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# E-catalogue with Product Data Sheets

Morgan
Advanced Materials
THERMAL CERAMICS
Official Distributor

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# Thermal Ceramics at a Glance

## What differentiates us?

- Advanced material science and processing capabilities
- Our applications engineering experience
- A strong history of innovation and reinvention
- Consistent and reliable performance
- A truly global footprint
- We find and invest in the best people

## The markets we serve

### Petrochemical

Thermal Ceramics makes critical components for tough assignments in the global petrochemical industry.

### Transportation

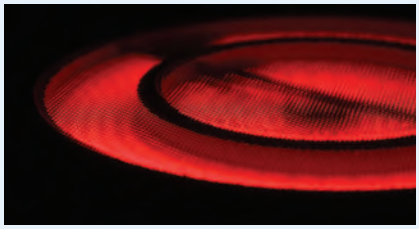
We make high-performance products to exacting standards for aerospace, automotive, marine and rail applications.

### Energy

Thermal Ceramics develops products for power distribution and generation from renewable and traditional sources and insulation materials for heat management.

### Fire Protection

We have developed passive fire protection products marketed as FireMaster®. Application solutions for marine, industrial, rail, road and tunnel, petrochemical and offshore.



### Consumer Goods

Thermal Ceramics has developed a range of thermal insulation materials for domestic appliances, small boilers and water heaters all of which deliver exceptional performance and value.

### Cement

We manufacture and install a wide range of insulation fibre and monolithic products and work with customers to develop the right solution to extend their kiln's life span or speed with advanced technology to reduce downtime.

### Ceramics and Glass

As a major producer of high temperature insulating products, Thermal Ceramics understands the firing conditions of this industry and the lining requirements placed upon our materials.

### Iron and Steel

Thermal Ceramics is uniquely positioned, technically and geographically, to offer a comprehensive range of advanced refractory engineered solutions for the complete iron and steel process.

### Aluminum

We provide the aluminum production and processing industry with the widest selection of refractories and high temperature insulating materials on the market.

The Thermal Ceramics business of Morgan Advanced Materials makes a range of fibre, refractory and microporous high temperature insulation products used to reduce energy consumption in demanding industrial processes.

We have extensive experience working with customers all over the world to engineer, design and install high performance insulation in operating environments from 500°C to 1750°C (932°F to 3200°F). We have a proven track record for helping customers to improve operational efficiency and respond to changing environmental pressures.

Thermal Ceramics produces a variety of market-leading brands including: Superwool® low biopersistent (LBP) insulating fibre, Pyro-Bloc® modules, WDS® and Min-K® microporous and JM™, K® and TJM™ insulating firebricks, Tri-Mor® monolithics and FireMaster® passive fire protection products.

Wherever you are in the world, our geographical coverage and engineering expertise ensures that you will be provided the highest levels of service and support, throughout the development and purchasing of your insulation solutions.

- **We deliver intelligently engineered insulation solutions to a wide variety of industries and market sectors**
- **Integrated approach, incorporating design, manufacture and installation**

Morgan is committed to expansive research and development ensuring that our products remain at the technical edge and continue to push boundaries.

**Global Footprint**
Thermal Ceramics has sales and operations in more than 30 countries and employs approximately 3,300 people.

Our extensive network of sales and distribution partners allows Thermal Ceramics to serve the global market with well supported regional personnel.

## Thermal Ceramics offers products and engineered systems for high-performance thermal management applications in a variety of industries world-wide

# Our products

Thermal Ceramics manufactures advanced ceramic materials, products and systems for thermal insulation in high-temperature environments.

Systems are designed for the safety of people and equipment in demanding applications, while products help customers, especially those operating energy-intensive processes, to reduce energy consumption, emissions and operating costs.

Thermal Ceramics products are used in high-temperature industrial processing of metals, petrochemicals, cement, ceramics and glass, and by manufacturers of equipment for aerospace, automotive, marine and domestic applications.

One of Thermal Ceramics' core strengths is the ability to address individual customer problems, using materials and application expertise to design, manufacture and install optimal thermal solutions.

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## Blanket
These highly versatile high temperature insulating fibre products are lightweight, have low thermal conductivity, low heat storage and excellent resistance to thermal shock. They are available in a variety of densities, chemistries, thicknesses and temperature capabilities.

## Bulk
A complete line of fibres each of which offers its own unique combination of properties. These bulk fibres are produced by varying composition, fibre length, compressed density, fibre content, fibre diameter and lubricity, available in chopped, un-chopped, lubricated and non-lubricated.

## Module and Log
A unique solution to high temperature insulation linings in industrial heaters, boilers and furnaces as well as many other applications. Blanket folded and stacked module systems are also available.

## Board and Shapes
The entire vacuum formed fibre line of Boards and Shapes are available as flexible or rigid products in a wide range of compositions and a variety of standard dimensions with tolerances which can be adapted to very demanding applications. The formulations are selected to optimize performances in each application and shapes can be produced according to customer design.

## Paper and Felt
Thin sheet products including millboard, paper and felt are suitable for a variety of insulation and filtration applications. Many special grades offer properties such as no binder outgassing, low shot content and high strength.

## Textiles
Textile products are made from highly textured forms of various fibres in both Superwool® fibre and Kao-Tex® using refractory ceramic fibre. Fibre yarns and other organic binders are converted into a wide variety of woven textile forms including cloth, ropes, packing and sleeving.

## Mastics
Mastic insulation from Thermal Ceramics complement our full line of refractory and insulation products. This extensive offering includes pumpables, moldable, cements, and coatings, and is manufactured specifically to aid in efficient furnace, kiln, and boiler operations.

## Fire Protection
Our FireMaster® brand of fire protection products are high performance materials that provide high quality, cost-effective fire-safe solutions that do not age, ensuring reliable fire protection when needed.

## Microporous insulation
Min-K®, and WDS® microporous high temperature insulation products for applications in aerospace, advanced technology and industrial.

## Firebrick, Insulating Firebrick (IFB) and Mortars
JM™, K®, TC® and TJM™ insulating Firebricks offer superior insulating properties, minimising energy use, combined with the ability to withstand chemical attack and high heat conditions. Mortars are available that are matched for use with the Thermal Ceramics IFB range.

## Insulating, Dense and Special Duty Monolithics
Tri-Mor®, Kaolite®, Firelite®, Kaocrete®, Firecrete® monolithics are market leaders in a full range of products for applications requiring high resistance to corrosion, abrasion and reducing atmospheres. They are particularly suited to applications where fast turn around of installation and repairs is important.

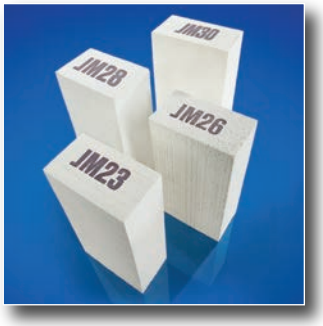
## Fired Refractory Shapes
High alumina, silicon carbide, fused silica and alumina-zirconia-silica compositions display excellent performance in highly abrasive applications. These materials offer excellent hot strengths and resistance to thermal shock and molten metals.

## Structural Block insulation
Our structural block insulation offers a wide range of structural insulation products used in many applications within the energy, industrial and aluminium industries.

Thermal Ceramics world leading products offer a diverse, strongly branded product range that combines quality with consistency and reliability

# Product materials

| Material types | Product form |
|---|---|
| **Fibre**<br>Low Biopersistent Fibres:<br>• Superwool®, FireMaster®<br>Refractory Ceramic Fibre (RCF):<br>• Kaowool®, Cera®<br>Polycrystalline Fibre (PCW):<br>• Denka® | Blanket, Bulk, Module, Log, Board, Shape, Paper, Felt, Mastic, Textile |
| **Fired refractory**<br>Firebrick<br>Insulating Firebrick (IFB):<br>• JM™, K® and TJM™ | Bricks, Shapes |
| Monolithics:<br>• Tri-Mor®, Kaolite®, Firelite®, Kaocrete®, Firecrete®, Kao-Tuff® | Cast, Gun, Ram, Vibratory |
| Crucibles<br>Fired shapes | Various chemistries |
| **Structural Block**<br>• TR-19™<br>• TR-20™ | Block |
| **Microporous**<br>• Min-K®<br>• WDS® | Flexible, Panel, Rigid |




Thermal Ceramics designs, manufactures and installs a broad range of thermal insulation products that reduce energy consumption and emissions in a variety of high temperature processing applications.

**In use high temperature insulation will:**

- Reduce greenhouse gas emissions
- Reduce energy usage
- Improve efficiency of furnaces and process equipment

Our product offering is extensive and covers application needs from industrial to commercial markets and is organized into the following categories, with available product forms, typical of the high temperature insulation industry.

**Thermal Ceramics High Temperature Insulation Wool (HTIW) from 600°C to 1600°C (1112°F up to 2912°F) includes:**

- Low Biopersistent fibre: **Superwool**
- Refractory Ceramic fibre: **Kaowool and Cera**
- Polycrystalline fibre: **Denka**

## Fibres

### Low Biopersistent fibres (LBP) - Superwool

Low biopersistent Superwool fibre has been developed to show improved high temperature characteristics required to act as an alternative to RCF where possible. The Superwool fibre family of products offer a versatile alternative to traditional insulation solutions for commercial, industrial, and transportation applications. Thermal Ceramics Superwool fibre patented technology is available in a variety of forms including blanket, bulk, boards, shapes, felt, paper, modules and mastic products.

**Benefits:**

- Excellent thermal stability and insulation properties
- Low thermal conductivity
- Flexible, resilient and immune to thermal shock
- Good resistance to tearing
- Low heat storage capacity
- Good sound absorption
- Exonerated from carcinogen classification within Europe and not classified as hazardous by IARC or under any national regulations on a global basis
- No requirement for warning labels under Globally Harmonized System for the classification and labeling of chemicals (GHS)

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### Refractory Ceramic Fibre (RCF)

RCF, also known as Alumino-Silicate Wools, is a highly versatile material which can be spun or blown into bulk and air-laid into blanket, folded into modules, converted into papers, boards, and shapes.

