

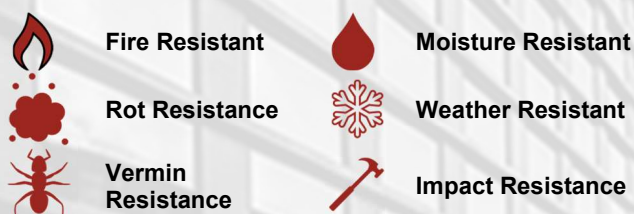
VERSAROC®

CEMENT BONDED PARTICLE BOARD



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 combined with the Portland cement matrix to add strength and flexibility, giving the panel significant structural characteristics coupled with the qualities contributed by Portland cement:



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® 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.
8mm	5/16"		
10mm	3/8"		
12mm	1/2"		
16mm	5/8"	X	X
19mm	3/4"	X	X
22mm	7/8"	X	X
25mm	1"	X	X

Square edge boards are standard on thickness 5/16" through 1/2". Tongue and groove edges (on 2 or 4 edges) are available on thicknesses of 5/8" through 1" for flooring applications. All 5/8" through 1" 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 Cornerstone Innovative Specialties, 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.

Surface Treatments: VERSAROC® may have a wide range of surface treatments applied.

Fire Resistance: VERSAROC® is a highly fire resistant building material having passed the stringent requirements of ASTM E84 with 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/ft³), 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.

INTERNAL, EXTERNAL & OTHER APPLICATIONS

INTERNAL

VERSAROC® board has advantages over other types of board materials due to its strength, workability and durability coupled with the three main attributes: fire resistance, sound reduction and high performance in the presence of moisture.

VERSAROC® may be confidently used in wet areas. It is ideal for cold storage, food processing and all areas which highlight the importance of hygiene.

The first choice for internal walls and partitions in domestic or public buildings due to its impact resistance, fire resistance and sound reduction properties.

EXTERNAL

Proven performance as an external sheathing material - VERSAROC® has been successfully used in prefabricated panel construction - both single skin and sandwich application. Also, due to the excellent "racking" properties of VERSAROC®, the board may be utilised as a structural member in a composite building application.

VERSAROC® in an untreated state is weather resistant and will not degrade with permanent exposure, even if subjected to freeze/thaw conditions. However, in general, a surface treatment is recommended for external applications. A range of paint and textured finishes may be used.

OTHER APPLICATIONS

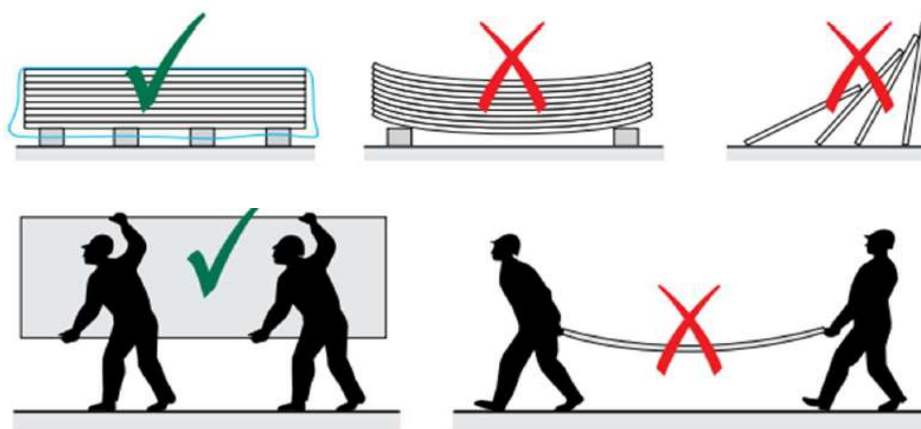
Can also be used for a wide range of applications including as a backing board (carrier panel) to cladding systems such as:

- ◇ Insulated Render Systems
- ◇ Terracotta Cladding Systems
- ◇ High Performance Cladding Panels
- ◇ Brick Slip Systems

The benefits of using VERSAROC® in this type of application is:

to help acoustic performance, fire performance, impact performance, pull out performance for approved fasteners, tested for wind loadings, ventilated rainscreen cavity.

JOBSITE HANDLING



VERSAROC® panels should be stored indoors or under protective cover from inclement weather.

Store panels flat on level supports not exceeding 30" o.c. Never store panels on edges or upright.

Stack full pallets no more than 4 units high. If temporarily stored outdoors, a weather protective covering must be secured over the pallets. When hand carrying single panels, they must be carried on edge with the 4 ft. dimension vertical.



BONDING

Only alkali and fire resistant adhesives are recommended, suitable for VERSAROC® due to a potential surface pH of 11 - 13 when wet. For high- quality bonding, VERSAROC® with calibrated surfaces are 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 should always be counterbalanced. For large-area adhesive bonding, some pre-testing should always be carried out in cooperation with the adhesive manufacturer.

