



BNZ Materials, Inc.

Marinite® P

Refractory Products

Fire-Resistant Structural Insulation



Marinite P structural insulation is an incombustible, self-supporting board that combines high insulating values, fire safety, and exceptionally high compressive strength in a variety of fire protection and heat processing applications.

Damage-resistant Marinite P insulation is a non-asbestos material formed from calcium silicate with inert fillers and reinforcing agents. It combines structural strength and thermal insulation properties in a single material.

Standard Sizes

Marinite P is available in 4 ft. x 8 ft. boards, 60 lbs/ft², sanded on both sides, that range in thickness from 1/2" to 2"



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Typical Applications

Because of its thermal insulating values and high compressive strength, Marinite P structural insulation is especially well suited to withstand both the temperatures and pressures associated with platen press operations. It also provides durable, low maintenance insulation for large diameter pipe support systems in the power generation and process industries.

It provides an ideal backup insulation in rotary kilns in lime and cement plants, and steel ladles, torpedo cars and tundishes in steel plants. In these applications, Marinite P has withstood estimated hot face temperatures of 1700-1800°F, and has performed well where less compressive-resistant boards have failed.

In ceramics and foundry applications, Marinite P insulation can be used as a pallet to support special refractory shapes and foundry cores during oven drying. In addition, it provides an effective alternative for many of the industrial applications which previously used Transite® flat sheets.

The maximum service temperature of Marinite P is dependent upon the application, and application parameters vary greatly in size, thickness, temperature,

heat flow equilibrium and construction — carefully review the enclosed data and also consult your sales representative/distributor for application recommendations.

Attachment Considerations

Occasionally, Marinite P is mechanically attached using screws or nuts and bolts to materials having different thermal expansion characteristics, such as steel or concrete. Under these conditions it is imperative that drilled holes in the Marinite be at least ¼" oversize and screws or bolts be used with oversize washers. Do not overtighten the fasteners or even begin to pin the Marinite, as this will create thermal stresses upon heating which will cause cracking.

Advantages

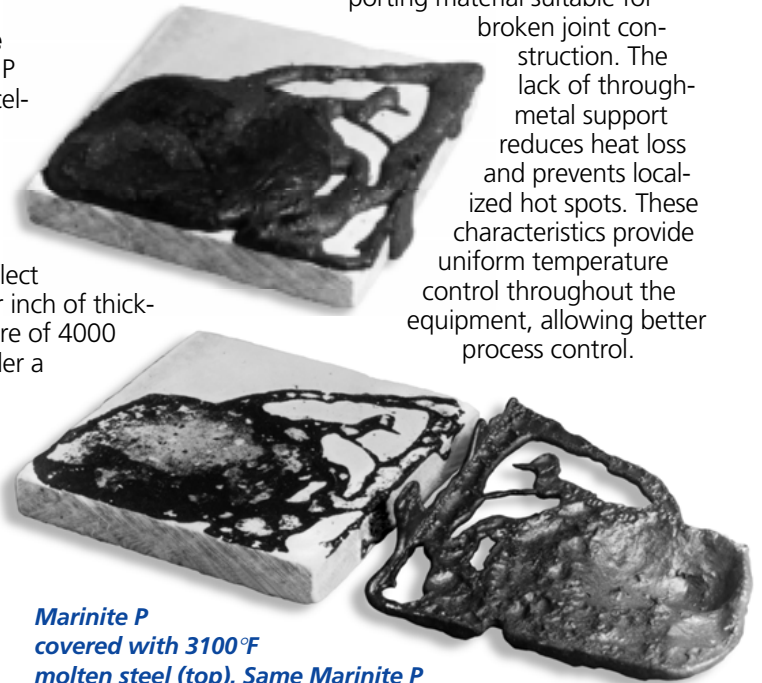
High Compressive Strength. Marinite P insulation offers excellent resistance to compression as well as high tensile, shear and transverse strengths. It will deflect less than ⅛ inch per inch of thickness under a pressure of 4000 psi and only ⅜ under a 2000 psi loading.

