

## Kaowool® Pumpables

Datasheet Code US: 5-14-1011

### Product Description

Kaowool Pumpables are water-based, pliable, putty-like materials composed of high temperature ceramic fibers, organic polymers, inorganic binders, and other proprietary ingredients. They are supplied premixed and ready to install from straight-sided 5-gallon pails using the HS-100 Extrusion or similar pump. Kaowool Pumpables can be used in hot or cold repairs of any deteriorated back-up insulation in ovens, furnaces, boilers, and process equipment, and as a hot-face repair of any cracks or gaps in existing refractory due to shrinkage. Kaowool Pumpables when dried form a hard rigid mass that provides good insulating properties, good strength and vibration resistance.

**Kaowool Pumpable** - Standard grade pumpable for applications up to 2000°F (1093°C)

**Kaowool Pumpable XTP** – A more fluid grade of pumpable for applications up to 2000°F (1093°C)

**Kaowool Pumpable HT** – High temperature grade for applications up to 2500°F (1371°C)

**Kaowool Pumpable HS** – An exceptionally strong and abrasion resistant refractory insulation for applications up to 2800°F (1538°C)

### Features

- Hot spot repair
- One-component pumpable
- Ready to use
- Good damming ability
- Highly insulating
- Four unique grades available
- Freeze/Thaw stable (except Kaowool Pumpable XTP)

### Applications

- Hot or cold repair to refractory backup insulation
- Hot or cold repair of boiler insulation, sidewalls, and penthouses
- Brick kiln crown and walls
- Coke oven jambs and seals

### Installation Information

Kaowool Pumpables are installed under pressure using pumping equipment such as the HS-100 Extrusion Pump. A back-pressure gauge is recommended when pumping Kaowool Pumpables to repair a backup lining. This will protect against damage to the hot face lining. The HS-100 Extrusion Pump is available for purchase and can also be rented on a weekly basis.

### Handling

Pails should be kept sealed to avoid hardening. Kaowool Pumpable XTP will be damaged if allowed to freeze. Normal shelf life is minimum six to twelve months depending on grade in unopened containers that have been properly stored.

| Mastics Product Name                                  | <u>Kaowool Pumpable</u> | <u>Kaowool Pumpable XTP</u> | <u>Kaowool Pumpable HT</u> | <u>Kaowool Pumpable HS</u> |
|---|-------------------------|-----------------------------|----------------------------|----------------------------|
| <b>Chemical Analysis, % weight basis after firing</b> |                         |                             |                            |                            |
| Alumina, Al <sub>2</sub> O <sub>3</sub>               | 39-43                   | 34                          | 43-47                      | 47-50                      |
| Silica, SiO <sub>2</sub>                              | 52-58                   | 66                          | 50-54                      | 47-50                      |
| Ferric oxide, Fe <sub>2</sub> O <sub>3</sub>          | -                       | -                           | -                          | 0.4-0.7                    |
| Other   | 3-5                     | -                           | 2-4                        | 2-4                        |

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|--|-------------------------|-----------------------------|----------------------------|----------------------------|
| Fiber Class                                | RCF                     | RCF                         | RCF                        | RCF                        |
| <b>Physical Properties</b>                 |                         |                             |                            |                            |
| Color                                      | off white               | off white                   | light brown                | light brown                |
| Continuous Use Temperature, °F             | 1900                    | 1900                        | 2400                       | 2800                       |
| Continuous Use Temperature, °C             | 1038                    | 1038                        | 1316                       | 1538                       |
| Classification Temperature, °F             | 2000                    | 2000                        | 2500                       | 2800                       |
| Classification Temperature, °C             | 1093                    | 1093                        | 1371                       | 1538                       |
| Density, dried @ 230°F, pcf                | 22-26                   | 34-40                       | 23-28                      | 70                         |
| Denisty, dried @ 110°C, kg/m <sup>3</sup>  | 352-416                 | 545-641                     | 368-448                    | 1121                       |
| Density, wet, pcf                          | 70-75                   | 70-75                       | 73-78                      | 100                        |
| Denisty, wet, kg/m <sup>3</sup>            | 1121-1201               | 1121-1201                   | 1169-1249                  | 1602                       |
| Yield, cubic ft / gal                      | 0.13                    | 0.13                        | 0.13                       | 0.13                       |
| Yield, cubic m / L                         | 0.004                   | 0.004                       | 0.004                      | 0.004                      |
| Shelf life, months                         | 6-12                    | 6-12                        | 6-12                       | 6-12                       |
| <b>Modulus of Rupture, MOR, dried, psi</b> |                         |                             |                            |                            |
| 230°F                                      | 156                     | -                           | -                          | 890                        |
| 1200°F                                     | 76                      | -                           | -                          | -                          |
| 1500°F                                     | 47                      | -                           | 74                         | -                          |
| 1800°F                                     | 67                      | -                           | -                          | -                          |
| 2000°F                                     | -                       | -                           | -                          | 530                        |
| 2250°F                                     | -                       | -                           | -                          | 300                        |
| 2550°F                                     | -                       | -                           | -                          | 410                        |
| <b>Modulus of Rupture, MOR, dried, MPa</b> |                         |                             |                            |                            |
| 110°C                                      | 1.08                    | -                           | -                          | 614                        |
| 649°C                                      | 0.52                    | -                           | -                          | -                          |
| 816°C                                      | 0.32                    | -                           | 0.51                       | -                          |
| 982°C                                      | 0.46                    | -                           | -                          | -                          |
| 1093°C                                     | -                       | -                           | -                          | 3.65                       |
| 1232°C                                     | -                       | -                           | -                          | 2.07                       |
| 1399°C                                     | -                       | -                           | -                          | 2.83                       |