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®

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 ASTM D3498 compliant adhesives such as:

- PEMCO 5100, nonflammable, solvent free, zero V.O.C. polyurethane adhesive
 - LOCTITE PL400 Subfloor Adhesive
- 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 layer applied. With 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.

MOUNTING AND FASTENERS

VERSAROC® shall be fastened with corrosion resistant self-countersinking head screws such as, Grabber item# GH8158LG and HILLMAN item# 41876 or equal. Fasteners to be minimum #8 diameter with S-12 self-drilling 'TEK' points. Length = 2 to 3 times the board thickness.

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 in manuals
- ◇ Seat screw heads flush with surface, don't over drive screws.

FRAMING NOTES

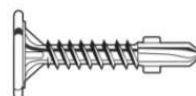
Normally wall framing assemblies are designed for a maximum allowable deflection of L/240 for cementitious and elastomeric coatings. Maximum allowable deflection of L/360 or less is common for ceramic, quarry, and stone tile as well as for thin brick. Where greater load resistance is required by local 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.



Self countersinking head



Steel Framing



Wood Framing

JOBSITE PROCESSING

MACHINING

VERSAROC® is machined and processed in the same manner as resin bonded particle boards, but ensuring that tungsten carbide tipped blades are used at all times. Comprehensive tests have shown that wear on tools during the processing of VERSAROC® is significantly lower when compared with resin bonded board. This is due to the lack of resin buildup and a lower degree of heating.

SAWING

Equipment

- ◇ Cross cut hand saws for thicknesses up to 12mm (1/2")
- ◇ Jigsaw for thicknesses up to 12mm (1/2") and small work.
- ◇ Portable circular saw.
- ◇ Fixed saw for dimensioning (vertical or horizontal).

Type of blade

- ◇ Alternative or trapezoidal teeth
- ◇ **Chart shows number of rpm and number of teeth per blade (Z=).**

Diameter mm (inches)	250 (10")	300 (12")	350 (14")	400 (16")
Panel thickness up to 12mm (1/2")	Z=48	Z=60	Z=72	Z=72
Panel thickness exceeding 12mm (1/2")	Z=36	Z=48	Z=54	Z=60
Number of revolutions rpm	3000/4500	3000	3000	3000/1500



MILLING

When working in confined areas dust extraction equipment is recommended. When used indoors use vacuum dust extractor. Common machines with carbide-tipped tools. The higher the rpm, the better the milled edge.



COUNTERSINKING DRILLING

When working in confined areas dust extraction equipment is recommended. When used indoors, use vacuum dust extractor. VERSAROC® can be drilled using conventional portable drilling machines; high speed steel drills or tungsten carbide drills (for prolonged use) and central tip for precision drilling. Although VERSAROC® is a wood and cement panel it is not concrete and therefore does not require percussion drilling. The drilling speeds are the same as for plywood panels (3000/4000 rpm).



SANDING

When working in confined areas dust extraction equipment is recommended. When used indoors, use vacuum dust extractor. VERSAROC® can be sanded using a vibrating sanding machine or belt sanding machine. Belts should be 40-80 grains; open coat structure with linear speed of 20 to 28 m/sec. Hand-held Orbital Sander, Hand-held Belt Sander.

EDGING AND JOINT DETAIL



Tongue and Groove



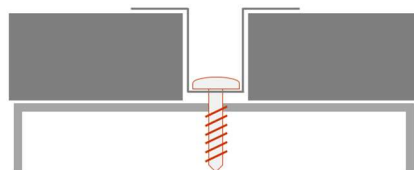
Shiplap



Beveled Edge joint



Angled edges

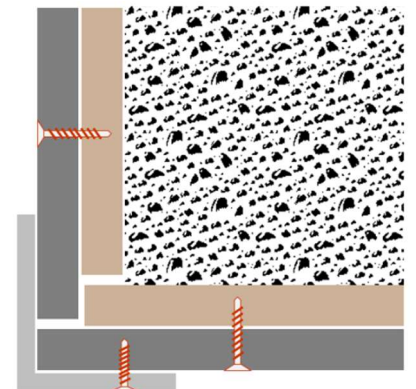
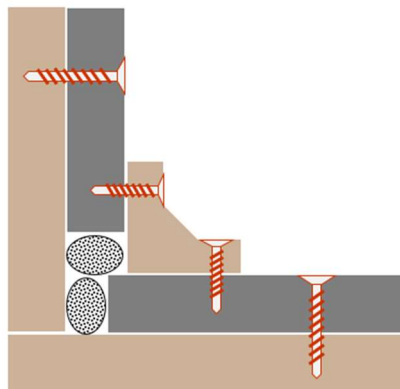
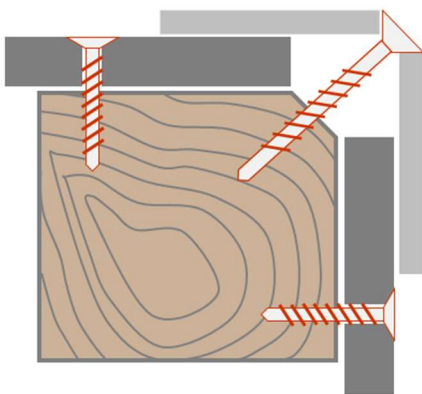


