

Kaolite® 2000, 2000-HS, 2000-HS Gun, 2200, 2200 Gun, 1:2:4

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Product Description

Kaolite 2000, 2000-HS and Kaolite 2000-HS Gun are general purpose, lightweight monolithics for use up to 2000°F (1093°C). Kaolite 2000 is a gun/cast material for use where low thermal conductivity is required. Kaolite 2000-HS and Kaolite 2000-HS Gun maintain excellent volume stability throughout their temperature use range and are well suited for insulating applications where strength is also required.

Kaolite 2200 and Kaolite 2200 Gun are designed for temperatures up to 2200°F (1204°C). They have excellent volume stability and good strength. These general purpose, lightweight monolithics have low density, excellent resistance to thermal shock, and low thermal conductivity.

Kaolite 1:2:4 is a general-purpose, cast/gun lightweight monolithic for use up to 2000°F (1093°C). It provides the advantage of a pre-mixed, controlled formula product compared to typical 1:2:4 spec field mixes.

Features

- Light weight and low thermal conductivity reduce both the quantity of heat storage and heat transfer producing significant savings in furnace fuel consumption
- Lower densities reduce the amount of supporting furnace steelwork required and provide more insulation with a thinner lining.

Applications

- Backup insulation in two component linings in petrochemical process units
- Hot face lining in ductwork from waste heat recovery boilers and process unit
- F.C.C.U. linings-regenerator
- Hydrogen or reducing atmosphere linings
- Radiant section in steam flood generators
- Hydrogen or reducing atmosphere linings
- Steam flood generator convection sections and target walls

Instructions for Using

Casting

Highest strength is obtained with monolithic refractory by using the least amount of clean mixing water that will allow thorough working of material into place by vibrating. A mechanical mixer is required for proper placement (paddle-type mortar mixers are best suited). Mix for 6 minutes to achieve a ball-in-hand consistency. Place material within 30 minutes after mixing.

Gunning

Use suitable gunite equipment. The gun grade materials should be pre-dampened uniformly with approximately 8-12 % by weight of clean water in a mechanical mixer before placing into gun. This will reduce rebound and dust. Add required water at nozzle with needle valve controls for effective placement. Suggested air pressure at the nozzle is 20 to 30 psi.

Precautions

Store bagged monolithics in a dry place, off the ground and, when possible, with the original shrink wrapping intact. Normal shelf life is 12 months if properly stored.

Watertight forms must be used when placing material. All porous surfaces that will come in contact with the material must be waterproofed with a suitable coating or membrane. For maximum strength, cure 24 hours under damp conditions before initial heat-up. Keep freshly placed monolithic warm during cold weather, ideally between 60°F and 80°F until wet curing is completed. New monolithic installations must be heated slowly the first time.

Freshly placed lightweight monolithics are sometimes prone to a deteriorating condition called alkali hydrolysis when they are kept in a non-dried state for a sustained period of time. Under these conditions, the monolithics should be force-dried soon after placement to help retard the possible deterioration effects.

