSAROC® is used in a wide range of applications such as:

- Fire-rated Floor/Ceiling assemblies
- Fire-rated roof assemblies
- Fire-resistant wall construction
- High performance shear wall construction
- High impact resistant wall construction
- Weather resistant backer board for coating systems
- Structural Insulated Panels
- Access Floor Systems

VERSAROC® FOR HIGH PERFORMANCE FLOOR, WALL & ROOF CONSTRUCTION

THE FOLLOWING DESIGN NOTES ARE INTENDED AS A GENERAL GUIDE TO PROJECT SPECIFICATION DEVELOPMENT BY A QUALIFIED ARCHITECT OR ENGINEER.

VERSAROC® is a unique panel as its physical properties make it applicable in high performance areas where there are strict fire regulations, conditions requiring long-term durability, as well as moisture and water resistance requirements.

Fire Resistance: VERSAROC® is a highly fire resistant building material having passed the stringent requirements of a modified ASTM E136 (ten minute duration). It has zero flame spread and zero smoke development ratings.

Highly Impact Resistant: High impact resistance is a significant product advantage over other building materials. VERSAROC® is ideal for use in public areas of schools, airports, hospitals, prisons, or installations subject to high abuse or elements of security.

Acoustic Performance: Because of its high density (77 lbs/ft^3), VERSAROC® contributes significant acoustic performance when used as a wall or floor sheathing. The following chart lists STC (Sound Transmission Control) ratings for VERSAROC® when used as a component in walls, ceilings, and floor assemblies.

Sound Transmission Control Ratings (STC)

THICKNESS	LBS/SQ.FT.	STC RATING
8mm (5/16")	2.0	30
10mm (3/8")	2.5	31
12mm (1/2")	3.0	31
19mm (3/4")	4.75	33
22mm (7/8")	5.50	33
25mm (1")	6.25	35

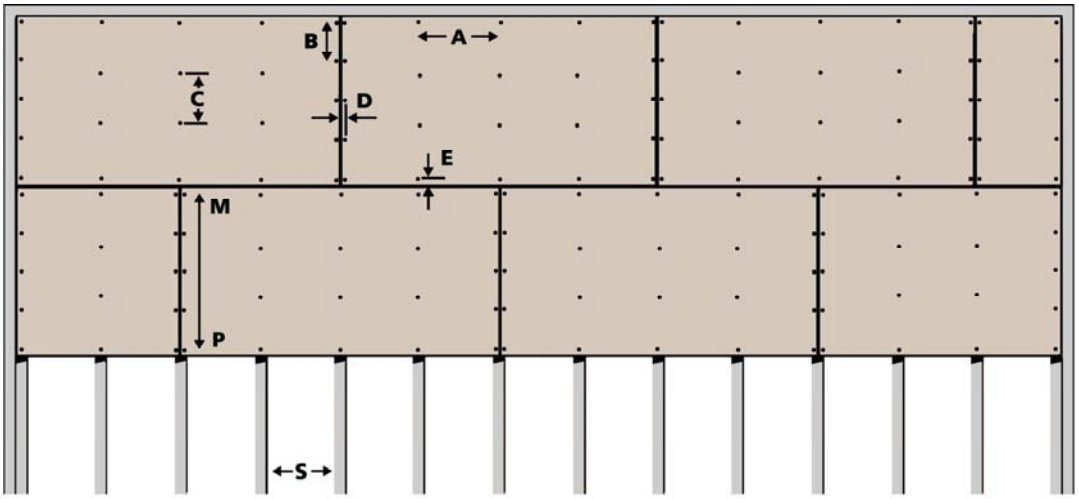
STC ratings can be enhanced by including VERSAROC® as part of a steel stud or wood stud partition or floor assembly with insulation in the stud or joist cavities.