Thermal Ceramics fibre blanket products are available in a wide range of chemistries, are air laid into a continuous mat and mechanically needled for added strength and surface integrity.

**Benefits:**

- Excellent insulating performance
- Excellent thermal stability: fibres have good resistance to devitrification
- Low heat storage
- The combination of long spun fibres and the needling operation produce tough, resilient and strong blankets, which resist tearing both before and after heating
- Resistance to thermal shock
- Good acoustic properties
- No smoke emission due to binder burn out

### Polycrystalline Wool - PCW

Polycrystalline fibre is produced by sol-gel technology from aqueous spinning solutions and is suitable for use at application temperatures >1300°C (2372°F) and in critical chemical and physical application conditions.

**Benefits:**

- Defined dimensions
- Chemical and thermal stability
- Low linear shrinkage
- Low thermal mass and good insulating properties
- High tensile strength
- Very low shot content <1%
- Uniform fibre diameters average
- Lightweight
- High resilience

## Fired Refractory

Thermal Ceramics high temperature insulation refractories from 650°C to 1870°C (1200°F up to 3400°F) includes:

- **Firebrick and IFB: SR, K, JM, TJM**
- **Monolithics: Tri-Mor, Kaolite, Firelite, Kaocrete, Firecrete, Kao-Tuff**
- **Crucibles and Shapes: Cerox, Valcor**
- **Structural Block: TR**

Firebricks from Thermal Ceramics are available for temperature use up to 1788°C (3250°F) and marketed as SR-90® and SR-99®.

Insulating Firebricks (IFB) are manufactured with very low thermal conductivity and high hot load strengths. JM™, K® and TJM™ branded bricks have the ability to withstand chemical attack and high heat conditions. Both wet and dry mortars are available that are matched for use with our IFB range.

Fired Refractory Crucibles and Shapes are individually crafted as Cerox® and Valcor®. Crucibles and fired shapes hold up under harsh conditions. With various alumina-silica, silicon carbide, high-alumina and alumina silica-zirconia compositions, these materials offer excellent hot strengths and resistance to thermal shock and molten metals.

Monolithics are available in Insulating, Dense and Special Duty Monolithics. World recognised branding, the Tri-Mor® line of Kaocrete® dense monolithic has been proven ideal for applications that require strong, easy to place and economical materials. Tri-Mor Kaolite® insulating monolithics provide low thermal conductivity values, ease of installation and superior performance in petrochemical applications. The Tri-Mor line of special duty monolithics such as Kao-Tuff®, Plascast / Plasgun®, Kao-Tab®, Firelite® and Firecrete® feature specifically enhanced properties such as resistance to corrosion, abrasion and reducing atmospheres.

Structural Block insulation is marketed under the TR™ product offering manufactured from vermiculite and diatomaceous silica. The product can be made into exact customer specifications as boards or shapes.

## Microporous

Thermal Ceramics high temperature microporous insulation from 900°C to 1200°C (1650°F up to 2200°F) includes:

- **Aerospace, Advanced Technology, Critical Data Recorders: Min-K**
- **Industrial, Transportation, Commercial: WDS**

Microporous insulation is available under Min-K®, WDS® for technologically advanced applications in aerospace to industrial markets. Specially formulated and designed for applications such as ladle liner back-up insulation for Iron and Steel and board back-up insulation in Ethylene crackers. These lightweight, high compressive strength materials are the most thermally efficient insulation available.

# Albond® HS

Product Data Sheet

## Product Description

A bauxite based, coarse grained, low cement castable specifically developed for aluminium contact applications. Albond HS has an enhanced strength profile with improved abrasion and thermal shock resistance and provides excellent resistance to corundum growth.

| Properties | Albond HS |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1400 (2550) |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 2890 (180.4) |
| Water addition, % by weight | 4.7-5.2 |
| Maximum grain size, mm | 8 |
| Packaging in bags, kg (lb) | 25 (55) |



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# Albond® HS

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried, 110°C (230°F) | 2920 (182.2) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°F) | 120-160 (17400-23200) |
| after 5 hours firing, 1000°C (1832°F) | 160-200 (23200-29000) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours, 1000°C (1832°F) | -0.25 |
| after 5 hours, 1400°C (2550°F) | 0.7 |
| **Thermal conductivity, W/m•k (BTU•in./hr•ft²•°F), ASTM C201/417** | |
| 600°C (1112°F) | 2.3 (15.96) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 81 |
| Silica, $SiO_2$ | 11.5 |
| Ferric oxide, $Fe_2O_3$ | 1.2 |
| Calcium oxide, CaO | 2.6 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firecrete® 3X

Product Data Sheet

## Product Description

A high alumina, general purpose castable for service temperature up to 1650°C (3000°F). It has a good thermal shock resistance. It is recommended for casting burner blocks, door lining, car tops, crucible furnace linings and special shapes. Its high purity makes it suitable for special furnace atmospheres. A separate gunning version is also available.

| Properties | Firecrete 3X |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1650 (3000) |
| ASTM C401-91 Classification | E |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 2170 (135) |
| Water addition, % by weight | 11 |
| Maximum grain size, mm | 5 |
| Packaging in bags, kg (lb) | 25 (55) |





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# Firecrete® 3X

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried, 110°C (230°F) | 2190 (136.7) |
| after 5 hours firing, 815°C (1500°F) | 2150 (134.2) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°F) | 27.4 (3973) |
| after 5 hours firing, 815°C (1500°F) | 22.4 (3248) |
| after 5 hours firing, 1000°C (1832°F) | 16.7 (2421) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours, 815°C (1500°F) | -0.1 |
| after 5 hours, 1000°C (1832°F) | -0.1 |
| after 5 hours, 1600°C (2912°F) | 0.2 |
| **Thermal conductivity, W/m•k (BTU•in./hr•ft²•°F), ASTM C201/417** | |
| 400°C (752°F) | 0.94 (6.52) |
| 600°C (1112°F) | 0.945 (6.56) |
| 800°C (1472°F) | 0.965 (4.51) |
| 1000°C (1832°F) | 1.005 (6.97) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 54.47 |
| Silica, $SiO_2$ | 40.78 |
| Ferric oxide, $Fe_2O_3$ | 0.58 |
| Titanium oxide, $TiO_2$ | 1 |
| Calcium oxide, CaO | 2.87 |
| Barium oxide, BaO | 0.01 |
| Alkalis as, $MgO+K_2O+Na_2O$ | 0.47 |
| Ignition Loss | 0.2 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firecrete® 95

Product Data Sheet

## Product Description

A high purity casting concrete with very low iron and silica content for service above 1800°C (3270°F). Firecrete 95 has a very high strength and abrasion resistance. Firecrete 95 is used for general application in severe conditions; It is recommended for special atmospheres, particularly resistant to chemical attack in the ammonia production processes where hydrogen atmospheres are encountered.

| Properties | Firecrete 95 |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1800 (3270) |
| ASTM C401-91 Classification | G |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 2570 (160) |
| Water addition, % by weight | 10 |
| Maximum grain size, mm | 3 |
| Packaging in bags, kg (lb) | 25 (55) |





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# Firecrete® 95

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried, 110°C (230°F) | 2620 (163.5) |
| after 5 hours firing, 815°C (1500°F) | 2550 (159.1) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°F) | 75.8 (10991) |
| after 5 hours firing, 815°C (1500°F) | 72.8 (10556) |
| after 5 hours firing, 1000°C (1832°F) | 60.8 (8816) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours, 815°C (1500°F) | -0.1 |
| after 5 hours, 1000°C (1832°F) | -0.1 |
| after 5 hours, 1600°C (2912°F) | -0.3 |
| **Thermal conductivity, W/m•K (BTU•in./hr•ft²•°F), ASTM C201/417** | |
| 400°C (752°F) | 1.69 (11.73) |
| 600°C (1112°F) | 1.63 (11.31) |
| 800°C (1472°F) | 1.55 (10.75) |
| 1000°C (1832°F) | 1.44 (9.99) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 95.5 |
| Silica, $SiO_2$ | <0.1 |
| Ferric oxide, $Fe_2O_3$ | <0.1 |
| Titanium oxide, $TiO_2$ | Trace |
| Calcium oxide, CaO | 4.9 |
| Alkalis as, $MgO+K_2O+Na_2O$ | 0.44 |
| Ignition Loss | 0.5 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firecrete® HT

Product Data Sheet

## Product Description

A low cost, high alumina castable for temperatures up to 1540°C (2800°F). It is suitable for door linings, burner blocks, boilers and all types of furnace lining. A separate gunning version is also available.

| Properties | Firecrete HT |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1540 (2800) |
| ASTM C401-91 Classification | D |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 1950 (122) |
| Water addition, % by weight | 14 |
| Maximum grain size, mm | 5 |
| Packaging in bags, kg (lb) | 25 (55) |





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# Firecrete® HT

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried, 110°C (230°F) | 1980 (123.6) |
| after 5 hours firing, 815°C (1500°F) | 1900 (118.6)) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°F) | 26.9 (3900) |
| after 5 hours firing, 815°C (1500°F) | 17.4 (2523) |
| after 5 hours firing, 1000°C (1832°F) | 9.8 (1421) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours, 815°C (1500°F) | -0.2 |
| after 5 hours, 1000°C (1832°F) | -0.2 |
| **Thermal conductivity, W/m•K (BTU•in./hr•ft²•°F), ASTM C201/417** | |
| 400°C (752°F) | 0.64 (4.44) |
| 600°C (1112°F) | 0.73 (5.06) |
| 800°C (1472°F) | 0.81 (5.62) |
| 1000°C (1832°F) | 0.92 (6.38) |
| 1200°C (2192°F) | 1.01 (7.01) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 49.73 |
| Silica, $SiO_2$ | 43.43 |
| Ferric oxide, $Fe_2O_3$ | 0.88 |
| Titanium oxide, $TiO_2$ | 1.37 |
| Calcium oxide, CaO | 4.24 |
| Barium oxide, BaO | 0.02 |
| Alkalis as, $MgO+K_2O+Na_2O$ | 0.52 |
| Ignition Loss | 0.132 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firecrete® STD

