

## Hicast® Super and Super R

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SDS: 111



### Product Description

Hicast Super is a 2800°F (1538°C) product containing a graded kaolin calcine aggregate. It is designed for internal or external high frequency vibration only. The densely packed structure produces low permeability and excellent abrasion resistance. Hicast Super has excellent resistance to alkali attack. A hand rammable version, Hicast Super R is available on special request.

### Features

- Provide 2 to 3 times greater strengths than standard monolithics with similar densities
- Superb resistances to abrasion or mechanical impact
- Excellent thermal shock resistance
- Resistant to slag or metal contact
- Stronger bond formed when heated
- Porosity rivals that of dense firebrick
- Resistant to alkali attack

### Instructions for Using

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). After adding the recommended amount of water, wet mix for 6 minutes. Place material within 30 minutes after mixing.

### 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 – 48 hours in a damp condition before initial heat-up. Keep freshly placed monolithic warm during cold weather, ideally between 60°F and 80°F (15°C and 27°C). New monolithic installations must be heated slowly the first time.

## Tri-Mor® Hicast® Super and Super R



| Monolithic Product Name                             | Hicast® Super  | Hicast Super R | Hicast 90      | Hicast 90TR    |
|---|----------------|----------------|----------------|----------------|
| Material method of installation                     | vibratory cast | vibratory cast | vibratory cast | vibratory cast |
| <b>Physical Properties</b>                          |                |                |                |                |
| Temperature use limit, °F                           | 2800           | 3100           | 3400           | 3200           |
| Temperature use limit, °C                           | 1538           | 1704           | 1871           | 1760           |
| Placement, average lb to place 1 ft <sup>3</sup>    | 140            | 145            | 182            | 179            |
| Placement, average kg to place 1 m <sup>3</sup>     | 64             | 66             | 83             | 82             |
| Pounds per bag, lb                                  | 55             | 55             | 55             | 55             |
| Pounds per bag, kg                                  | 25             | 25             | 25             | 25             |
| Shelf life, months                                  | 6              | 6              | 6              | 6              |
| <b>Water, %, recommended</b>                        |                |                |                |                |
| casting by vibrating                                | 5.4-6.2        | 4.7-5.5        | 4.4-5.0        | 4.0-4.8        |
| <b>Density, ASTM C 134, pcf</b>                     |                |                |                |                |
| fired @ 1500°F                                      | 134-144        | 139-145        | 178-189        | 173-185        |
| <b>Density, ASTM C 134, kg/m<sup>3</sup></b>        |                |                |                |                |
| fired @ 816°C                                       | 2146-2307      | 2224-2368      | 2851-3027      | 2772-2963      |
| <b>Abrasion loss, ASTM C 704, cc</b>                |                |                |                |                |
| fired @ 1500°F (816°C)                              | 8 -12          | 7 -11          | 5 - 8          | 4 - 6          |
| <b>Modulus of Rupture, MOR, ASTM C 133, psi</b>     |                |                |                |                |
| dried 24 hrs @ 220°F                                | 1200-2000      | 1200-2000      | 1600-2400      | -              |
| fired 5 hrs @ 1500°F                                | 1200-2000      | 1200-2000      | 1500-2100      | -              |
| <b>Modulus of Rupture, MOR, ASTM C 133, MPa</b>     |                |                |                |                |
| dried 24 hrs @ 104°C                                | 8.27-13.79     | 8.27-13.79     | 11-17          | -              |
| fired 5 hrs @ 816°C                                 | 8.27-13.79     | 8.27-13.79     | 10-14          | -              |
| <b>Hot Modulus of Rupture, MOR, ASTM C 583, psi</b> |                |                |                |                |
| 1500°F  | 1500-2500      | 1500-2500      | -              | -              |
| 2000°F  | 2000-3100      | 2000-3100      | -              | -              |
| 2250°F  | 700-1300       | 700-1300       | -              | -              |
| 2500°F  | 600-1050       | 600-1050       | -              | -              |
| <b>Hot Modulus of Rupture, MOR, ASTM C 583, MPa</b> |                |                |                |                |
| 816°C   | 10.3-17.2      | 10.3-17.2      | -              | -              |
| 1093°C  | 13.8-21.4      | 13.8-21.4      | -              | -              |
| 1232°C  | 4.8-9.0        | 4.8-9.0        | -              | -              |
| 1371°C  | 4.1-7.2        | 4.1-7.2        | -              | -              |

