

PRODUCT BULLETIN



**ALLIED
MINERAL**
PRODUCTS, INC.

MINRO-SIL[®] RAM 1001

MINRO-SIL[®] RAM 1001 is a silica-based refractory designed for lining coreless induction furnaces. It is widely used for the low cost melting of gray, ductile and malleable iron in all types of iron foundry operations, ranging from periodic cold melting to continuous holding applications. In addition to being suitable for many iron alloys, such as ni-hard, ni-resist and chrome irons, MINRO-SIL[®] may also be used for selected high temperature nonferrous applications. Successful installations have been made in coreless induction furnaces of all sizes and in equipment made by all major furnace builders.

High density, trouble-free linings are readily achieved with MINRO-SIL[®] because of its closely controlled grain size distribution and bond content. This permits successful lining installations employing any one of several techniques utilizing vibrators, mechanical impacting tools or hand ramming.

MINRO-SIL[®] RAM 1001 is shipped as a dry granular mix with the boric acid or boron oxide bond preblended to your exact specification. It is ready for immediate use. Detailed installation and sintering procedures for MINRO-SIL[®] RAM 1001 are given in Allied Mineral Products' Procedure Bulletins CL-1, CL-2, CL-4, CL-13, CL-17, CL-18, CL-34, CL-44, CL-52, and CL-61. Contact your local Allied representative for a copy of the procedure bulletin appropriate for your application.

Typical Chemical Analysis

(Major Components without bond)

SiO ₂	99.0%	Material Required.....	2.15 g/cm ³ (134 lb./ft. ³)
Al ₂ O ₃	0.3%	Grain Size.....	4 mm (6 mesh) and finer
Fe ₂ O ₃	0.2%	Maximum Practical Use Temperature.....	1650°C (3000°F)
		Installation Method.....	Dry ram or vibrate

Packaged in 25 kg (55 lb.) multi-wall paper bags protected with stretch wrap. Also available in bulk packaging. Storage beyond 24 months is not recommended.

Sintering Data

First Hold Temperature: 1100°C (2000°F), for minimum 2 hours

Final Hold Temperature: 1600°C (2900°F), for minimum 1 hour

Sinter Rate: 110°C (200°F)/Hour

Form Type: Consumable

Allied Mineral Products, Inc. supplies an entire line of monolithic refractories for the metals industry. For more information or a complete evaluation of your refractory requirements, please contact your local Allied representative.

Warning: Contains crystalline silica and boron oxide or boric acid. The International Agency for Research on Cancer (IARC) has classified crystalline silica inhaled in the form of quartz or cristobalite carcinogenic to humans. Do not breathe dust as it may cause delayed lung injury, silicosis. Wear NIOSH approved respirator during installation, removal, and disposal of product to prevent inhalation of dust. Refer to Material Safety Data Sheet. In case of eye contact, flush immediately and repeatedly with water and consult a physician. For safest use and optimum performance, proper practices must be followed.

(SBO)

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MORE YOU SHOULD KNOW ABOUT MINRO-SIL[®]

Boric Acid/Boron Oxide Bond

Boric acid or boron oxide (anhydrous boric acid) is used to promote the sintering of MINRO-SIL linings. It is a strong flux and the amount added must be carefully measured and evenly distributed throughout the ramming mix. In the manufacture of MINRO-SIL, the bond is screened to eliminate any lumps, accurately weighed and blended in large batches, then conveniently packaged.

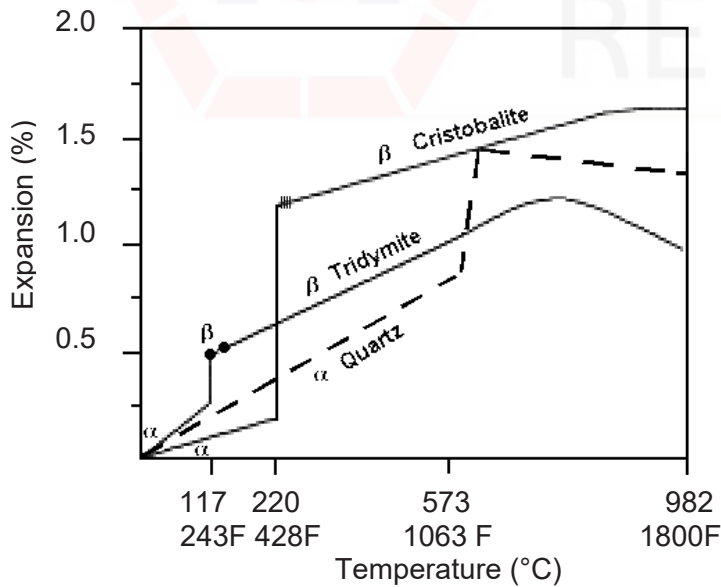
Crystal Transformations

	←————→	←————→
Crystal Form	Quartz ← 870°C (1598F) → Tridymite	← 1470°C (2678F) → Cristobalite
Density (g/cm³)	2.65	2.30 2.21

MINRO-SIL consists of high purity quartz. During service, these grains transform to tridymite and cristobalite with a very large increase in volume. This places the partially constricted lining under high compression, forcing the particles very tightly together and making MINRO-SIL refractory linings:

- **Dense**
- **Strong**
- **Resistant to metal attack**
- **Resistant to thermal shock**

Expansion of Silica Polymorphs



The low to high (α to β) temperature modifications of quartz, tridymite and cristobalite take place rapidly. Above 573°C (1063°F), the volume of all forms of silica remains relatively constant. This is why Minro-Sil linings show outstanding resistance to thermal spalling and cracking above this temperature. When a high percentage of tridymite and cristobalite is formed in the sintered lining, the furnace may be drained and cooled for close inspection without any difficulty.



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