VERSAROC® STRUCTURAL DECK SYSTEM

Factory Finished High Performance Flooring System

- VERSAROC® is used as a structural, highly fire resistant decking for fire-rated floor/ceiling assemblies.
- VERSAROC® is supplied factory primed/sealed on all sides/edges for moisture & weather protection. This factory primer/sealer renders the VERSAROC® dimensionally stable under extreme moisture conditions encountered on open job site construction.
- VERSAROC® is available with tongue & groove edges on two or four edges to enhance joint strength and provide optimum loading performance.
- VERSAROC® is available calibrated for extreme accuracy of thickness with a tolerance of ± 0.011 inch making it suitable for finishing with vinyl tile flooring, sheet linoleum, or thin carpet layers.
- Review our Technical Specifications and Handling & Care guide to ensure your successful application!

TYPICAL FASTENER LAYOUT FOR INSTALLATION OF VERSAROC® FLOORS

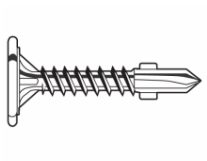


S = Support centers not to exceed 24 inches on center.
A = 16” or 24” dependent upon support spacing.
B = 12” on center at panel endings over supports.
C = 16” on center along supports within field of panel.
D = 3/4” from panel end joint edges.
E = 2” from panel side joint edges.
M-P = Bond all board edges with non-flammable adhesive.

Bonding of Joints: All long dimensions of panels are tongue & groove configuration. All short dimensions of panels are square edges. Both tongue & groove as well as square edged conditions are to be bonded using PEMCO 5100 Polyurethane Adhesive or equal. Adhesive to be non-flammable, solvent free, zero V.O.C., and compatible with portland cement based products (see adhesives & bonding notes on page 5).

Fastener Recommendations: Corrosion resistant screws with self-countersinking heads such as Grabber Part No. HS8158JBWG2 (or equal) #8 diameter minimum with self-drilling ‘TEK’ point for metal framing. Length = 2 to 3 times board thickness. Surface treatments should always be considered when selecting fastener types.

Self countersinking head



Steel Framing

Wood Framing

WALL CONSTRUCTION

VERSAROC® functions well as a structural substrate in prefabricated modular or on-site construction, employing either steel or wood studs. It can be used in large, multi-panel units because of its strength and dimensional stability, or as individual panels. In either case, VERSAROC® assemblies are lightweight, fire resistant and structurally sound. These features make VERSAROC® easy to install and contribute to significant in-place economies. VERSAROC® installation is simple. Panels are applied to metal framing with countersinking self-drilling screws, or in the case of wood framing, with screws, automatic nailers or staplers. If a decorative coating is to be applied holes are filled with a compatible non-shrinking filler. Where multi-panel assemblies are employed, joints between the panels are a minimum of 1/8" and are filled with an elastomeric sealant.

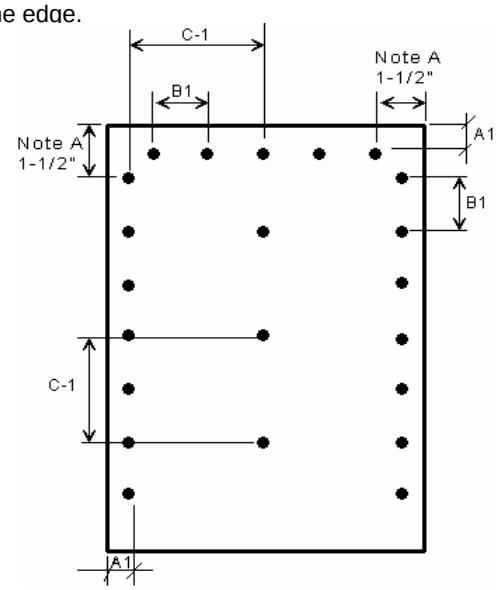
Wind Load Properties: Maximum allowable wind loads in mph velocity while limiting deflection to L/360 under indicated conditions for exterior walls are approximated as listed below when Versaroc is employed as the exterior wall sheathing.

Thickness	16" oc supports	24" oc supports
10mm (3/8")	120 mph	75 mph
12mm (1/2")	150 mph	90 mph
16mm (5/8")	150+ mph	120 mph
19mm (3/4")	150+ mph	150 mph

WALL APPLICATION FASTENER PLACEMENT

Drawing Detail	A	A1	B1	C1
All thickness boards	1-1/2"	3/4"	8"	16"

Note A: First fastener in from the corner must be minimum 1-1/2" in from the edge.