Versatility. Marinite P insulation can be used in the form of full size 4' x 8' panels or can be readily fabricated into required shapes for a wide variety of fire protection and heat processing applications. It can be cut with a brickmason's saw or common woodworking tools for small jobs.

Durability. Rugged Marinite P panels resist damage from installation and service abuse. The panels will not decay, rust or corrode. The resistance to moisture is sufficiently high that even after prolonged immersion in water, Marinite P structural insulation will not disintegrate.

Temperature Uniformity. Marinite P structural insulation is a solid, self-supporting material suitable for

broken joint construction. The lack of through-metal support reduces heat loss and prevents localized hot spots. These characteristics provide uniform temperature control throughout the equipment, allowing better process control.



Marinite P covered with 3100°F molten steel (top). Same Marinite P after steel cooled (bottom), showing no cracking, spalling, melting or disintegration.

Typical Data

Physical Properties

Density , pcf (kg/m ³)	60	(961)
Moisture Content , (normal),* % of dry weight	3	
Modulus of Rupture , (dry),* psi (kg/cm ²)	1400	(98)
Modulus of Elasticity , (dry), psi (kg/cm ²) (From Modulus of Rupture Test)	700,000	(49,215)
Compressive Strength , psi (kg/cm ²)		
For 5% deformation	3050	(214)
For 10% deformation	5850	(411)
Tensile Strength , (normal), psi (kg/cm ²)		
per ASTM C 209		
Parallel to major surface	500	(35)
Normal to major surface	140	(9.8)
Pandux Hardness , units		
Die side	75	
Screen side	78	
Brinell Hardness No. , (dry)		
per ASTM E 10		
45.5 kg load, 19.05 mm ball	2.15	
Charpy Impact Resistance , ft-lb		
per ASTM D 256		
½" x ½" thick samples	0.19	
Screw Holding Strength , (normal), lb (kg)		
½" penetration	200	(91)
⅞" penetration	500	(227)
Permeability , perm inches		
per ASTM C 355	4.1	

Dimensional Change Due to Moisture, in/in	Length		
	Length	Width	Thickness
Shrinkage – normal to dry	0.006	0.005	0.013
Expansion – dry to saturated	0.004	0.009	0.010
Expansion – normal to 90% RH	0.003	0.005	0.008

Specific Heat	Btu/°F/lb
Temperature, °F (°C)	
200 (93)	0.28
400 (205)	0.30
600 (316)	0.32
800 (425)	0.34

Standard Sizes

	Thickness, inches (mm)	Sheet Size, feet (mm)
Marinite P	½, ¾, 1, 1½, 2 (12.7, 19.1, 25.4, 38.1, 50.8)	4 x 8 (1219 x 2438) 4 x 4 (1219 x 1219) 2 x 4 (610 x 1219)

Dimensional Tolerances, inches (mm)

Length and Width	Thickness	Squareness (max. difference between diagonals)
± ½ ₃₂ (± 0.79)	± ½ ₃₂ (± 0.79)	⅛ (3.175)

Electrical Properties

Dielectric Breakdown , volts/mil, ASTM D 149	
500 volts per second rate of rise	
At 72°F and 50% RH	46
At 72°F and 90% RH	27
Volume Resistivity at 100 volts , million OHM-CM	
per ASTM D 257	
At 72°F and 50% RH	500
At 72°F and 90% RH	75

High Temperature Properties

Thermal Conductivity , Btu-in/ft ² , hr, °F (W/m ² °K)	
per ASTM C 177	
Mean Temperature, °F (°C)	
75 (24)	1.15 (.17)
400 (205)	1.13 (.16)
600 (316)	1.15 (.17)
800 (425)	1.16 (.17)
1000 (538)	1.17 (.17)

Heat Soak Shrinkage, %

24 hrs @ Temp., °F, (°C)	Length	Thickness	Avg. Linear	Weight Loss, %
1000 (538)	0.3	1.4	0.8	9.1
1200 (650)	0.6	2.1	1.1	8.7
1400 (760)	0.9	3.5	1.6	9.2
1600 (870)	2.6	12.7	5.5	9.8
1800 (982)	2.6	14.2	5.3	10.4