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Monolithic Product Name	<u>Kaolite 2000</u>	<u>Kaolite 2000-HS</u>	<u>Kaolite 2000-HS Gun</u>	<u>Kaolite 2200</u>	<u>Kaolite 2200 Gun</u>	<u>Kaolite 1:2:4</u>
Material Class	Crystalline Silica					
Material method of installation	cast/gun	cast	gun	cast	gun	cast/gun
Physical Properties						
Temperature use limit, °F	2000	2000	2000	2200	2200	2000
Temperature use limit, °C	1093	1093	1093	1204	1204	1093
Placement, average lb to place 1 ft ³	32	61	62	61	62	57
Placement, average kg to place 1 m ³	513	977	993	977	993	913
Pounds per bag, lb	20	40	40	40	40	50
Pounds per bag, kg	9	18	18	18	18	23
Shelf life, months	12	12	12	12	12	12
Water, %, recommended						
casting by vibrating	110-125	45-53	-	45-53	-	55-65
Density, ASTM C 134, pcf						
dried 24 hrs @ 220°F	31-41	61-72	63-74	61-72	63-74	55-66
fired @ 1500°F	27-36	55-66	56-67	55-66	56-67	51-61
Density, ASTM C 134, kg/m ³						
dried 24 hrs @ 104°C	496-657	977-1105	1009-1186	977-1105	1009-1186	881-1057
fired @ 816°C	432-577	881-1057	897-1073	881-1057	897-1073	801-961
Modulus of Rupture, MOR, ASTM C 133, psi						
dried 24 hrs @ 220°F	50-90	90-175	85-150	90-175	90-150	125-200
fired 5 hrs @ 1500°F	55-100	100-225	110-225	100-225	110-225	80-175
fired 5 hrs @ temperature use limit, °F	60-100	90-160	130-250	80-160	130-250	75-150
Modulus of Rupture, MOR, ASTM C 133, MPa						
dried 24 hrs @ 104°C	0.31-0.62	0.62-1.21	0.59-1.03	0.62-1.21	0.62-1.03	0.86-1.38
fired 5 hrs @ 816°C	0.38-0.76	0.69-1.55	0.76-1.55	0.69-1.55	0.76-1.55	0.55-1.21
fired 5 hrs @ temperature use limit, °C	0.41-0.76	0.55-1.10	0.90-1.72	0.55-1.10	0.90-1.72	0.52-1.03
Cold crushing strength, CCS, ASTM C 133, psi						
dried 24 hrs @ 220°F	95-180	350-750	300-700	350-650	300-500	300-500
fired 5 hrs @ 1500°F	100-185	350-800	350-800	350-800	400-900	250-450
fired 5 hrs @ temperature use limit, °F	100-200	450-900	450-900	450-900	450-900	250-450
Cold crushing strength, CCS, ASTM C 133, MPa						
dried 24 hrs @ 104°C	0.65-1.24	2.1-5.2	2.1-4.8	2.4-4.5	2.06-3.5	2.06-3.5
fired 5 hrs @ 816°C	0.69-1.28	2.1-5.2	2.1-5.2	2.4-5.2	2.76-6.2	1.7-3.1
fired 5 hrs @ temperature use limit, °C	0.69-1.38	3.1-6.2	3.1-6.2	3.1-6.2	3.1-6.2	1.7-3.1

Compliance data sheets for specific applications or job requirements are available upon request. The values given herein are 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. The data contained herein should not be used for specification purposes. Check with your Morgan Advanced Materials office to obtain current information.

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Permanent Linear Shrinkage, ASTM C 113, %						
dried 24 hrs @ 220°F (104°C)	0 to -0.3	0 to -0.2	0 to -0.2	0 to -0.2	0 to -0.2	0 to -0.2
fired 5 hrs @ 1500°F (816°C)	-0.6 to -1.5	-0.2 to -0.55	-0.2 to -0.65	-0.2 to -0.55	-0.2 to -0.65	-0.4 to -1.0
fired 5 hrs @ temperature use limit, °F (°C)	-1.5 to -2.5	-0.3 to -1.0	-0.3 to -0.8	-0.3 to -1.0	-0.3 to -0.8	-
Chemical Analysis, % weight basis after firing						
Alumina, Al ₂ O ₃	33	37	36	37	36	26
Silica, SiO ₂	35	38	42	38	42	38
Ferric Oxide, Fe ₂ O ₃	4.0	2.2	1.6	2.2	1.6	11
Titanium Oxide, TiO ₂	1.7	1.5	1.4	1.5	1.4	1.4
Calcium Oxide, CaO	18	19 (12)	17 (10)	19 (12)	17 (10)	17
Magnesium Oxide, MgO	4.6	0.2	0.2	0.2	0.2	3.4
Alkalies as Na ₂ O and K ₂ O	3.1	1.2	1.4	1.2	1.4	2.6
Thermal Conductivity, BTU•in/hr•ft ² , per ASTM C201						
Mean Temperature @ 500°F	0.73	1.48	1.48	1.48	1.48	1.3
1000°F	0.88	1.63	1.63	1.63	1.63	1.55
1500°F	0.98	1.79	1.79	1.79	1.79	1.9
2000°F	-	1.96	1.96	1.96	1.96	-
Thermal Conductivity, W/m•K, per ASTM C201						
Mean temperature @ 260°C	0.11	0.21	0.21	0.21	0.21	0.14
538°C	0.13	0.23	0.23	0.23	0.23	0.22
815°C	0.14	0.26	0.26	0.26	0.26	0.27
1093°C	-	0.28	0.28	0.28	0.28	-

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