NOTE: Unsealed VERSAROC® panels can be affected by slight dimensional changes according to variation in relative humidity. If the boards are not sealed or a surface treatment is used which allows the boards to be subjected to the varying effects of relative humidity, then the fastener locations, and in particular, the joints between the boards, must allow for movement, i.e., oversize the fastener hole and leave a 1/8" minimum gap at board joints.

ROOF CONSTRUCTION

Versaroc is used in fire resistant, structural roof deck systems for sloped, flat & built up roofing assemblies. Key Benefits to using Versaroc in your roofing assembly are:

- Installs using standard carpentry tools and equipment.
- Receives roofing shingles, slate, metal roofing, rolled products, etc.
- Install over metal or wood framing / trusses up to 24" oc.
- Installs over metal deck.
- Can be used for soffit & facia applications.

Fascias, Soffits, and other Exterior Uses: Additional exterior applications for VERSAROC® include fascias, wall re-cladding, soffits, balcony panels, balcony floors and canopies, as well as a variety of agricultural building uses such as barns, paddocks and stall enclosures at race tracks where fire-resistance and durability is required.

GENERAL CONSTRUCTION & PRACTICE

FASTENER RECOMMENDATIONS

VERSAROC® shall be fastened with corrosion resistant self-countersinking head screws such as, Grabber HS8158JBW, HS8158G2 or equal. Fasteners to be minimum #8 diameter with S-12 self-drilling 'TEK' points. Length = 2 to 3 times the board thickness. The following table is a guide to fastener locations for most common applications. **NOTE:** Surface treatments should always be considered when selecting fastener types.

Screw Fastening Methods

- Pre-drilling of VERSAROC® panels is not necessary when using electric or pneumatic powered screw driving guns and self-drilling screws.
- Pre-drill VERSAROC® panels if manually fastening by hand.
- Fasteners must be positioned as shown.
- Seat screw heads flush with surface, don't over drive screws.

FRAMING NOTES

Normally wall framing assemblies are designed for a maximum allowable deflection of L/240 for cementitious and elastomeric coatings. Maximum allowable deflection of L/360 or less is common for ceramic, quarry, and stone tile as well as for thin brick. Where greater load resistance is required by local building codes or unique project conditions, structural criteria should be established by a qualified engineer.

Steel Framing: Steel framing shall be a minimum of 20 gauge and be spaced a maximum of 24" on centers depending upon the wind load requirements and the thickness of the VERSAROC® board selected. At panel joints, studs must have a minimum flange width of 2" or use double studs at all panel joints to accommodate the 1/8" minimum space between panels and the fastening requirements specific to VERSAROC®. Minimum requirements of metal framing must be in accordance with ASTM C-645 "Specification for Non-Load Bearing Steel Stud Runners and Rigid Furring Channels in Screw Application", and have a minimum of G40 galvanized coating per ASTM A-525 and A-586. Framing shall meet ANSI A108.3 for uniform dimension and be fabricated from steel conforming to ASTM A-446.

Wood Framing: Framing shall be a minimum of 2" x 4" (nominal) and be spaced a maximum of 24" on centers depending on wind load requirements and the thickness of the VERSAROC® panel selected. At vertical panel joints, use double studs at all vertical panel joints to accommodate the 1/8" minimum space between panels and the fastening requirements specific to VERSAROC® panels. Framing shall be installed in conformance with ANSI 108.3 specification and bear the mark of a registered grading agency.

Sheathing Applications: Where weather resistance and continuing serviceability is a consideration for applications such as brick or masonry veneer exteriors: VERSAROC® installed as the sheathing behind the brick or masonry veneer systems assures strength, durability, and weather resistance to the installation.

ADHESIVES & BONDING

Only alkali resistant adhesives should be used, suitable for VERSAROC® pH value of 11-13. For high-quality bonding, VERSAROC® with calibrated surfaces is most suitable. For adhesive bonding by means of hot pressing, a board moisture content of no more than 6% -9% is required, but this should be determined with the adhesive manufacturer. When bonding to one face of VERSAROC® the reverse side of sheet should always be counterbalanced with a similar facing. For large-area adhesive bonding, some pre-testing should always be carried out in cooperation with the adhesive manufacturer to ensure application quality.