Hot Load Deformation, %

1600°F, 15 psi, 5 hrs	10.0
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Hot Modulus of Rupture, psi (kg/cm²)

per ASTM C 583	
°F (°C)	
250 (121)	1250 (88)
1000 (538)	850 (57)
1200 (650)	970 (68)
1350 (732)	740 (52)

Hot Surface Performance, % shrinkage, per ASTM C 411

24 hrs simulated service (hot face/cold face)			
	Temperature	Thickness	Avg. Linear
	Hot/Cold, °F	Shrinkage	Shrinkage
		%	%
Vertical Test (Electric Glo-Bar)	2000/236	9.9	3.8
Vertical Test (Gas Spall Furnace)	1600/413	3.0	1.4
	1800/464	3.0	1.4
	2000/445	7.9	3.2

* (normal) refers to normal conditions of 75°F and 50% R.H.
(dry) refers to oven-dried material.

Compressive Properties, (average typical values at 60 pcf, ½" thickness)
Heat treated 24 hours at indicated temperatures and then promptly compressed

Pressure (psi)	300°F		400°F		600°F		800°F		1000°F		1200°F	
	DUL*	PC**	DUL*	PC**	DUL*	PC**	DUL*	PC**	DUL*	PC**	DUL*	PC**
500	0.012	0	0.030	0.010	0.060	0.018	0.070	0.020	0.078	0.028	0.089	0.036
1,000	0.020	0.010	0.046	0.016	0.076	0.028	0.087	0.036	0.098	0.050	0.111	0.076
2,000	0.048	0.014	0.078	0.020	0.108	0.038	0.126	0.068	0.138	0.062	0.154	0.092
3,000	0.080	0.019	0.110	0.032	0.141	0.068	0.159	0.096	0.178	0.096	0.197	0.120
4,000	0.110	0.024	0.142	0.060	0.174	0.094	0.195	0.112	0.218	0.130	0.241	0.160
5,000	0.144	0.048	0.174	0.090	0.205	0.124	0.231	0.142	0.248	0.166	0.288	0.200
6,000	0.174	0.076	0.204	0.116	0.240	0.154	0.266	0.172	0.298	0.200	0.326	0.244
7,000	0.206	0.108	0.236	0.142	0.272	0.180	0.302	0.202	0.336	0.234	0.368	0.288
8,000	0.238	0.138	0.265	0.172	0.304	0.208	0.333	0.230	0.366	0.264	0.410	0.312
9,000	0.268	0.166	0.295	0.196	0.324	0.228	0.362	0.256	0.394	0.290	0.434	0.338
10,000	0.296	0.186	0.316	0.218	0.343	0.248	0.386	0.274	0.416	0.310	0.456	0.360

* DUL = Deflection under load, in/in. **PC = Permanent consolidation, in/in.

Marinite P Fire-Resistant Structural Insulation Panels: Heat Loss, Heat Storage and Outside Surface Temperature