Product Data Sheet

## Product Description

A versatile high strength, general purpose concrete, for casting and gunning applications up to 1400°C (2550°F). It is especially recommended for boilers, door lining, furnace floor lining, car tops.

| Properties | Firecrete STD |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast / Gun |
| Maximum Service Temperature, °C (°F) | 1400 (2550) |
| ASTM C401-91 Classification | C |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 1980 (124) |
| Water addition, % by weight | 14 |
| Maximum grain size, mm | 5 |
| Packaging in bags, kg (lb) | 25 (55) |





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# Firecrete® STD

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried, 110°C (230°F) | 2090 (130.4) |
| after 5 hours firing, 815°C (1500°F) | 1970 (122.9) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°F) | 41.4 (6003) |
| after 5 hours firing, 815°C (1500°F) | 28.9 (4190) |
| after 5 hours firing, 1000°C (1832°F) | 22.5 (3262) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours, 815°C (1500°F) | -0.2 |
| after 5 hours, 1000°C (1832°F) | -0.2 |
| **Thermal conductivity, W/m•K (BTU•in./hr•ft²•°F), ASTM C201/417** | |
| 400°C (752°F) | 0.73 (5.06) |
| 600°C (1112°F) | 0.78 (5.41) |
| 800°C (1472°F) | 0.82 (5.69) |
| 1000°C (1832°F) | 0.85 (5.90) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 44.75 |
| Silica, $SiO_2$ | 38.26 |
| Ferric oxide, $Fe_2O_3$ | 4.81 |
| Titanium oxide, $TiO_2$ | 1.9 |
| Calcium oxide, CaO | 9.96 |
| Barium oxide, BaO | 0.03 |
| Alkalis as, $MgO+K_2O+Na_2O$ | 0.62 |
| Ignition Loss | 0.676 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 14

Product Data Sheet

## Product Description

Insulating castable for service up to 1200°C (2190°F) to be installed by casting application. Combines good strength and low thermal conductivity. Particularly recommended for convection zone, ducts and stacks in petrochemical heaters. Can be used in applications similar to those described by UOP 2-17-0. Conforms to class P, ASTM classification C-401-91.

A separate product data sheet is available for the gunning version.

| Properties | Firelite 14 |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1200 (2190) |
| ASTM C401-91 Classification | P |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 1060 (66.16) |
| Water addition, % by weight | 36 |
| Maximum grain size, mm | 8 |
| Packaging by weight, kg (lb) | 25 (55) |





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# Firelite® 14

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried, 110°C (230°F) | 1114 (69.5) |
| after 5 hours firing, 815°C (1500°F) | 1060 (66.1) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°C) | 9.7 (1406.5) |
| after 5 hours firing, 815°C (1500°F) | 7.5 (1087.5) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours firing, 815°C (1500°F) | -0.2 |
| after 5 hours firing, 1100°C (2010°F) | -0.2 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$•°F), ASTM C201/417** | |
| 200°C (392°F) | 0.24 (1.67) |
| 400°C (752°C) | 0.26 (1.80) |
| 600°C (1112°F) | 0.29 (2.01) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 30.6 |
| Silica, $SiO_2$ | 39.7 |
| Calcium Oxide, CaO | 16.4 |
| Ferric Oxide, $Fe_2O_3$ | 7.2 |
| Titanium Oxide, $TiO_2$ | 1.0 |
| Alkali as, $MgO+K_2O+Na_2O$ | 4.1 |
| Ignition Loss | 0.3 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 20X

Product Data Sheet

## Product Description

An insulating lightweight concrete for service up to 1230°C (2250°F) to be installed by casting application. It has the lowest thermal conductivity in the Firelites 20 family, it is generally recommended for petrochemical floor and doors working lining in both radiant and convection section where is challenging to achieve cold face T requested. It conforms to class N,O and P of ASTM C401-91.

A separate product data sheet is available for the gunning version.

| Properties | Firelite 20X |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1230 (2250) |
| ASTM C401-91 Classification | N, O, P |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 820 (51.18) |
| Water addition, % by weight | 78 |
| Maximum grain size, mm | 8 |
| Packaging in bags, kg (lb) | 25 (55) |





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# Firelite® 20X

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried, 110°C (230°F) | 880 (54.91) |
| after 5 hours firing, 815°C (1500°F) | 820 (51.17) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 1.7 (246.5) |
| after 5 hours firing, 815°C (1500°F) | 1.4 (203) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.2 |
| after 5 hours firing, 1000°C (1832°F) | -0.3 |
| after 5 hours firing, 1100°C (2012°F) | -0.4 |
| after 5 hours firing, 1200°C (2192°F) | -0.6 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$)** | |
| 200°C (392°F) | 0.15 (1.04) |
| 400°C (752°C) | 0.16 (1.11) |
| 600°C (1112°F) | 0.17 (1.18) |
| 800°C (1472°F) | 0.18 (1.25) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 38.3 |
| Silica, $SiO_2$ | 35.1 |
| Calcium Oxide, CaO | 20.7 |
| Ferric Oxide, $Fe_2O_3$ | 4.6 |
| Titanium Oxide, $TiO_2$ | 0.8 |
| Alkali as, $MgO+K_2O+Na_2O$ | 1.6 |
| Ignition Loss | 0.3 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 95

Product Data Sheet

## Product Description

A high purity castable with low iron and low silica content for service up to 1760°C (3200°F). It combines very high refractoriness with low thermal conductivity. Recommended for burner blocks in thin walls and for special atmospheres; particularly resistant to chemical attack in ammonia production processes where hydrogen atmospheres are encountered. Conforms to class V of ASTM classification C-401-91.

| Properties | Firelite 95 |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1760 (3200) |
| ASTM C401-91 Classification | V |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 1690 (105.48) |
| Water addition, % by weight | 16 |
| Maximum grain size, mm | 5 |
| Packaging by weight, kg (lb) | 25 (55) |





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# Firelite® 95

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried, 110°C (230°F) | 1730 (108.0) |
| after 5 hours firing, 815°C (1500°F) | 1690 (105.5) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 18.5 (2682.5) |
| after 5 hours firing, 815°C (1500°F) | 11.3 (1638.5) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.1 |
| After 5 hours firing, 1000°C (1832°F) | -0.1 |
| after 5 hours firing, 1200°C (2192°F) | -0.2 |
| after 5 hours firing, 1400°C (2550°F) | -0.2 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$)** | |
| 400°C (752°F) | 0.93 (6.45) |
| 600°C (1112°C) | 0.84 (5.83) |
| 800°C (1472°F) | 0.79 (5.48) |
| 1000°C (1832°F) | 0.78 (5.41) |
| 1200°C (2192°F) | 0.77 (5.34) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 95.4 |
| Silica, $SiO_2$ | 0.4 |
| Calcium Oxide, CaO | 4.9 |
| Ferric Oxide, $Fe_2O_3$ | 0.1 |
| Titanium Oxide, $TiO_2$ | 0.06 |
| Alkali as, $MgO+K_2O+Na_2O$ | 0.3 |
| Ignition Loss | 0.31 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 105

Product Data Sheet

## Product Description

A very light insulating concrete, for service up to 1100°C (2010°F), to be installed by casting. It is recommended for applications requiring very low density and thermal conductivity, such as general high temperature backup insulation as radiant and convection section in petrochemical heaters. It conforms to class N ASTM C401-91.

| Properties | Firelite 105 |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1100 (2010) |
| ASTM C401-91 Classification | N |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 622 (38.8) |
| Water addition, % by weight | 88 |
| Maximum grain size, mm | 3 |
| Packaging in bags, kg (lb) | 20 (44) |





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# Firelite® 105

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried @ 110°C (230°F) | 710 (44.3) |
| after 5 hours firing @ 815°C (1500°F) | 620 (38.7) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 2.2 (319) |
| after 5 hours firing, 815°C (1500°F) | 1.6 (232) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.5 |
| after 5 hours firing, 1000°C (1832°F) | -1.0 |
| **Thermal conductivity, W/m•K (BTU•in./hr•ft²•°F)** | |
| 200°C (392°F) | 0.13 (0.90) |
| 400°C (752°C) | 0.15 (1.04) |
| 600°C (1112°F) | 0.17 (1.18) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 38.0 |
| Silica, $SiO_2$ | 22.1 |
| Calcium Oxide, CaO | 22.2 |
| Ferric Oxide, $Fe_2O_3$ | 10.2 |
| Titanium Oxide, $TiO_2$ | 1.3 |
| Alkali as, $MgO+K_2O+Na_2O$ | 6.2 |
| Ignition Loss | 2.2 |

### Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 105L

Product Data Sheet

## Product Description

A very light insulating concrete, for service up to 1100°C (2010°F), to be installed by casting; it is the lighter version of Firelite 105 and a separate gunning version is also available. It is recommended for applications requiring very low density and thermal conductivity, such as general high temperature backup insulation. It conforms to class N ASTM C401-91.

| Properties | Firelite 105L |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1100 (2010) |
| ASTM C401-91 Classification | N |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 622 (38.8) |
| Water addition, % by weight | 95 |
| Maximum grain size, mm | 8 |
| Packaging in bags, kg (lb) | 20 (44.09) |





