

Kao-Tab[®] Monolithics



Product Description

Kao-Tab 95 and Kao-Tab 95-Gun are 95%-alumina monolithics designed for casting and gunning respectively. They maintain high strength throughout the temperature range of 3400°F (1871°C). Key features are high strength, high-use limit, good slag resistance, and high purity. Kao-Tab 95 Gun is the gunning version.

Kao-Tab SR is an 88%-alumina monolithic designed for gunning or ramming. It maintains high strength throughout the temperature range of 3000°F (1649°C). Key features are high strength, good abrasion resistance, and excellent slag resistance (both basic and acidic types).

Kao-Tab HDHS-98 is a very high purity, 98% alumina monolithic with high hot strengths. Excellent for hydrogen atmospheres needing high-purity or high temperature applications in the iron and steel, chemical processing, and cement industries.

Features

- Designed for supercritical applications
- Specially enhanced high alumina chemistries that allow Kao-Tab to outperform conventional monolithics

Applications

- Cat cracker transfer lines where more abrasion resistance is needed
- Secondary ammonia reformer linings where low silica is desired
- Recovery boiler
- Upper furnace walls
- Recovery/cyclone boilers
- Lower furnace walls and floor
- Cyclone boilers

Instructions For Using

Casting

Highest strength is obtained with a monolithic refractory by using the least amount of clean mixing water that will allow thorough working of material into place by vibrating or rodding. A mechanical mixer is required for proper placement (paddle-type mortar mixers are best suited). After adding the recommended amount of water to achieve a ball-in-hand consistency, wet mix for 3 minutes. Place material within 30 minutes after mixing.

Gunning

Use suitable gunite equipment. To reduce rebound and dust, material should first be predampened uniformly with approximately 2 - 3% by weight of clean water in a mechanical mixer. Dampened material should slake for 10-15 minutes depending on ambient conditions before placing into gun. Add required water at nozzle for effective placement.

Kao-Tab 95-Gun and Kao-Tab SR can be rammed or plastered into place by adding a sufficient amount of water for proper consistency. Follow recommended mixing instructions described above.

Precautions

Store bagged monolithics in a dry place, off the ground and, when possible, with the original shrink wrapping intact. 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 in a damp condition before initial heat-up. Keep freshly placed monolithic warm during cold weather, ideally between 70°F and 80°F. New monolithic installations must be heated slowly the first time.

For more information on monolithic placement, consult your Thermal Ceramics representative.

Kao-Tab® Monolithics

Physical Properties³

	Kao-Tab SR	Kao-Tab 95	Kao-Tab 95 Gun	Kao-Tab HDHS-98
Recommended use limit, °F (°C)	3000 (1649)	3400 (1871)	3400 (1871)	3400 (1871)
Pounds (kg) required to place one cubic ft ¹	165* (75)	170 (77)	167* (76)	185 (84)
Density, pcf fired (kg/m ³)	160 - 170 (2564 - 2724)	163 - 175 (2612 - 2804)	164 - 175 (2628 - 2804)	176 - 188 (2821 - 3013)
Method of installation	gun/ram	cast	gun/ram	cast
Water ranges, % by weight, recommended ²				
Casting (by vibrating)	-	8 - 10	-	6.0 - 7.0
Ramming	4 - 8	-	4 - 8	-
Pounds per bag (kg)	50 (23)	50 (23)	50 (23)	50 (23)
Shelf life, months	12	12	12	12
Modulus of rupture, psi (Mpa) ASTM C 133				
Dried 18-24 hrs. @ 220°F (104°C)	1000 - 1400 (7 - 10)	1300 - 1900 (8.9 - 13)	1400 - 2000 (10 - 14)	700 - 1200 (4.8 - 8.3)
Fired 5 hrs. @ 1500°F (816°C)	900 - 1300 (6 - 8.9)	1000 - 1600 (7 - 11)	1100 - 1800 (8 - 12)	500 - 800 (3.4 - 5.5)
Fired 5 hrs. @ use limit	1500 - 2200 (10 - 15)	1400 - 1900 (10 - 13)	1400 - 2000 (10 - 14)	1000 - 1400 (7 - 9.7)
Cold crushing strength psi, (Mpa) ASTM C 113				
Dried 18-24 hrs. @ 220°F (104°C)	5000 - 9000 (34 - 62)	6000 - 9000 (41 - 62)	5000 - 7500 (34 - 52)	4700 - 6500 (32.4 - 45)
Fired 5 hrs. @ 1500°F (816°C)	5000 - 8500 (34 - 59)	6000 - 10000 (41 - 69)	5000 - 9000 (34 - 62)	3500 - 6000 (24.1 - 41.4)
Fired 5 hrs. @ use limit	6000 - 9000 (41 - 62)	6000 - 9000 (41 - 62)	6000 - 9000 (41 - 62)	6000 - 8500 (41.4 - 59)
Perm. linear change, % (ASTM C 113) ⁴				
Dried 18-24 hrs. @ 220°F (104°C)	0 to -0.2	0.0 to -0.2	0.0 to -0.2	0 to -0.2
Fired 5 hrs. @ 1500°F (816°C)	-0.1 to -0.3	-0.1 to -0.3	-0.1 to -0.3	0 to -0.4
Fired 5 hrs. @ use limit	-	0 to -1.5	0 to -1.5	-0.2 to -0.7
Abrasion loss, cc's (ASTM C 704)				
Fired 5 hrs. @ 1500°F (816°C)	18 - 24	10 - 19	13 - 20	7 - 11

Chemical Analysis, %, Weight basis after firing

Alumina, Al ₂ O ₃	88	95	95	98
Silica, SiO ₂	0.2	0.1	0.2	0.1
Ferric oxide, Fe ₂ O ₃	7.1	0.1	0.2	-
Titanium oxide, TiO ₂	-	trace	trace	-
Calcium oxide, CaO	4.2	4.6	4.2	1.8
Magnesium oxide, MgO	-	trace	trace	-
Alkalies, as, Na ₂ O	0.2	0.1	0.1	0.1

Thermal Conductivity, Btu·in./hr·ft²·°F (w/m·k), ASTM C 417

Mean temperature @ 500°F (260°C)	12.7 (1.8)	16.6 (2.4)	18.1 (2.6)	21.4 (3.1)
@ 1000°F (538°C)	11.6 (1.7)	13.8 (2.0)	15.3 (2.2)	17.4 (2.5)
@ 1500°F (816°C)	11.0 (1.6)	12.2 (1.8)	13.3 (1.9)	15.2 (2.2)
@ 2000°F (1093°C)	9.7 (1.4)	11.3 (1.6)	12.1 (1.7)	13.1 (1.9)
@ 2500°F (1371°C)	9.2 (1.3)	10.7 (1.5)	11.2 (1.6)	-

* Without rebound loss

1. Gunite installation may require 10-30% overage due to rebound and on-site loss.
 3. Properties indicated are for vibratory cast materials only unless specified otherwise.

2. Water requirements indicated are offered as a guide. Actual water required may be subject to field conditions.
 4. Fired linear change values reflect samples taken from a direct to fired state.

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. Therefore, the data contained herein should not be used for specification purposes. Check with your Thermal Ceramics office to obtain current information.