

### Product Description

Kao-Tuff 110G is a medium-weight erosion-resistant monolithic with excellent insulating properties installed by standard gunning techniques. Abrasion losses of 7 -14 cc's and a thermal conductivity of 5.4 at 816°C (1500°F) make it effective for numerous applications in FCCU and other industrial uses.

### Instructions for Using

**Gunning:** Use suitable gunite equipment. Material should be pre-dampened uniformly with approximately 3-4% of clean water. This should be mixed in a mechanical mixer and allowed to slake if necessary for up to 20 minutes (the cooler the mix temperature, longer the slaking time) before placing into gun. At 50°F a slaking time of 10-15 minutes is normal. This will greatly reduce rebound and dusting.

Add the required amount of water at nozzle using a recommended minimum 18" nozzle extension past the water ring for better intermixing. A water needle valve is also needed to control flow of the water more precisely. Suggested air pressure at the nozzle is 2.1 to 3.1 bar (30 to 45 psi).

For improved properties and lower rebound it is recommended that a water booster pump be used to increase the plant water pressure. For best results a 16 hole water ring along with water pressure at the nozzle of 125 to 200 psi will help drive the water into the material at the water ring for the best mixing of the water and monolithic.

**Other:** Kao-Tuff 110G can be hand rammed by adding a sufficient amount of water for proper consistency. Follow recommended mixing instructions described above.

**Precautions:** Use watertight forms; when placing against porous surfaces, waterproof the surface. For maximum strength, cure 24 hours under damp conditions before initial heat-up. Keep freshly placed monolithic warm during cold weather, ideally between 16°C and 27°C (60°F and 80°F). In hot conditions, keep mix temperatures below 80°F or working time will be greatly reduced. New monolithic installations must be heated slowly the first time.

For detailed installation instructions and commissioning schedules, please contact your Morgan Advanced Materials-Thermal Ceramics representative.

Properties	Kao-Tuff 110G	
Region of Manufacture	Americas	
Bond type	Hydraulic	
Raw material base	Fireclay	
Method of installation	Gun/Ram	
Maximum grain size, mm	4	
Maximum service temperature, °C (°F)	1316 (2400)	
Net material requirement, kg/m <sup>3</sup> (pcf)	1778 (111)	
Water addition, % by weight		
	casting by vibrating	13.5-15.5 (testing purposes)
Packaging in bags, kg (lbs)	25 (55)	

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# Kao-Tuff™ 110G Monolithic

## Product Data Sheet



Properties		Kao-Tuff 110G
<b>Bulk Density, kg/m<sup>3</sup> (pcf), ASTM C134</b>		
	dried 24 hours @ 105°C (220°F)	1794-1970 (112-123)
	fired 5 hours @ 816°C (1500°F)	1698-1858 (106-116)
<b>Modulus of Rupture, MPa (psi), ASTM C133</b>		
	dried 24 hours @ 105°C (220°F)	5.5-9.0 (800-1300)
	fired 5 hours @ 816°C (1500°F)	4.8-7.6 (700-1100)
	fired 5 hours @ maximum service temperature °C (°F)	5.2-8.3 (750-1200)
<b>Cold Crushing Strength, MPa (psi), ASTM C133</b>		
	dried 24 hours @ 105°C (220°F)	44.8-69.0 (6500-10000)
	fired 5 hours @ 816°C (1500°F)	44.8-75.9 (6500-11000)
	fired 5 hours @ maximum service temperature °C (°F)	48.3-75.9 (7000-11000)
<b>Permanent Linear Change, %, ASTM C113</b>		
	dried 24 hours @ 105°C (220°F)	0 to -0.2
	fired 5 hours @ 816°C (1500°F)	-0.1 to -0.3
	fired 5 hours @ maximum service temperature °C (°F)	-0.6 to +0.4
<b>Abrasion loss, cm<sup>3</sup>, ASTM C704</b>		
	fired 5 hours @ 816°C (1500°F)	7-14
<b>Chemical Analysis, %, Calcined Basis</b>		
	Alumina, Al <sub>2</sub> O <sub>3</sub>	49
	Silica, SiO <sub>2</sub>	33
	Iron Oxide, Fe <sub>2</sub> O <sub>3</sub>	1.5
	Titania, TiO <sub>2</sub>	0.8
	Lime, CaO	14
	Magnesia, MgO	0.4
	Alkali as, Na <sub>2</sub> O + K <sub>2</sub> O	1.3
<b>Thermal Conductivity, W.m•K (BTU•in/hr•ft<sup>2</sup>•°F), ASTM C417</b>		
	260°C (500°F)	0.75 (5.2)
	538°C (1000°F)	0.76 (5.3)
	816°C (1500°F)	0.78 (5.4)
	1093°C (2000°F)	0.79 (5.5)

### Storage and Shelf Life

- Monolithics should be stored in a dry, well-ventilated area and held off the ground on pallets ideally with the original packaging intact. Keep out of rain and damp conditions.
- Normal shelf life is 12 months from date of manufacture when properly stored.

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