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# Firelite® 105L

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried @ 110°C (230°F) | 674 (42.0) |
| after 5 hours firing @ 815°C (1500°F) | 598 (37.3) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 1.6 (232) |
| after 5 hours firing, 815°C (1500°F) | 1.1 (159.5) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.5 |
| after 5 hours firing, 1000°C (1832°F) | -1.1 |
| **Thermal conductivity, W/m•K (BTU•in./hr•ft²•°F)** | |
| 200°C (392°F) | 0.12 (0.83) |
| 400°C (752°C) | 0.13 (0.90) |
| 600°C (1112°F) | 0.14 (0.97) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 35.9 |
| Silica, $SiO_2$ | 24.0 |
| Calcium Oxide, CaO | 24.1 |
| Ferric Oxide, $Fe_2O_3$ | 9.4 |
| Titanium Oxide, $TiO_2$ | 1.2 |
| Alkali as, $MgO+K_2O+Na_2O$ | 5.7 |
| Ignition Loss | 2.8 |

### Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 124L

Product Data Sheet

## Product Description

An insulating lightweight concrete for service up to 1100°C (2010°F), to be installed by casting. It is the lighter version of Firelite 124 with better insualting performances. It is recommended for applications requiring low thermal conductivity and relatively high mechanical strength, such as working and backup linings in radiant and convection zones in petrochemical heaters, as well as waste gas ducts and stacks. It conforms to ASTM C401-91, class O and P and to application described into UOP-2-19-0.

| Properties | Firelite 124L |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1100 (2010) |
| ASTM C401-91 Classification | O, P |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 860 (53.67) |
| Water addition, % by weight | 50 |
| Maximum grain size, mm | 8 |
| Packaging in bags, kg (lb) | 20 (44) |





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# Firelite® 124L

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried, 110°C (230°F) | 960 (59.9) |
| after 5 hours firing, 815°C (1500°F) | 860 (53.7) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 4.5 (652.5) |
| after 5 hours firing, 815°C (1500°F) | 3.4 (493) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.2 |
| after 5 hours firing, 1000°C (1832°F) | -0.4 |
| after 5 hours firing, 1100°C (2012°F) | -0.6 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$)** | |
| 200°C (392°F) | 0.21 (1.45) |
| 400°C (752°C) | 0.21 (1.45) |
| 600°C (1112°F) | 0.22 (1.53) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 32.5 |
| Silica, $SiO_2$ | 34.1 |
| Calcium Oxide, CaO | 18.8 |
| Ferric Oxide, $Fe_2O_3$ | 8.9 |
| Titanium Oxide, $TiO_2$ | 1.1 |
| Alkali as, $MgO+K_2O+Na_2O$ | 4.6 |
| Ignition Loss | 1.2 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 1230

Product Data Sheet

## Product Description

A good general purpose medium weight concrete for service up to 1230°C (2250°F), to be installed by casting or gunning. Recommended for convection zone, ducts and stacks in petrochemical heaters. Conforms to classes P and Q of ASTM classification C-401-91.

A separate product data sheet is available for the gunning version.

| Properties | Firelite 1230 |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1230 (2250) |
| ASTM C401-91 Classification | P, Q |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 1110 (69.28) |
| Water addition, % by weight | 53 |
| Maximum grain size, mm | 8 |
| Packaging by weight, kg (lb) | 30 (66) |





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# Firelite® 1230

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried, 110°C (230°F) | 1150 (71.8) |
| after 5 hours firing, 815°C (1500°F) | 1100 (68.6) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 4.3 (623.5) |
| after 5 hours firing, 815°C (1500°F) | 3.2 (464) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.3 |
| after 5 hours firing, 1200°C (2192°F) | -0.6 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$)** | |
| 200°C (392°F) | 0.22 (1.53) |
| 400°C (752°C) | 0.24 (1.67) |
| 600°C (1112°F) | 0.26 (1.80) |
| 800°C (1472°F) | 0.28 (1.94) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 31.2 |
| Silica, $SiO_2$ | 30.5 |
| Calcium Oxide, CaO | 21.6 |
| Ferric Oxide, $Fe_2O_3$ | 10.5 |
| Titanium Oxide, $TiO_2$ | 1.3 |
| Alkali as, $MgO+K_2O+Na_2O$ | 4.9 |
| Ignition Loss | 0.9 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 2300VLI G

Product Data Sheet

## Product Description

A very low iron and highly insulating castable offering service up to 1260°C (2300°F), to be installed by gunning. Recommended for controlled atmosphere heat treatment furnaces where extremely low thermal conductivity is required. Also used as back-up insulation in ammonia production processes. Conforms to class P and Q of ASTM classification C-401-91.

A separate product data sheet is available for the casting version.

| Properties | Firelite 2300VLI G |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Gun |
| Maximum Service Temperature, °C (°F) | 1260 (2300) |
| ASTM C401-91 Classification | P, Q |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 978 (61.04) |
| Water addition, % by weight | 65 |
| Maximum grain size, mm | 8 |
| Packaging by weight, kg (lb) | 25 (55) |





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# Firelite® 2300VLI G

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried, 110°C (230°F) | 1080 (67.4) |
| after 5 hours firing, 815°C (1500°F) | 944 (58.9) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 5.3 (768.5) |
| after 5 hours firing, 815°C (1500°F) | 4.2 (609) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.2 |
| after 5 hours firing, 1200°C (2192°F) | -0.4 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$)** | |
| 200°C (392°F) | 0.22 (1.53) |
| 400°C (752°C) | 0.25 (1.73) |
| 600°C (1112°F) | 0.27 (0.87) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 47.99 |
| Silica, $SiO_2$ | 31.74 |
| Calcium Oxide, CaO | 18.48 |
| Ferric Oxide, $Fe_2O_3$ | 0.66 |
| Titanium Oxide, $TiO_2$ | 0.32 |
| Alkali as, $MgO+K_2O+Na_2O$ | 1.34 |
| Ignition Loss | 1.25 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 2300VLI

Product Data Sheet

## Product Description

A very low iron and highly insulating castable offering service up to 1260°C (2300°F), to be installed by casting. Recommended for controlled atmosphere heat treatment furnaces where extremely low thermal conductivity is required. Also used as back-up insulation in ammonia production processes. Conforms to class O,P and Q of ASTM classification C-401-91.

A separate product data sheet is available for the gunning version.

| Properties | Firelite 2300VLI |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1260 (2300) |
| ASTM C401-91 Classification | O, P, Q |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 860 (53.67) |
| Water addition, % by weight | 75 |
| Maximum grain size, mm | 8 |
| Packaging by weight, kg (lb) | 25 (55) |





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# Firelite® 2300VLI

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried, 110°C (230°F) | 930 (58) |
| after 5 hours firing, 815°C (1500°F) | 860 (53.7) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 3.1 (449.5) |
| after 5 hours firing, 815°C (1500°F) | 2.4 (348) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.1 |
| after 5 hours firing, 1200°C (2192°F) | -0.3 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$)** | |
| 200°C (392°F) | 0.18 (1.25) |
| 400°C (752°C) | 0.19 (1.32) |
| 600°C (1112°F) | 0.20 (1.39) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 51.4 |
| Silica, $SiO_2$ | 30.5 |
| Calcium Oxide, CaO | 16.9 |
| Ferric Oxide, $Fe_2O_3$ | 0.6 |
| Titanium Oxide, $TiO_2$ | 0.4 |
| Alkali as, $MgO+K_2O+Na_2O$ | 1.2 |
| Ignition Loss | 0.8 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 2500

Product Data Sheet

## Product Description

A low lime, high alumina concrete for service up to 1370°C (2500°F). It combines good strength with very low thermal conductivity. It can be cast or gunned. Particularly recommended for arches, convection zones and ducts in petrochemical heaters. Also used for furnaces doors and covers, kiln car tops, etc. Conforms to class R of ASTM classification C-401-91 .

| Properties | Firelite 2500 |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1370 (2500) |
| ASTM C401-91 Classification | R |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 1330 (83) |
| Water addition, % by weight | 40 |
| Maximum grain size, mm | 6 |
| Packaging, kg (lb) | 30 (66) |





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# Firelite® 2500

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried @ 110°C (230°F) | 1420 (88.6) |
| after 5 hours firing @ 815°C (1500°F) | 1315 (82.1) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°C) | 7.9 (1145.5) |
| after 5 hours firing, 815°C (1500°F) | 6.6 (957) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours firing, 815°C (1500°F) | -0.1 |
| **Thermal conductivity, W/m•K (BTU•in./hr•ft²•°F), ASTM C201/417** | |
| 200°C (392°F) | 0.38 (2.64) |
| 400°C (752°C) | 0.39 (2.71) |
| 600°C (1112°F) | 0.39 (2.71) |
| 800°C (1472°F) | 0.40 (2.78) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 49.2 |
| Silica, $SiO_2$ | 30.9 |
| Calcium Oxide, CaO | 10.9 |
| Ferric Oxide, $Fe_2O_3$ | 4.9 |
| Titanium Oxide, $TiO_2$ | 1.0 |
| Alkali as, $MgO+K_2O+Na_2O$ | 1.2 |

### Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 2500HS

Product Data Sheet

## Product Description

A low lime, high alumina concrete for service up to 1370°C (2500°F). It combines an high strength with low thermal conductivity. Particularly recommended for arches, convection zones and ducts in petrochemical heaters. Also used for furnaces doors and covers, kiln car tops, etc. Conforms to class R of ASTM classification C-401-91.

| Properties | Firelite 2500HS |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1370 (2500) |
| ASTM C401-91 Classification | R |
| Estimated weight of dry material/ $m^3$ of construction, kg (lb) | 1422 (89) |
| Water addition, % by weight | 34 |
| Maximum grain size, mm | 6 |



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# Firelite® 2500HS

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried @ 110°C (230°F) | 1540 (96.1) |
| after 5 hours firing @ 815°C (1500°F) | 1425 (88.9) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°C) | 12.2 (1769) |
| after 5 hours firing, 815°C (1500°F) | 8.7 (1261) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours firing, 815°C (1500°F) | -0.2 |
| **Thermal conductivity, W/m•K (BTU•in./hr•ft²•°F), ASTM C201/417** | |
| 200°C (392°F) | 0.40 (2.78) |
| 400°C (752°C) | 0.48 (3.33) |
| 600°C (1112°F) | 0.53 (3.68) |
| 800°C (1472°F) | 0.55 (3.82) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 47.7 |
| Silica, $SiO_2$ | 33.5 |
| Calcium Oxide, CaO | 11.5 |
| Ferric Oxide, $Fe_2O_3$ | 5.1 |
| Titanium Oxide, $TiO_2$ | 1.2 |
| Alkali as, $MgO+K_2O+Na_2O$ | 1.1 |

### Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 2600LI

Product Data Sheet

## Product Description

A low iron insulating castable for service up to 1430°C (2600°F), to be installed by casting. Recommended for controlled atmosphere heat treatment furnaces. This concrete gives excellent results as back up insulation in transfer line and secondary reformers in ammonia production processes. Conforms to class Q and R of ASTM classification C-401-91.

