

## PRODUCT DESCRIPTION

Gunning Refractory Mass (GRM™) is a refractory powder mixture with a special mixing design designed to be applied by spraying or spraying with an air gun or other shotcrete tools. Gunning Refractory Mass (GRM™) is made from a combination of alumina, magnesium, silicon, etc. with different ratios. Gunning refractory mixtures consist of a multi-component system including refractory aggregates with a specific particle size distribution, binders, and additives. GRM™ as an amorphous material can be used in three ways: dry, semi-dry, and wet, depending on the type of materials used in production. For this purpose, the setting of this group of refractory masses is sometimes done through hydration bonding and sometimes heat-hardening (they harden by heating). gunning refractory mass (GRM™), adheres strongly to the surface and with low rebonding loss, can be used as a heat-resistant liner with very low thermal conductivity and high resistance to corrosion, erosion, etc. They can greatly increase the useful life of structures exposed to high heat, such as types of thermal furnaces. Gunning Refractory Masses (GRM™) are applicable in both cold and hot conditions. They can be implemented quickly and easily without the need for formatting. Therefore, the speed of construction with this type of refractory product is greatly increased. gunning refractory mass is mainly used in repair, restoration, and maintenance applications of thermal furnaces and other damaged surfaces exposed to heat.

## PRODUCT FEATURES

- High resistance to heat (refractory)
- High resistance to thermal shocks
- Penetration resistant
- porous
- Excellent mechanical resistance
- High density
- Ease of installation or implementation
- Resistant to slag
- Available in acidic, basic and neutral types
- High useful life
- High durability and stability
- Applicable both in cold and hot conditions
- Designed for spraying
- Excellent adhesive strength with minimal loss

## PRODUCT USES

Gunning Refractory Mass (GRM™) are widely used in the following industries:

- steel industry
- cast iron industry
- zinc industry
- Tundish
- Covering melting furnaces
- blast furnace iron runner and slag runner
- Hot blast dome furnace
- Blast furnace cover
- Molten steel crucibles
- Electric arc furnace
- Covering induction furnaces



Gunning Refractory Mass-GRM™

## HOW TO USE

### SURFACE PREPARATION

The installation site or the surface to be covered or repaired using GRM™ must be free of any contamination such as rust, corrosion, and damaged and loose shells. Therefore, before installing GRM™, the surface must be cleaned and prepared by sandblasting or other methods.

### Preparing the spray gun

The components of the spray gun must be taken apart and carefully inspected. The material remaining in the wall of the spray pipe must be cleaned well. After you finish checking the airgun components, install them and check if the connections of each part and the pipeline connections are tight. Try the device on a trial basis and make sure of the correct ventilation and sealing condition.

### MIXING

To prepare GRM™, remove the dry mixture from the bag and transfer it to a blender or flat surface. GRM™ can be prepared both with a mixer and by hand. After removing the mixture from the bag, mix the contents for 1 minute. To implementation semi-dry and wet gunning refractory masses, the GRM™ mix must be prepared by adding water. Therefore, water should be added to the mixture according to the values mentioned in the table of mechanical characteristics of the product. In the installation of GRM™ refractory mass by wet method, water should be added slowly to the powder and dry mix of GRM™ and mixed well. In semi-dry mode, a predetermined amount of water should be added to the water tank of the spray gun. In this method, gunning refractory mass and water are mixed during spraying. There is no need to use water to prepare the mixture in the implementation of gunning refractory masses in dry method. Just mix the contents of the GRM™ bag well and finally transfer it to the tank of the spray gun.

### APPLICATION

GRM™ coating is applied using a spray gun. To implement the gunning refractory mass, the pre-prepared mass must be transferred to the tank of the spraying machine and then the spraying operation should begin. The spray gun first supplies air, then

feeds the material and water from the tank during spraying and shoots or throws. In the wet and dry state, the prepared mixture is ejected from a nozzle. But in the semi-dry state, the mixture is thrown from one nozzle and water from the other nozzle towards the surface.