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 Morgan Advanced Materials office to obtain current information. This product may be covered by one or more patents or foreign equivalents: A list of patent numbers is available upon request to Morgan Advance Materials plc.

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|--|-------------------------|-----------------------------|----------------------------|----------------------------|
| Compressive strength @ 5% deformation, dried, psi  |                         |                             |                            |                            |
| 230°F  | 27                      | -                           | -                          | 430                        |
| 1200°F   | 30                      | -                           | -                          | -                          |
| 1500°F   | 35                      | -                           | -                          | -                          |
| 1800°F   | 45                      | 75                          | -                          | -                          |
| 2000°F   | -                       | -                           | -                          | 280                        |
| 2250°F   | -                       | -                           | -                          | 270                        |
| 2550°F   | -                       | -                           | -                          | 270                        |
| Compressive strength @ 5% deformation, dried, MPa  |                         |                             |                            |                            |
| 110°C  | 0.19                    | -                           | -                          | 2.96                       |
| 649°C  | 0.21                    | -                           | -                          | -                          |
| 816°C  | 0.24                    | -                           | -                          | -                          |
| 982°C  | 0.31                    | 0.52                        | -                          | -                          |
| 1093°C   | -                       | -                           | -                          | 1.93                       |
| 1232°C   | -                       | -                           | -                          | 1.86                       |
| 1399°C   | -                       | -                           | -                          | 1.86                       |
| Compressive strength @ 10% deformation, dried, psi |                         |                             |                            |                            |
| 230°F  | 44                      | -                           | -                          | -                          |
| 1200°F   | 44                      | -                           | -                          | -                          |
| 1500°F   | 54                      | -                           | -                          | -                          |
| 1800°F   | 68                      | -                           | -                          | -                          |
| Compressive strength @ 10% deformation, dried, MPa |                         |                             |                            |                            |
| 110°C  | 0.3                     | -                           | -                          | -                          |
| 649°C  | 0.3                     | -                           | -                          | -                          |
| 816°C  | 0.37                    | -                           | -                          | -                          |
| 982°C  | 0.49                    | -                           | -                          | -                          |

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|--|-------------------------|-----------------------------|----------------------------|----------------------------|
| <b>Thermal Conductivity, BTU•in/hr•ft<sup>2</sup>, per ASTM C201</b> |                         |                             |                            |                            |
| 300°F  | -                       | 0.5                         | -                          | -                          |
| 500°F  | 0.5                     | -                           | 0.5                        | -                          |
| 700°F  | -                       | 0.7                         | -                          | -                          |
| 1000°F   | 0.7                     | -                           | 0.7                        | -                          |
| 1100°F   | -                       | 1.1                         | -                          | -                          |
| 1500°F   | 1                       | -                           | 1                          | -                          |
| <b>Thermal Conductivity, W/m•K, per ASTM C201</b>                    |                         |                             |                            |                            |
| 149°C  | -                       | 0.07                        | -                          | -                          |
| 260°C  | 0.07                    | -                           | 0.07                       | -                          |
| 371°C  | -                       | 0.1                         | -                          | -                          |
| 538°C  | 0.1                     | -                           | 0.1                        | -                          |
| 593°C  | -                       | 0.16                        | -                          | -                          |
| 816°C  | 0.14                    | -                           | 0.14                       | -                          |

### Availability

| <u>Products</u>      | <u>5 gallon pail</u> |
|----------------------|----------------------|
| Kaowool Pumpable     | X                    |
| Kaowool Pumpable XTP | X                    |
| Kaowool Pumpable HT  | X                    |
| Kaowool Pumpable HS  | X                    |

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