A gunning version is also available.

| Properties | Firelite 2600LI |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1430 (2600) |
| ASTM C401-91 Classification | Q, R |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 1140 (71.15) |
| Water addition, % by weight | 47 |
| Maximum grain size, mm | 6 |
| Packaging by weight, kg (lb) | 30 (66) |





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# Firelite® 2600LI

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried, 110°C (230°F) | 1230 (76.8) |
| after 5 hours firing, 815°C (1500°F) | 1140 (71.1) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 6.3 (913.5) |
| after 5 hours firing, 815°C (1500°F) | 4.5 (652.5) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.2 |
| after 5 hours firing, 1200°C (2192°F) | -0.5 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$)** | |
| 200°C (392°F) | 0.38 (2.64) |
| 400°C (752°C) | 0.38 (2.64) |
| 600°C (1112°F) | 0.38 (2.64) |
| 800°C (1472°F) | 0.39 (2.71) |
| 1000°C (1832°F) | 0.39 (2.71) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 61.6 |
| Silica, $SiO_2$ | 28.7 |
| Calcium Oxide, CaO | 8.0 |
| Ferric Oxide, $Fe_2O_3$ | 0.7 |
| Titanium Oxide, $TiO_2$ | 0.3 |
| Alkali as, $MgO+K_2O+Na_2O$ | 1.4 |
| Ignition Loss | 0.9 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® 2800LI

Product Data Sheet

## Product Description

A low iron and low lime insulating castable for service up to 1540°C (2800°F) in controlled atmosphere applications. Recommended for casting monolithic shapes and furnace linings where good insulation and light weight are necessary

| Properties | Firelite 2800LI |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1540 (2800) |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 1350 (84.3) |
| Water addition, % by weight | 38 |
| Maximum grain size, mm | 6 |
| Packaging by weight, kg (lb) | 30 (66) |





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# Firelite® 2800LI

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried, 110°C (230°F) | 1430 (89.2) |
| after 5 hours firing, 815°C (1500°F) | 1340 (83.9) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°C) | 10.0 (1450) |
| after 5 hours firing, 815°C (1500°F) | 6.0 (870) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours firing, 815°C (1500°F) | -0.1 |
| after 5 hours firing, 1200°C (2192°F) | -0.2 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$•°F), ASTM C201/417** | |
| 200°C (392°F) | 0.35 (2.43) |
| 400°C (752°C) | 0.40 (2.78) |
| 600°C (1112°F) | 0.44 (3.05) |
| 800°C (1472°F) | 0.48 (3.33) |
| 1000°C (1832°F) | 0.53 (3.68) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 78.3 |
| Silica, $SiO_2$ | 13.0 |
| Calcium Oxide, CaO | 7.3 |
| Ferric Oxide, $Fe_2O_3$ | 0.4 |
| Titanium Oxide, $TiO_2$ | 0.2 |
| Alkali as, $MgO+K_2O+Na_2O$ | 0.8 |
| Ignition Loss | 0.5 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Firelite® LOD SWHT

Product Data Sheet

## Product Description

An insulating concrete based on low bio-persistent fibres for service up to 1200°C (2200°F), expressly designed to withstand thermal shock; it has extremely low thermal conductivity.

Particularly recommended for the following applications: by casting: special shapes to complete fibre lining of heaters and furnaces; kiln car tops for rapid firing in ceramic industry; by trowelling: lining of launders and distributors in primary aluminium industry; lining of ladles in secondary aluminium industry.

| Properties | Firelite LOD SWHT |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of Application | Cast |
| Maximum Service Temperature, °C (°F) | 1200 (2200) |
| Estimated weight of dry material/$m^3$ of construction, kg (lb) | 948 (59.2) |
| Water Addition, % by weight | 72 |
| Maximum grain size, mm | 10 |
| Packaging in bags, kg (lb) | 25 (55) |





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# Firelite® LOD SWHT

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf)** | |
| oven dried, 110°C (230°F) | 1030 (64.27) |
| after 5 hours firing, 815°C (1500°F) | 940 (58.66) |
| **Cold crushing strength, MPa (psi)** | |
| oven dried, 110°C (230°C) | 2.2 (319) |
| after 5 hours firing, 815°C (1500°F) | 1.8 (261) |
| **Permanent linear change, %** | |
| after 5 hours firing, 815°C (1500°F) | -0.3 |
| **Thermal conductivity, W/m•K (BTU•in/hr•ft$^2$)** | |
| 200°C (392°F) | 0.17 (1.18) |
| 400°C (752°C) | 0.20 (1.69) |
| 600°C (1112°F) | 0.22 (1.53) |
| 800°C (1472°F) | 0.24 (1.67) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 35.7 |
| Silica, $SiO_2$ | 38.84 |
| Calcium Oxide, CaO | 19.77 |
| Ferric Oxide, $Fe_2O_3$ | 2.97 |
| Alkali as, $MgO+K_2O+Na_2O$ | 1.39 |
| Titanium Oxide, $TiO_2$ | 0.85 |

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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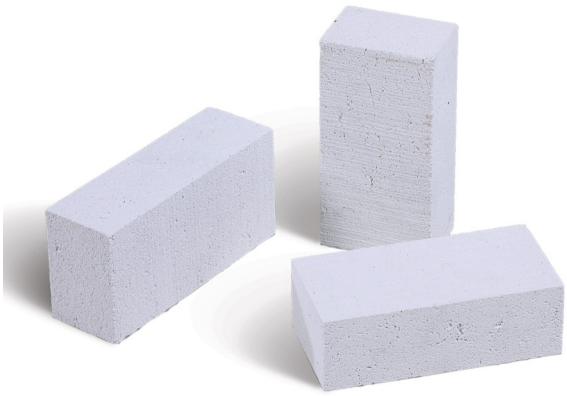
# IFB Insulation 1350 to 1650°C

Product Data Sheet



## Product Description

The Insulation Range of IFB for applications where temperatures are 1350°C - 1650°C (2450°F - 3000°F) includes JM™25, K®25, K26, JM26, JM28, JM30 and JM30 HA.

The IFB range is manufactured via cast (K®) and slinger (JM™) processes, is a market leader in applications such as Petrochemical and Ceramics where the ability to operate in environments above 1000°C (1800°F) is critical. The range also provides low thermal conductivity due its unique manufacturing process.

Our IFBs deliver energy savings for multiple markets and our global manufacturing footprint enables Morgan to meet your regional and global application demands.

## Features

- Produced mainly by slinger process, our IFB's have stronger mechanical properties while maintaining some of the lowest thermal conductivity on the market
- The light weight and low thermal conductivity reduce heat absorption, producing significant energy savings and reducing emissions
- Low iron and alkali flux content gives high refractoriness under load in operating conditions
- Available in multiple sizes, up to 700 mm (27½") in length, which can be machined into special shapes or installed, reducing the need for multiple sections and joints
- Low heat storage
- High levels of purity due to premium quality raw material
- High hot compressive strength
- A comprehensive range of mortars is available to enable long last joints with superior performance

## Applications as hot face refractory or back-up insulation in:

- Aluminium (anode bake furnaces, primary electrolytic cells, holding and melting furnaces and secondary re-melt furnaces)
- Petrochemical (kilns, flues, refining vessels and heaters and reactor chambers)
- Iron and steel industry (heat treatment and galvanising)
- Coke and iron making (blast furnaces, hot blast stoves, hot blast and bustle main)
- Hobby and laboratory kilns
- Ceramic industry (including kilns for domestic use)
- Lime and cement kilns
- Glass industry



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# IFB Insulation 1350 to 1650°C