#### LIMITATIONS

- When spraying, pay attention so that the Gunning refractory mixture is sprayed evenly and continuously. The direction of spraying should be perpendicular to the surface to be sprayed, the distance between the nozzle and the desired surface should be considered between 1 and 1.5 meters, and the nozzle should continuously move

in a spiral so that the distribution of coarse and fine particles is uniform.

- Return materials and materials scattered during spraying should be removed in time and should not be recycled for spraying.
- When construction is interrupted, it is recommended to wet the joint area directly with water before continuing to spray.
- Spraying operation at high altitude should be equipped with communication facilities.
- The thickness of the sprayed layer should be checked in time and the part that is too thick should be removed. The surface of the spray coating should not be smooth.

#### TECHNICAL DATA

	GRM™ AI60	GRM™ AI45	GRM™ AI40	GRM™ AI35	GRM™ Mg75
Maximum service temperature	1580	1300	1300	1100	1750
Main material	Fireclay, bauxite	Fireclay	Fireclay	Fireclay	Dead Burned Magnesia
Aggregate size (mm)	0 - 5	0 - 4	0 - 5	0 - 5	0 - 3
Amount of water required (%)	11.2 - 12.2	16 - 18	26 - 29	70 - 80	---
Al <sub>2</sub> O <sub>3</sub>	≥60.1	≥41.1	≥40.1	≥27.5	3 - 1
SiO <sub>2</sub>	≤31.9	≤38.4	≤37	≤52.6	10 - 8
Mgo	---	---	---	---	min 75
TiO <sub>2</sub>	≤1.7	≤4.7	≤3.7	≤1.4	---
Fe <sub>2</sub> O <sub>3</sub>	≤1.6	≤5.9	≤6.5	≤5.7	3 - 2
CaO	≤3.7	≤10	≤12.3	≤12.1	---
Alkalies	≤1	≤0.6	≤1	≤1	---
Na <sub>2</sub> O+K <sub>2</sub> O	---	---	---	---	1 - 3
volumetric density (g/cm <sup>3</sup> )	2.32	2.1	1.48	0.75	---

#### STORAGE

Gunning refractory mass (GRM™) should be stored in moisture-resistant 25 kg bags installed by the product manufacturer. The bags containing the dry powder mixture of GRM™ refractory should be stored in a covered warehouse away from moisture and direct sunlight. Throwing GRM™ bags during transportation should be avoided. Because it is possible that the granularity distribution will be messed up. In addition, no more than three pallets of Gunning refractory mass should be stacked on top of each other. Because, the mass may harden under pressure. In the best case, Gunning refractory mass (GRM™) can be stored for 8 months.

#### CAUTION

Users should observe good industrial and personal hygiene. The use of hardhats, proper footwear, and ear protection should be evaluated on a site-by-site basis. In situations where installation is occurring in water, flotation devices should be utilized. In general, installers of products should wear long-sleeve shirts and pants and use safety glasses/goggles and gloves to minimize skin contact. Measures such as washing after handling the material and before eating, drinking, and/or smoking, as well as routinely washing work clothing and protective equipment to remove contaminants, should be employed.

#### CLEANUP

Dispose of material in accordance with local disposal regulations. Uncured material can be removed with approved solvents. Cured materials can only be removed mechanically. In fact, the thinner can not completely clean the equipment, Therefore, acetone or ketone solution can be used to clean equipment.

#### FIRST AID

- In case of contact with skin, wash thoroughly with soap and water
- In case of contact with eyes, rinse immediately with plenty of water.
- Get out of space or use oxygen capsules if you have trouble breathing.
- Wash clothing before reuse

#### DISCLAIMER OF LIABILITY

AFZIR, LLC warrants its products to be free from manufacturing defects. Buyer determines suitability of product for use and assumes all risks. Buyer's sole remedy shall be limited to replacement of product. Any claim for breach of this warranty must be brought within six months of the date of purchase.

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