Applications and Types of Adhesives: When the walls of a room are to be completely covered with ceramic tiles (e.g. laboratories and sanitary facilities) the back of the VERSAROC® must also be primed / sealed. Lack of sealant on the back of the boards, moisture can penetrate the board, which can result in distortion. Distortion can also take place when the back of the board dries out on one side only. For adhesive bonding to free floating floors VERSAROC® primed on both sides should be used, to avoid one-sided penetration of moisture which could lead to distortion. Boards with a calibrated surface can absorb moisture.

Full Surface Bonding of VERSAROC® to Each Other:
Dry Rooms; Dispersion adhesive or one component reaction resin adhesives. Wet Rooms; Double component resin adhesive polyurethane based or epoxy resin adhesive.

Bonding of Tongue & Grooved Edges: Use PEMCO 5100 non-flammable, solvent free, zero V.O.C. polyurethane adhesive as supplied by Alpha Systems, Inc., Elkhart, IN or equal. Follow manufacturer's directions for application.

Full Surface Bonding of Laminates and Veneers:
VERSAROC® is an excellent substrate for the application of decorative laminates and veneers. The sanded/calibrated finish should always be used when bonding a decorative surface to one face. The reverse of the panel must have a compensator laminate applied. When applying timber veneers a cross band veneer is usually required. In all instances the above operations should be carried out by experienced companies specializing in bonding techniques using the input from adhesive manufacturers for bonding to cement board material.

Note: Always consult adhesive manufacturer and laminate manufacturer for technical assistance on suitability of use. Always test a small sample of the materials before application.

PROCESSING / MACHINING

VERSAROC® is machined and processed in the same manner as resin bonded particle boards, ensuring that tungsten carbide tipped blades are used at all times. Comprehensive tests show wear on tools processing VERSAROC® to be significantly lower compared with resin bonded board due to the lack of resin build-up and a lower degree of heating.

Sawing: Cross cut hand saws of thickness up to 12mm (1/2"); Jigsaw for thickness up to 12mm (1/2") and small work; Portable circular saw; Fixed saw for dimensioning (vertical or horizontal). Use alternative or trapezoidal tooth carbide tipped blades

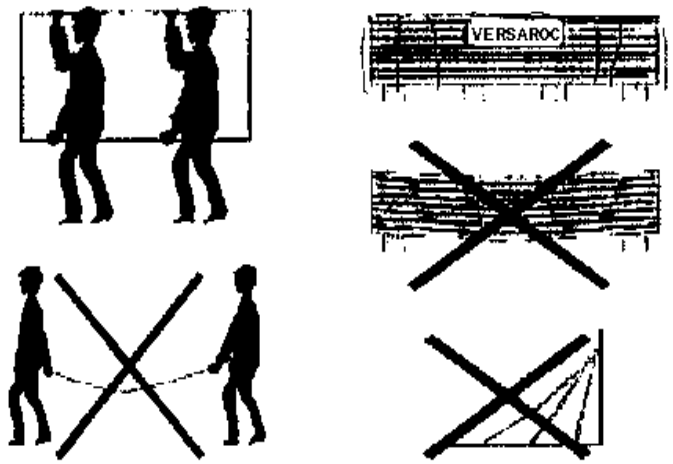
Milling: Common machines with carbide tipped tools. The higher the RPM, the better the milled edge.

HANDLING & STORAGE

Transport: VERSAROC® boards are usually delivered secured in plastic bound, edge protected pallets. When loose boards are transported they must be laid flat and fully protected with a waterproof sheet. When manually moving VERSAROC® it must be carried in a vertical position.

Storage: VERSAROC® boards should be stored flat on level supports at 30 inch maximum support spacing. It must never be stored on edge or upright. If outside, a protective plastic sheet must be secured to protect from weather.

Conditioning: VERSAROC® has an ex-works moisture content of 9% (+ - 3%) and is in equilibrium when the temperature is 68°F with a relative air humidity of 50-60%. VERSAROC® adapts to the ambient humidity level, therefore to adjust to its working conditions it should be allowed to acclimatize for 48 hours prior to installation.