Product Data Sheet

| | JM™25 | K®25 | K®26 | JM™26 | JM™28 | JM™30 | JM™30 HA |
|---|---|---|---|---|---|---|---|
| **ISO 2245 Classification** | - | - | - | 140 0.8L | 150 0.9L | 160 1.0L | - |
| **Manufacturing Method** | Slinger | Cast | Cast | Slinger | Slinger | Slinger | Slinger |
| **Manufacturing Location** | Europe | Americas | Americas | Europe | Europe | Europe | Europe |
| **Product Identification - printed on brick** | 25 | 25 | 26 | 26 | 28 | 30 | 30 HA |
| **Classification Temperature, °C (°F)** | 1350 (2450) | 1370 (2500) | 1430 (2600) | 1430 (2600) | 1540 (2800) | 1650 (3000) | 1650 (3000) |
| **Density, kg/m$^3$ (pcf), ASTM C-134** | 770 (48.0) | 617 (38.5) | 617 (38.5) | 800 (49.9) | 890 (55.5) | 1020 (63.6) | 1250 (78.0) |
| **Modulus of Rupture, MPa (psi), ASTM C-133** | 1 (145) | 0.95 (137.7) | 0.9 (130.5) | 1.5 (217.5) | 1.8 (261) | 2 (290) | 2.1 (304.6) |
| **Cold Crushing Strength, MPa (psi), ASTM C-133** | 1.3 (188.5) | 1.3 (188.5) | 1.3 (188.5) | 1.6 (232) | 2.1 (304.5) | 2.3 (333.5) | 3.2 (464.1) |
| **Permanent Linear Shrinkage, % after 24 hrs Soaking (ASTM C-210)** | | | | | | | |
| @ 1290°C (2354°F) | -0.2 | - | - | - | - | - | - |
| @ 1350°C (2462°F) | - | -0.3 | - | - | - | - | - |
| @ 1400°C (2552°F) | - | - | -0.8 | -0.2 | - | - | - |
| @ 1510°C (2750°F) | - | - | - | - | -0.4 | - | - |
| @ 1570°C (2858°F) | - | - | - | - | - | - | - |
| @ 1620°C (2948°F) | - | - | - | - | - | -0.6 | ±0.1 |
| **Reversible Linear Expansion, max. %** | 0.55 | 0.8 | 0.7 | 0.7 | 0.8 | 0.8 | - |
| **Deformation under hot load, % after 90 min. (ASTM C-16; JM brick tested according to ISO 3187)** | | | | | | | |
| 1200°C @ 0.069 Mpa (2192°F @ 10 psi) | - | 0.2 | 0.2 | - | - | - | - |
| 1260°C @ 0.069 Mpa (2300°F @ 10 psi) | - | - | - | 0.2 | 0.1 | - | - |
| 1320°C @ 0.069 Mpa (2408°F @ 10 psi) | - | - | - | - | 0.2 | 0.1 | - |
| 1370°C @ 0.069 Mpa (2498°F @ 10 psi) | - | - | - | - | - | 0.5 | - |
| **Thermal Conductivity, W/m•K (BTU•in/hr•ft$^2$•°F), ASTM C-182** | | | | | | | |
| 260°C (500°F) | - | 0.15 (1.04) | 0.16 (1.11) | - | - | | |
| 400°C (752°F) | 0.24 (1.67) | - | - | 0.25 (1.73) | 0.3 (2.08) | 0.38 (2.64) | 0.47 (3.26) |
| 540°C (1004°F) | - | 0.18 (1.25) | 0.19 (1.32) | - | - | - | |
| 600°C (1112°F) | 0.25 (1.73) | - | - | 0.27 (1.87) | 0.32 (2.22) | 0.39 (2.71) | 0.48 (3.33) |
| 800°C (1472°F) | 0.27 (1.87) | - | - | 0.3 (2.08) | 0.34 (2.36) | 0.4 (2.78) | 0.49 (3.40) |
| 815°C (1499°F) | - | 0.2 (1.39) | 0.21 (1.46) | - | - | - | |
| 1000°C (1832°F) | 0.3 (2.08) | - | - | 0.33 (2.29) | 0.36 (2.50) | 0.41 (2.84) | 0.5 (3.47) |
| 1100°C (2012°F) | | 0.22 (1.53) | 0.24 (1.67) | - | - | - | |
| 1200°C (2192°F) | - | - | - | 0.35 (2.43) | 0.38 (2.64) | 0.42 (2.91) | 0.51 (3.54) |
| 1370°C (2498°F) | - | - | 0.27 (1.87) | - | - | - | |
| **Specific Heat Capacity, kJ/kg•K @ 1000°C (1832°F)** | | 1.07 | 1.07 | 1.10 | 1.10 | 1.10 | - |
| **Chemical Composition, %** | | | | | | | |
| $Al_2O_3$ | 58 | 47 | 48 | 58 | 67.1 | 73.4 | 79.7 |
| $SiO_2$ | 38 | 38 | 36 | 38.8 | 30.0 | 24.6 | 18.0 |
| $Fe_2O_3$ | 0.9 | 0.2 | 0.3 | 0.8 | 0.60 | 0.50 | 0.40 |
| $TiO_2$ | 0.4 | 1.4 | 1.2 | 0.3 | 0.5 | 0.50 | 0.3 |
| CaO | 0.2 | 13.5 | 12.3 | 0.1 | 0.1 | Trace | 0.1 |
| MgO + $Na_2O$ + $K_2O$ | 1.8 | 0.5 | 0.4 | 1.9 | 1.0 | 0.90 | 0.7 |
| **CO Attack (popouts after 200 hrs), ASTM C-288** | - | - | - | - | Class A | Class A | - |





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# JM 2600 / Blakite / Blakite V /JM 3300


**Type**
Refractory air-setting mortars.

**Classification Temperatures**

| | |
|---|---|
| JM 2600: | 1430°C |
| Blakite: | 1650°C |
| Blakite V: | 1650°C |
| JM 3300: | 1760°C |

**Maximum Continuous Use Temperature**
The maximum continuous use temperature depends on the application. In case of doubt, refer to your local Morgan Thermal Ceramics distributor for advice.

**Features**
- Good workability, ideal plasticity and water retention
- Low drying and firing shrinkages
- High refractoriness
- High bonding strength
- Good resistance to chemical attack
- Stability of chemical components

**Applications**
- For laying insulating firebricks, super-duty and high alumina dense refractory bricks
- Provide resistance to infiltration of air or hot gases
- Hobby and laboratory kilns
- Retard penetration of slag and molten metal into the joints

**Description**
Morgan Thermal Ceramics refractory mortars are normally supplied as ready-to-use wet blends of finely-ground aggregates and special binders.

They develop good strength on air drying, forming strong joints and conferring an almost monolithic structure to the brickwork.

**Available Types**
- **JM 2600**
  This is an air-setting cement developed for use in lower temperature applications, where a high strength bond is required. It is recommended for mortaring insulating firebricks for operating temperatures up to 1430°C and can be used for both trowelled and dipped joints.

- **Blakite**
  This is a highly refractory mortar, dark grey in colour, which has a high water retention characteristic. It was specially developed for laying insulating firebricks but is also suitable for use with super duty and high alumina dense refractory bricks, at operating temperatures up to 1650°C. It is supplied in a consistency suitable for shallow patching or trowelling but requires the addition of approximately 5% water for dipping. Blakite is a good choice as a single, general purpose mortar on projects involving mainly insulating firebricks but also including some dense firebricks.

- **Blakite V**
  This is the standard product with a harder consistency to be used to glue special refractory shapes and steel plates.

- **JM 3300**
  A very highly refractory air-setting mortar suitable for laying JM 32 insulating firebricks, and high alumina dense refractory bricks and for operating temperatures up to 1760°C.

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# JM 2600 / Blakite / Blakite V /JM 3300

## Main Properties

| | JM 2600 | Blakite | Blakite V | JM 3300 |
|---|---|---|---|---|
| Classification (ASTM C-199-84) | Medium Duty | Super Duty | Super Duty | Super Duty |
| Temperature limit (normal oxidizing conditions) (°C) | 1430 | 1650 | 1650 | 1760 |
| **Properties Measured at Ambient Conditions (23°C/50% RH)** | | | | |
| Density (as applied) (kg/m$^3$) | 1700 | 1900 | 1950 | 2000 |
| Viscosity "for guidance" (Thermal Ceramics method Cylinder Penetration) (mm) | 30 | 24 | 10 | 25 |
| Modulus of rupture (dried at 100°C) (MPa) | 12 | 20 | 21 | 28 |
| **High Temperature Performance** | | | | |
| Permanent linear change when dried (%) | -3 | -2.4 | -2.3 | -2 |
| Refractories (ASTM C-24-84) (PCE) | 23 | 33 | 33 | 34 |
| **Chemical Composition (%)** | | | | |
| $Al_2O_3$ | 33.4 | 43.1 | 43.1 | 54.8 |
| $SiO_2$ | 60.7 | 51.7 | 51.7 | 40.6 |
| $Fe_2O_3$ | 1.3 | 1.2 | 1.2 | 0.9 |
| $TiO_2$ | 1.2 | 1.0 | 1.0 | 0.6 |
| CaO + MgO | 0.3 | 0.2 | 0.2 | 0.2 |
| $K_2O$ + $Na_2O$ | 2.8 | 2.7 | 2.7 | 0.3 |
| **Quantity Required and Packaging** | | | | |
| Quantity required to set 1000 bricks* (kg) | 180 | 200 | N/A | 200 |

* Amount depends upon thickness of the joint and porosity of the brick. The figure given is for trowelled joint, approx 2mm thick

JM 2600, Blakite, Blakite V and JM 3300 are delivered ready-to-use, in metal drums.Dry JM 2600 and dry Blakite are available on request (subject to special technical requirements).

| Standard Packaging | JM 2600 | Blakite | Blakite V | JM 3300 |
|---|---|---|---|---|
| 12 metal drums of 50kg on pallet | X | X | | X |
| 40 metal drums of 20kg on pallet | | X | X | |

The values given herein are typical 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 Thermal Ceramics office to obtain current information.

Data sheet

# Kaowool™ VF shapes

**ENGLISH**

**Metric information** - Page 2

## Description

**Kaowool™ VF Shapes are insulating products made from a mixture of refractory ceramic fibre by vacuum forming.**

This process allows the production of a variety of configurations, tailored to the particular application and ranging from simple sections (such as sleeves, cones) to complex shapes. Compositions are available for service temperatures from 1260°C to 1600°C. For utilisation over this range of temperature, please refer to our Alphawool datasheet. Shapes can also be produced in a strong composition which gives higher strength and density. Thermal properties are similar to the normal grades but with improved resistance to erosion.

**Kaowool™ 1260 LB** and **1400 LB** is a flexible shape which shows good dimensional resilience after compression & make utilization of these shapes very easy where rigid shapes are unsuitable.