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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| Cold crushing strength, CCS, ASTM C 133, psi                    |              |              |              |              |
|---|--------------|--------------|--------------|--------------|
| dried 24 hrs @ 220°F  | 8000-11000   | 8000-11000   | 10000-14000  | 11000-19000  |
| fired 5 hrs @ 1500°F  | 8500-13000   | 8500-13000   | 11000-18000  | 13000-21000  |
| fired 5 hrs @ temperature use limit, °F                         | 10000-14000  | 10000-14000  | 13000-20000  | -            |
| Cold crushing strength, CCS, ASTM C 133, MPa                    |              |              |              |              |
| dried 24 hrs @ 104°C  | 55-76        | 55-76        | 69-97        | 76-131       |
| fired 5 hrs @ 816°C   | 59-90        | 59-90        | 76-124       | 90-145       |
| fired 5 hrs @ temperature use limit, °C                         | 69-96        | 69-96        | 90-138       | -            |
| Deformation under hot load, ASTM C 16, % @ 25 psi (0.17 MPa)    |              |              |              |              |
| dried 24 hrs @ 220°F (104°C)                                    | 1.4          | 1.4          | -0.6         | -            |
| Permanent Linear Shrinkage, ASTM C 113, %                       |              |              |              |              |
| dried 24 hrs @ 220°F (104°C)                                    | 0 to -0.2    | 0 to -0.2    | 0 to -0.2    | 0 to -0.1    |
| fired 5 hrs @ 1500°F (816°C)                                    | -0.1 to -0.3 | -0.1 to -0.3 | -0.1 to -0.3 | -0.1 to -0.3 |
| fired 5 hrs @ temperature use limit, °F (°C)                    | -0.5 to -1.5 | -0.5 to -1.5 | -0.5 to +0.5 | -0.5 to +0.5 |
| Chemical Analysis, % weight basis after firing                  |              |              |              |              |
| Alumina, Al <sub>2</sub> O <sub>3</sub>                         | 50           | 50           | 92           | 91           |
| Silica, SiO <sub>2</sub>  | 45           | 45           | 6.2          | 5.9          |
| Ferric Oxide, Fe <sub>2</sub> O <sub>3</sub>                    | 0.9          | 0.9          | 0.1          | 0.2          |
| Titanium Oxide, TiO <sub>2</sub>                                | 1.6          | 1.6          | -            | -            |
| Calcium Oxide + Magnesium Oxide, CaO + MgO                      | 2.0          | 2.0          | 1.2          | 1.9          |
| Alkalies as Na <sub>2</sub> O                                   | 0.5          | 0.5          | 0.4          | 0.4          |
| Thermal Conductivity, BTU-in/hr-ft <sup>2</sup> , per ASTM C201 |              |              |              |              |
| Mean Temperature @ 500°F  | 11.3         | 11.3         | 28.3         | -            |
| 1000°F  | 11.6         | 11.6         | 23           | -            |
| 1500°F  | 11.9         | 11.9         | 20           | -            |
| 2000°F  | 12.1         | 12.1         | 18.5         | -            |
| Thermal Conductivity, W/m-K, per ASTM C201                      |              |              |              |              |
| Mean Temperature @ 260°C  | 1.63         | 1.63         | 4.08         | -            |
| 538°C   | 1.67         | 1.67         | 3.32         | -            |
| 815°C   | 1.72         | 1.72         | 2.88         | -            |
| 1093°C  | 1.74         | 1.74         | 2.67         | -            |

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