VERSAROC® FLOOR SYSTEM

LOAD TABLES*

1. **Continuous loading conditions where panels span 3 or more supports of equal spacing.**
   Uniformly distributed live loads in pounds per square foot allowable on VERSAROC® panels.

PANELS SPANNING 3 OR MORE SUPPORTS

VERSAROC® PANEL THICKNESS	LOAD GOVERNED BY	12" o.c. Supports	16"o.c. Supports	24" o.c. Supports
16mm (5/8")	L/240 ▲ between supports	212	117	50
	L/360 ▲ between supports	212	117	50
19mm (3/4")	L/240 ▲ between supports	299	166	71
	L/360 ▲ between supports	299	166	71
22mm (7/8")	L/240 ▲ between supports	402	224	96
	L/360 ▲ between supports	402	224	96
25mm (1")	L/240 ▲ between supports	520	290	125
	L/360 ▲ between supports	520	290	125
28mm (1-1/8")	L/240 ▲ between supports	654	365	158
	L/360 ▲ between supports	654	365	158
32mm (1-1/4")	L/240 ▲ between supports	790	477	208
	L/360 ▲ between supports	790	477	208
38mm (1-1/2")	L/240 ▲ between supports	889	605	264
	L/360 ▲ between supports	889	605	264

2. **Single Span Condition**
   Uniformly distributed live loads in pounds per square foot allowable on VERSAROC® panels.

SINGLE SPAN CONDITIONS

VERSAROC® PANEL THICKNESS	LOAD LIMITED BY	12" o.c. Supports	16"o.c. Supports	24" o.c. Supports
16mm (5/8")	L/240 ▲ between supports	169	93	39
	L/360 ▲ between supports	169	93	30
19mm (3/4")	L/240 ▲ between supports	239	132	56
	L/360 ▲ between supports	239	132	51
22mm (7/8")	L/240 ▲ between supports	321	178	76
	L/360 ▲ between supports	321	178	76
25mm (1")	L/240 ▲ between supports	415	231	99
	L/360 ▲ between supports	415	231	99
28mm (1-1/8")	L/240 ▲ between supports	521	290	125
	L/360 ▲ between supports	521	290	125
32mm (1-1/4")	L/240 ▲ between supports	682	380	164
	L/360 ▲ between supports	682	380	164
38mm (1-1/2")	L/240 ▲ between supports	865	482	209
	L/360 ▲ between supports	865	482	209

* Load calculations based upon a safety factory of 4. Moisture content of VERSAROC is assumed to be 9% by weight (+-3%) as shipped from the factory – this is considered 'dry' condition. If VERSAROC is allowed to become saturated, reduce live load working capacity approximately 30% until the boards have re-dried. All load table data remains valid for re-dried boards. Technical tables and specifications are provided as a general guideline only. No table can be sufficiently comprehensive to cover all details of a specific project design. We recommend that all installations be designed and reviewed by a qualified architect or engineer.

FIRE RESISTANT - WATER RESISTANT – FREEZE/THAW RESISTANT – IMPACT RESISTANT
SOUND RESISTANT – FABRICATES & INSTALLS LIKE WOOD
THE ANSWER TO 'FRT' PLYWOOD PROBLEMS!

PHYSICAL PROPERTIES	VALUE	TEST STANDARD
Thermal Conductivity (12mm / ½")	'K' value 1.054 BTU/hr-ft^2 -^{o}F 'R' value 0.447 hr-ft^2-^{o}F/BTU	ASTM C518
Coefficient of Linear Thermal Expansion (12mm / ½")	0.589 x 10^{-5} per ^{o}F 1.06 x 10^{-5} per ^{o}C	ASTM D696
Density – Oven Dry	77 lbs. per cu. ft.	ASTM D1037
Moisture Content	6.8%	ASTM D1037
Linear Variation With Change In Moisture 50% to 90% relative humidity: Parallel to fibers Perpendicular to fibers	 0.06% 0.09%	ASTM D1037
Saturated Thickness Swelling (24 hour water immersion)	0.51%	ASTM D1037
PH Value	12	Manufacturer
Water Vapor Permeance	3.93 Perm-Inches 6.342 US Perms	ASTM E96
Formaldehyde Content	Zero	EN 120
Asbestos Content	Zero	EN 120
Silica Content	Zero	EN 120
Frost Resistance	No Effect – 50 cycles Freeze/Thaw	EN 112
Rot & Termite Resistance	Resistant to destruction	100% Resistant