**Kaowool™ VF** can also be supplied as a **Wet Pak** in size of 1000 x 1000mm, packed wet into individual plastic bags. The sheets can be formed in situ to any shape desired, which on drying, develops properties similar to those of Kaowool™ VF products. Wet Pak have a shelf life in a moist state of up to 42 days provided that the bags remain sealed and are maintained at temperatures within the range of 10°C to 50°C (50°F to 122°F).

All shapes have low shrinkage at temperatures within their service rating and retain the properties of high insulation light weight and resistance to thermal shock which are characteristic of Kaowool Ceramic Fibre.

The unfired material can be easily cut or machined.

## Type

Vacuum formed shapes.

## Classification temperature

From 1260°C up to 1600°C

The maximum continuous use temperature depends on the application. Please contact Morgan Advanced Materials, Thermal Ceramics for advice.

## Typical applications

These versatile products can be used where rigid shapes, self supporting are required for high temperature insulation (according to the mix). Designed as per customer drawings, they are easy to install.

Kaowool 1260LB is particularly recommended for sealing applications.

## Special treatment

Kaowool Hardener or Cement may be applied, if required, to shapes in order to provide a protective surface coating up to a temperature of 1260°C.

Kaowool 1260 Shapes can also be supplied in through-hardened material to individual customer requirements.

Data sheet

# Kaowool™ VF shapes

**Metric information**

| | 1260 | Strong | 1260 LB | 1400 | 1600 |
|---|---|---|---|---|---|
| **Classification temperature, °C** | 1260 | 1260 | 1260 | 1400 | 1600 |
| **Properties Measured at Ambient Conditions (23°C/50% RH)** | | | | | |
| **Colour** | white / tan | white / tan | white / tan | white / tan | white / tan |
| **Nominal density, kg/m³** | 280 | 330 | 200 | 280 | 320 |
| **Modules of rupture, MPa** Unfired | >1.4 | 2.7 | Flexible | >0.99 | >0.4 |
| **Compressive strength, MPa** @5% relative deformation | - | - | 0.56 | - | - |
| **High Temperature Performance** | | | | | |
| **Approx. weight loss on 1st firing %** | 5-7 | 5-7 | 5-7 | 5-7 | 5-7 |
| **Thermal conductivity W/m.K, (ASTM C-201) at mean temperature of:** | | | | | |
| @200°C | 0.07 | 0.06 | 0.07 | 0.06 | - |
| @400°C | 0.09 | 0.09 | 0.09 | 0.08 | 0.08 |
| @600°C | 0.11 | 0.12 | 0.11 | 0.1 | 0.11 |
| @800°C | 0.15 | 0.16 | 0.15 | 0.13 | 0.14 |
| @1000°C | - | - | - | 0.18 | 0.16 |
| @1200°C | - | - | - | 0.23 | 0.19 |
| @1400°C | - | - | - | - | 0.25 |

## Contact

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# Midcast™

Product Data Sheet

## Product Description

A 1500°C (2430°F) high alumina castable with excellent working properties, high strength and good abrasion resistance. Superior characteristics have made this product a firm favourite in a vast range of applications worldwide both for heat containment and metal contact.

| Properties | Midcast |
|---|---|
| Region of Manufacture | Europe |
| Bond Type | Hydraulic |
| Method of application | Cast |
| Maximum Service Temperature, °C (°F) | 1500 (2430) |
| Water addition, % by weight | 11 - 13 |
| Maximum grain size, mm | 6 |
| Packaging in bags, kg (lb) | 25 (55) |





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# Midcast™

Product Data Sheet

| | |
|---|---|
| **Density, kg/m$^3$ (pcf), ASTM C134** | |
| oven dried, 110°C (230°F) | 2560 (159.7) |
| **Cold crushing strength, MPa (psi), ASTM C133** | |
| oven dried, 110°C (230°F) | 67 (9715) |
| after 5 hours firing, 815°C (1500°F) | 40 (5800) |
| after 5 hours firing, 1000°C (1832°F) | 26 (3770) |
| **Permanent linear change, %, ASTM C113** | |
| after 5 hours, 815°C (1500°F) | -0.1 |
| after 5 hours, 1000°C (1832°F) | -0.2 |
| **Thermal conductivity, W/m•K (BTU•in./hr•ft²•°F), ASTM C201/417** | |
| 600°C (1112°F) | 1.31 (9.09) |
| **Chemical composition, %** | |
| Alumina, $Al_2O_3$ | 78 |
| Silica, $SiO_2$ | 6 |
| Ferric oxide, $Fe_2O_3$ | 4.7 |
| Calcium oxide, CaO | 8.8 |

## Instruction for Use

Highest strength is obtained with monolithic refractory by using the least amount of clean mixing water. This will allow thorough working of material into place by vibrating or rodding. A mechanical mixer is required for proper placement (paddle-type mortar mixers are best suited). After achieving a ball-in-hand consistency, mix for >4 minutes. Place material within 30 minutes after mixing.

## Storage and Shelf Life

- Should be stored in dry conditions, unopened packaging on pallets. Do not store on ground. Keep out of rain and damp conditions.
- Shelf life is of twelve months with original packaging, double shrink film and dehydrating agent provided if the monolithic is stored under these recommended conditions.





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# Cerablanket® and Cerachem® Blankets

Product Data Sheet

## Product Description

Cerablanket and Cerachem Blankets feature exceptional thermal and physical properties. Cerablanket and Cerachem are optimised for improved handleability with excellent tensile strength, low thermal conductivity and high-temperature performance stability.

Cerablanket is made from high purity oxides of alumina and silica and has a classification temperature of 1260°C (2300°F).

Cerachem Blankets are made from alumina-silica-zircona designed to resist excessive shrinkage at elevated temperatures and are rated to 1430°C (2600°F). Available in a wide range of densities and thicknesses allow for the most effective deployment of the superior thermal characteristics in a wide variety of applications.

Cerablanket and Cerachem Blankets are resistant to most types of chemical attack. They are lightweight, strong and feature a low heat storage capacity for effective energy savings and excellent thermal shock resistance for use in difficult environments.

## Features

- Excellent insulating performance
- Excellent thermal stability: fibres have good resistance to devitrification
- Low heat storage
- Tough, resilient and strong blankets, which resist tearing both before and after heating
- Resistance to thermal shock
- Good acoustic properties
- No smoke emission due to binder burn out

## Applications

- Power generation, especially HRSG duct insulation
- Industrial and Commercial Chimney insulation
- Furnace, Boiler and Heater linings
- Pipe wrap
- Back-up linings in kilns and furnaces
- Consumer goods
- Storage heater insulation
- Metals applications like launder covers
- Welding stress relief



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# Cerablanket® and Cerachem® Blankets

Product Data Sheet

| Properties | Cerablanket | Cerachem Blanket |
|---|---|---|
| Colour | White | White |
| Classification Temperature, °C (°F) | 1260 (2300) | 1430 (2600) |
| Continuous Use Temperature, °C (°F) | 1180 (2150) | 1315 (2400) |
| Melting Temperature, °C (°F) | 1760 (3200) | 1760 (3200) |
| Density, kg/m$^3$ (pcf) | 64, 96, 128, 160 (4, 6, 8, 10) | 64, 96, 128, 160 (4, 6, 8, 10) |
| **Tensile Strength, average, kPa (psi), EN 1094-1** | | |
| Measured Blanket density, kg/m$^3$ (pcf), 64 (4) | 30 (4.35) | 30 (4.35) |
| 96 (6) | 70 (10.15) | 70 (10.15) |
| 128 (8) | 90 (13.05) | 90 (13.05) |
| 160 (10) | 110 (15.95) | 110 (15.95) |
| **Chemical Analysis, %** | | |
| Silica, $SiO_2$ | 52 - 58 | 48 - 52 |
| Alumina, $Al_2O_3$ | 42 - 48 | 33 - 37 |
| Zirconia, $ZrO_2$ | - | 13 - 17 |
| Other | trace | trace |

| Thermal Conductivity, W/m•K, per ASTM C201 | | | | | |
|---|---|---|---|---|---|
| | Cerablanket | | | Cerachem Blanket | |
| Density, kg/m$^3$ (pcf) | 64 (4) | 96 (6) | 128 (8) | 96 (6) | 128 (8) |
| 200°C | 0.06 | 0.06 | 0.05 | 0.07 | 0.05 |
| 400°C | 0.11 | 0.09 | 0.08 | 0.1 | 0.08 |
| 600°C | 0.19 | 0.16 | 0.13 | 0.16 | 0.14 |
| 800°C | 0.31 | 0.25 | 0.19 | 0.24 | 0.19 |
| 1000°C | 0.45 | 0.36 | 0.27 | 0.36 | 0.27 |
| 1200°C | - | - | - | 0.51 | 0.36 |
| **Thermal Conductivity, BTU•in/hr•ft$^2$•°F, per ASTM C201** | | | | | |
| 500°F | 0.5 | 0.46 | 0.4 | 0.53 | 0.4 |
| 1000°F | 1.14 | 0.94 | 0.78 | 0.94 | 0.81 |
| 1500°F | 2.2 | 1.77 | 1.36 | 1.75 | 1.39 |
| 1832°F | 3.12 | 2.50 | 1.87 | 2.50 | 1.87 |
| 2000°F | 3.68 | 2.94 | 2.15 | 2.96 | 2.15 |

## Product Availability

Cerablanket and Cerachem Blankets are manufactured and available globally, but packaging, density and thickness vary by region. Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative to support providing specific packaging availability for your local business needs.