Joints with metal clip profile

NOTE:

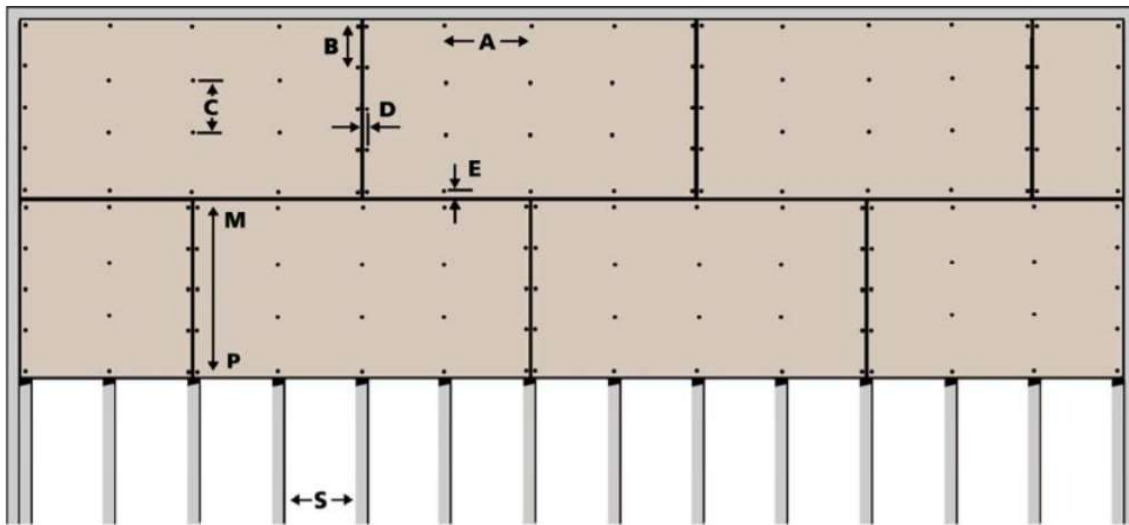
Where VERSAROC® is used on an application where the product is not sealed but can be exposed to temperature changes in relative humidity, then screw holes should be oversized and a gap which allows movement should be used at joints.

Examples showing 3 corner joints



Factory Finished High Performance Flooring System

- ◇ VERSAROC® is used as a structural decking for fire-rated floor/ceiling assemblies.
- ◇ VERSAROC® can be 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!



S = Support centers not to exceed 24 inches on center.

A = 6"-12" o.c. around perimeter

B = 12" on center at panel endings over supports.

C = 12" 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 in fire rated assemblies: All long dimensions of panels are tongue & groove configuration. All short dimensions of panels are square edges. Tongue & groove as well as square edged conditions both 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 Hilti PWH SD Cement Board Screw, No. 00372760 (#8 x 1-5/8") or Grabber Part No. HS8158JBWG2 (#8 x 1-5/8") or equal, #8 diameter minimum with self-drilling 'TEK' point for metal framing are recommended. The length of the fastener to be selected should be 2 to 3 times the board thickness. Surface treatments being applied should always be considered when selecting the appropriate fastener types.

WALL & ROOF APPLICATIONS

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.

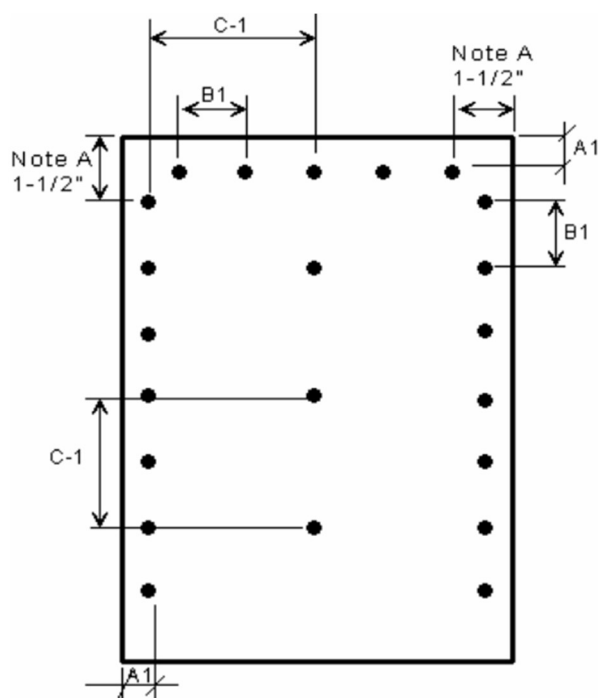
Wind Load Properties: Maximum allowable wind loads in mph velocity while limiting deflection to L/360 under indicated conditions for exterior walls are approximated as listed below when Versaroc is employed as the exterior wall sheathing.