Thickness, inches	Hot Face Temperature, °F (°C)											
	100 (38)			200 (93)			300 (149)			400 (205)		
	HL	HS	ST	HL	HS	ST	HL	HS	ST	HL	HS	ST
1	13	13	89 (32)	83	75	127 (53)	159	135	161 (72)	238	205	192 (89)
1½	10	18	87 (31)	63	106	117 (47)	119	192	144 (62)	176	291	168 (76)
2	8	23	86 (30)	51	136	111 (44)	95	246	133 (56)	141	374	153 (67)
3	6	33	84 (29)	37	194	103 (39)	69	351	120 (49)	101	535	136 (58)
4	5	42	84 (29)	29	250	99 (37)	54	454	112 (44)	78	693	125 (52)
5	4	52	83 (28)	24	306	96 (36)	44	556	107 (42)	64	850	118 (48)
6	3	61	83 (28)	20	361	94 (34)	37	658	104 (40)	55	1006	113 (45)
	500 (260)			600 (316)			700 (371)			800 (425)		
1	319	280	220 (104)	403	361	247 (119)	489	447	272 (133)	577	515	296 (147)
1½	235	398	191 (88)	295	513	212 (100)	356	637	232 (111)	418	735	251 (122)
2	187	512	172 (78)	234	662	190 (88)	281	822	207 (97)	330	950	224 (107)
3	133	735	150 (66)	166	951	164 (73)	199	1183	177 (81)	233	1369	190 (88)
4	104	954	137 (58)	129	1235	148 (64)	154	1538	159 (71)	180	1781	170 (77)
5	85	1170	128 (53)	105	1517	138 (59)	126	1890	147 (64)	147	2189	156 (69)
6	72	1385	122 (50)	89	1796	130 (54)	107	2239	138 (59)	125	2595	146 (63)
	900 (482)			1000 (538)			1100 (593)			1200 (649)		
1	667	609	318 (159)	759	679	340 (171)	853	781	361 (183)	950	853	381 (194)
1½	482	871	270 (132)	546	972	287 (142)	612	1120	305 (152)	679	1225	321 (161)
2	379	1126	239 (115)	428	1259	254 (123)	479	1451	269 (132)	531	1588	283 (139)
3	267	1625	202 (94)	301	1818	214 (101)	336	2098	226 (108)	371	2299	237 (114)
4	206	2116	180 (82)	233	2369	190 (88)	259	2735	200 (93)	286	2998	209 (98)
5	168	2602	165 (74)	190	2914	173 (78)	212	3366	182 (83)	233	3690	190 (88)
6	142	3085	154 (68)	160	3456	162 (72)	179	3993	169 (76)	197	4379	176 (80)

HL = Heat loss at steady state conditions, Btu/ft²/hr with 80°F ambient still air.

HS = Heat storage, Btu/ft².

ST = Outside surface temperature, °F, (°C).

The physical and chemical properties of BNZ's Marinite P represent typical average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice.



BNZ Materials manufactures and is a worldwide supplier of a range of specialty industrial insulations. Our calcium silicate insulation has been manufactured continuously at Billerica, Massachusetts for over 50 years. Prior product identification was under the Johns-Manville JM trademark.

In addition to our calcium silicate product line, BNZ also manufactures Insulating Fire Brick and refractory specialties at the world's most advanced IFB plant located in Zelienople, PA. Over sixteen types of IFB are available for use in applications from 2000°F to 3200°F to meet the specific needs of a variety of industries.

Contact BNZ for more information on these products and their applications.



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Marinite® P

Plant Location

Billerica

400 Iron Horse Park
North Billerica, MA 01862
Phone: (978) 663-3401
(800) 888-0061
FAX: (978) 663-2735

Insulating Fire Brick

Plant Location

Zelienople

191 Front Street
Zelienople, PA 16063
Phone: (412) 452-8650
(800) 955-8650
FAX: (412) 452-1346

Warranty

BNZ Materials warrants that its products are manufactured in accordance with its applicable material specifications and are free from defects in workmanship and materials using BNZ's specifications as a standard. Every claim under this warranty shall be deemed waived unless in writing and received by BNZ within thirty (30) days of the date the defect was discovered and within one (1) year of the date of the shipment of the product.

BNZ MAKES NO OTHER REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, IN FACT OR IN LAW, INCLUDING WITHOUT LIMITATION, THE WARRANTY OF MERCHANTABILITY OR THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, OTHER THAN THE LIMITED WARRANTY SET FORTH ABOVE.

Limitation of Liability

It is expressly understood and agreed that the limit of BNZ's liability shall be the resupply of a like quantity of non-defective product and that BNZ shall have no such liability except where the damage or claim results solely from breach of BNZ's warranty.

IT IS ALSO AGREED THAT BNZ SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, OR OTHER DAMAGES FOR ANY ALLEGED NEGLIGENCE, BREACH OF WARRANTY, STRICT LIABILITY, OR ANY OTHER THEORY, OTHER THAN THE LIMITED LIABILITY SET FORTH ABOVE.