MECHANICAL PROPERTIES	VALUE	TEST STANDARD
Modulus of Elasticity, psi	717,800	ASTM C120
Modulus of Rupture, psi	1,840	ASTM C120
Shear Strength, psi	1,424	ASTM D732
Tensile Strength, psi	667	ASTM D1037
Compressive Strength, psi	4,852	ASTM D1037
Impact Strength, Izod Method	0.4607	ASTM D256
Permissible Design Value, psi	326	Manufacturer

COMBUSTION CHARACTERISTICS	VALUE	TEST STANDARD
Noncombustible	Passed Ten Minute Duration	ASTM E136
Flame Spread / Smoke Development	Zero / Zero	ASTM E84*
Fire Resistance Ratings	1 & 2 hour Floor/Ceiling Assemblies	ASTM E119

- *** Underwriters Laboratories tested in accordance with ASTM E84 and ANSI / UL 723**
- **New York City MEA Approvals:**
  - 453-04-M Versaroc accepted as a noncombustible building material.
  - 455-04-M Versaroc 1 hour fire-rated floor assembly.
  - 454-04-M Versaroc 2 hour fire-rated floor assembly.

VERSAROC® is warranted not to crack, spall, or degrade for a period of five years from the purchase date from U.S. Architectural Products, Inc., when used in accordance with the manufacturers application instructions included in, but not limited to this literature. This limited warranty is non-transferable and applies only if VERSAROC® is stored and installed in accordance with the manufacturer's published guidelines following good construction practice. The manufacturer, at its option, shall either replace any VERSAROC® that is found to be defective or refund the original purchase price.

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VERSAROC® WEIGHTS AND PACKAGING SPECIFICATIONS

ITEM	NOMINAL DIMENSION	PCS. / SQ.FT. PER CRATE 4' x 8' 4' x 10'	PCS. /SQ.FT. Per T/L 4' x 8' 4' x 10'	WEIGHT PER SQ. FT.
8 mm	5/16"	52 / 1,664 42 / 1,680	624 / 19,968 420 / 16,800	2.0 lbs.
10 mm	3/8"	42 / 1,344 35 / 1,400	504 / 16,128 350 / 14,000	2.5 lbs.
12 mm	½"	35 / 1,120 29 / 1,160	420 / 13,440 290 / 11,600	3.25 lbs.
16mm	5/8"	27 / 864 21 / 840	324 / 10,368 210 / 8,400	4 lbs
19 mm	¾"	22 / 704 18 / 720	264 / 8,448 180 / 7,200	5 lbs.
22 mm	7/8"	19 / 608 16 / 640	228 / 7,296 160 / 6,400	5.7 lbs.
25 mm	1"	17 / 544 13 / 520	204 / 6,528 130 / 5,200	6.5 lbs.
28 mm	1-1/8"	15 / 480 12 / 480	180 / 5,760 120 / 4,800	7.3 lbs.
32 mm	1-1/4"	13 / 416 10 / 400	156 / 4992 100 / 4000	8 lbs.
38 mm	1-1/2"	11 / 352 8 / 320	132 / 4,224 80 / 3,200	9.7 lbs.
40 mm	1-5/8"	10 / 320 8 / 320	120 / 3,840 80 / 3200	10.6 lbs.

Company Profile

U.S. Architectural Products, Inc., is a wholesaler/ master distributor of highly fire resistant cement board sheathing products used for construction of floor, roof, and wall assemblies. Corporate offices are located at 55 Industrial Circle, Lincoln, RI 02865 U.S.A., with additional technical support and sales offices in Fairview, NC and Kendall Park, NJ. Warehousing and shipping facilities are located at Dayton, NJ – Charleston, SC - Miami, FL and Los Angeles, CA. All our products are shipped on common carrier trucks with products packaged and loaded for side forklift unloading.

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