Thickness	16" o.c. supports	24" o.c. 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 & fascia 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.

SURFACE TREATMENTS TO VERSAROC®

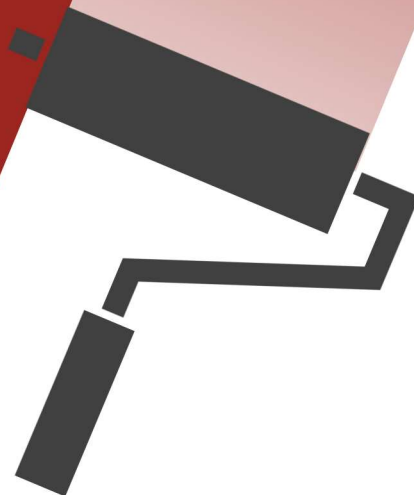
DECORATION TO VERSAROC®

VERSAROC® will receive most standard paint finishes and stains. VERSAROC® has a surface pH of 11-13 and therefore an alkali resistant primer may be required by some coatings - it is advisable to refer to the paint manufacturer in all instances. Remove any surface dust prior to decoration and ensure that if boards have been exposed to the elements that they have been allowed to dry out and acclimatize before being coated.

For surface treatments that are not vapor or moisture permeable, the reverse and all edges of the panel should also be treated in the same way. Uneven joints, screw holes or surface damage can be rectified by use of compatible filler.

FACTORY APPLIED PRIMER/SEALER TO VERSAPANEL®

VERSAROC® can be supplied with a factory applied primer/sealer that will resist up to 80% of possible moisture uptake. It can be applied to both unsanded and sanded material, compatibility of this finish to additional surface treatments should be referred to the finish-coating manufacturer before any application. This finish is standard for the VERSAROC® range of flooring and is essential when used in conjunction with ceramic tile installations.



TECHNICAL DATA

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

Load Tables

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

PANELS SPANNING 3 OR MORE SUPPORTS				
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 factor 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 to 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 general guidelines only. No table can be sufficiently comprehensive to overall details of a specific project design. We recommend that all installations be designed and reviewed by a qualified architect or engineer.



TECHNICAL DATA CONTINUED

PHYSICAL PROPERTIES	VALUES	TEST STANDARD
Thermal Conductivity (12mm / ½" panel)	K' value 1.054 BTU/hr-ft2 – °F 'R' value 0.447 hr-ft2 -°F/BTU	ASTM C518
Coefficient of Linear Thermal Expansion (12mm / ½")	0.589 x 10-5 per °F 1.06 x 10-5 per °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		ASTM D1037
50% to 90% relative humidity:		
Parallel to fibers –	0.06%	
Perpendicular to fibers –	0.09%	
Saturated Thickness Swelling (24 hour water immersion)	0.51%	ASTM D1037
PH Value	11-13	As per 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 after 50 cycles Freeze/Thaw	EN 112
Rot & Termite Resistance	Resilient to destruction	100% Resistant

MECHANICAL PROPERTIES	VALUES	TEST STANDARD
Concentrated load	854 lb. (3.58 kN) static 0.031" (0.7874 mm) max. deflection @ 200 lb. (0.89 kN)	ASTM E661 (550 lbs., 0.108")
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
Shear Diaphragm (19mm, ultimate shear value)	2,185 lbf with adhesive 1,210 lbf without adhesive	ASTM E455

COMBUSTION CHARACTERISTICS	VALUES	TEST STANDARD
Flame Spread / Smoke Development	Zero / Zero	ASTM E84*
Fire Resistance Ratings	1 & 2 hour Floor/Ceiling Assemblies	ASTM E119
Fire Resistance Ratings	1&1 ½ Hr. Rated roof assemblies	ANSI/UL 263†

- ◇ Underwriters Laboratories tested in accordance with ASTM E84 and ANSI / UL 723
- ◇ UL listed Filed # R25239
- ◇ UL Assembly BXUV.P523 acceptable alternate for roof sheathing

**CIS**

16192 Coastal Highway
Lewes, DE 19958

Tel: (904) 800-9224

Email: info@ci-specialties.com

www.ci-specialties.com

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