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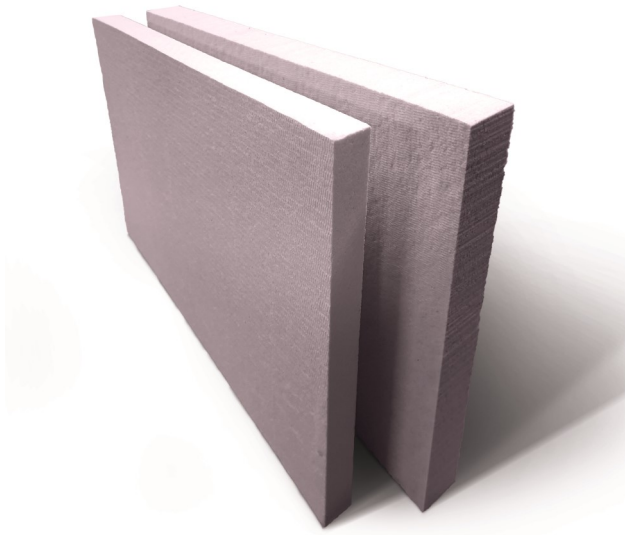
# Superwool® 1650SI Board

Product Data Sheet



## Product Description

Our Superwool 1650SI Board is a best-in-class 1650°C (3000°F) classification temperature low bio-persistent structural insulation board. It has been developed especially for the demanding application of back-up insulation in molten metal handling equipment such as the steel ladle, tundish or torpedo car.

This board is designed as a high performance back-up insulation. Any potential hot face applications should be discussed with your Morgan Advanced Materials—Thermal Ceramics representative prior to design and installation.

Superwool 1650SI delivers melting stability within the heavy-duty process of steel manufacturing. Its high temperature capability also allows it to be used in combination with our WDS® Microporous insulation delivering maximum energy savings. These properties deliver to the steel makers an edge with superior insulation performance, reliability, energy savings, and improved personnel safety.

Superwool 1650SI is formed from a combination of Superwool fibre which delivers exceptional insulating properties and tailored mechanical fillers which supply a rigid supporting skeleton. The two together provide an unequalled combination of insulating properties and mechanical strength.

## Features

- Classification Temperature 1650°C (3000°F)
- Low thermal conductivity
- High density
- Excellent strength
- Low shrinkage at elevated temperatures
- Hydrophobic
- Excellent cyclic load resistance

## Benefits

- Improved cost of ownership with higher energy efficiency, reduced maintenance and overall operational ladle performance
- Employee safety benefits from melt floor to maintenance with reduced outer shell temperatures
- Easy lining configuration due to agile manufacturing process
- Hydrophobicity expands selection of the product in wider back-up applications
- 1650°C Classification temperature offers opportunity for Microporous back-up lining system resulting in highest energy performance

## Environmental & Health Safety

Superwool low bio-persistent fibres are exonerated and are not classified as carcinogenic by IARC or under any national regulations on a global basis. They have no requirements for warning labels under GHS (Globally Harmonised System for the classification and labelling of chemicals).

In Europe, Superwool fibres meet the requirements specified under NOTA Q of European Directive 67/548. All Morgan Advanced Materials Superwool low bio-persistent fibre products are therefore exempt from the classification and labelling regulation in Europe.



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# Superwool® 1650SI Board

Product Data Sheet

| | Superwool 1650SI Board |
|---|---|
| Region of Manufacture | Europe |
| Classification Temperature, °C (°F), EN 1094-1 | 1650 (3000) |
| Continuous Use Temperature, °C (°F) | 1350 (2460) |
| Density, kg/m$^3$ (pcf) | 820 (51) |
| Cold Compression Strength, MPa (psi), 10% Deformation, ASTM C165 | 3 (435) |
| Modulus of Rupture, MPa (psi) | 4.5 (652.5) |
| Linear Shrinkage, %, EN 1094 | |
| 1650°C (3000°F) | <1.5 |
| Hot creep under 1 MPa (145 psi), %, | |
| 2 hours @ 500°C (932°F) | 2 |
| 2 hours @ 800°C (1472°F) | 3 |
| Water Absorption, 2 hours, % | 2 |
| **Chemical Analysis, %** | |
| Alumina, $Al_2O_3$ | 0-1 |
| Silica, $SiO_2$ | 91-95 |
| Calcium Oxide, CaO | 5-8 |
| Others | 0-1 |
| Loss of Ignition | 3.5 |
| **Thermal Conductivity, W/m•K (BTU•in/hr•ft$^2$•°F), ASTM C 201** | |
| 400°C (392°F) | 0.12 (0.83) |
| 600°C (752°F) | 0.14 (0.97) |
| 800°C (1112°F) | 0.17 (1.18) |
| 1000°C (1472°F) | 0.20 (1.39) |
| 1200°C (1832°F) | 0.24 (1.66) |
| 1300°C (2372°F) | 0.27 (1.87) |

## Shelf Life

The material remains stable over time and has no aging effect, provided it is kept in dry conditions and retained in the original packaging.

## Standard Dimensions and Availability

| Board Size, mm (in) | Thickness, mm (in) |
|---|---|
| 1000 x 1200 (39.3 x 47.2) | 10-13 (0.40-0.51) |
| 1000 x 600 (39.3 x 23.6) | Process capability up to 20mm (0.8 in) |
| Dimensions can be adapted for optimum fitting to tiling size | |





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# Superwool® HT Felt

Product Data Sheet

## Product Description

Superwool HT Felt is an insulating felt, obtained by hot pressing. It is made from low biopersistent Superwool HT fibres, bonded with an organic binder which begins to burn out at 180°C (356°F). This special binder makes Superwool HT Felt particularly suitable for die-cutting operations. Semi rigid, it is neither brittle or dusty.Superwool HT Felt optimises the manufacture of complex, die-cut shapes to close tolerances.

## Features

- Densities ranging from 64 to 288kg/m$^3$ (4 to 18 pcf)
- High temperature resistance
- Low thermal conductivity
- Flexible to semi-rigid, depending on density selected
- Chemically stable
- Thickness controls
- Thermal shock resistant
- Low heat storage
- No reaction with alumina based bricks in application in the range
- Suited to cutting operations (with saw, water jet or by stamping)
- Excellent sound absorption characteristics

## Applications

- Die cut shapes for domestic appliances
- Thermal barrier media
- Insulating thermal break
- High temperature gaskets
- Expansion joints for furnace, kiln and boiler linings

## Environmental & Health Safety

Superwool low biopersistent fibres are exonerated and are not classified as carcinogenic by IARC or under any national regulations on a global basis. They have no requirements for warning labels under GHS (Globally Harmonised System for the classification and labelling of chemicals).

In Europe, Superwool fibres meet the requirements specified under NOTA Q of European Directive 67/548. All Morgan Advanced Materials Superwool low biopersistent fibre products are therefore exempt from the classification and labelling regulation in Europe.



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# Superwool® HT Felt

Product Data Sheet

| | Superwool HT Felt | | | |
|---|---|---|---|---|
| **Properties** | | | | |
| Region of manufacture | Europe | | | |
| Color | Yellow | | | |
| Classification Temperature, °C (°F) | 1300 (2370) | | | |
| Denisty, kg/m$^3$ (pcf) | 64, 96, 128, 160, 192, 224, 256, 288 (4, 6, 8, 10,12, 14, 16, 18) | | | |
| Linear shrinkage, %, EN 1094-1 | | | | |
| 1200°C (2192°F) | <2 | | | |
| **Chemical Analysis, % weight basis after firing** | | | | |
| Silica, $SiO_2$ | 70-80 | | | |
| Calcium oxide + Magnesium oxide, CaO + MgO | 18-25 | | | |
| Other | <3 | | | |
| Loss of Ignition, LOI, density dependent | 4-12 | | | |
| **Thermal Conductivity, W/m•K ( BTU•in/hr•ft$^2$), per ASTM C201** | | | | |
| Density, kg/m$^3$ (pcf) | 64 (4) | 128 (8) | 192 (12) | 288 (18) |
| 300°C (572°F) | 0.07 (0.49) | 0.07 (0.49) | 0.06 (0.42) | 0.05 (0.35) |
| 500°C (932°F) | 0.16 (1.11) | 0.12 (0.83) | 0.09 (0.62) | 0.08 (0.56) |
| 700°C (1292°F) | 0.28 (1.94) | 0.2 (1.39) | 0.14 (0.97) | 0.11 (0.76) |
| 900°C (1652°F) | 0.45 (3.12) | 0.32 (2.22) | 0.21 (1.46) | 0.16 (1.11) |
| 1000°C (1832°F) | 0.55 (3.82) | 0.38 (2.64) | 0.25 (1.73) | 0.19 (1.32) |
| 1100°C (2012°F) | 0.66 (4.58) | 0.45 (3.12) | 0.3 (2.08) | 0.22 (1.53) |

## Product Availability

This product availability and packaging reflects the European manufactured Superwool HT Felt. Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative for packaging availability for your local needs.

| Thickness, mm (in) | Density, kg/m$^3$ (pcf) | | | | | | | Quantity / box | Minimum order quantity (Box) |
|---|---|---|---|---|---|---|---|---|---|
| | 64 (4) | 96 (6) | 128 (8) | 160 (10) | 192 (12) | 288 (18) | 384 (24) | | |
| 3 (0.12) | | | | | X | X | X | 40 | 1 |
| 6 (0.24) | | X | X | X | X | X | X | 22 | 2 |
| 10 (0.4) | X | X | X | X | X | X | X | 12 | 3 |
| 13 (0.52) | X | X | X | X | X | X | X | 10 | 3 |
| 19 (0.76) | X | X | X | X | X | | | 7 | 3 |
| 25 (1) | X | X | X | X | X | | | 5 | 4 |
| 38 (1.52) | | X | | | | | | 3 | 4 |





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# Superwool® Plus and HT Papers

Product Data Sheet

## Product Description

Superwool Paper is a unique family of paper products manufactured using our patented Superwool low biopersistent fibre in the non-woven matrix.
Special organic binders and fillers are used for giving them strength and distinct physical properties suitable for a varying range of applications. Superwool Plus and Superwool HT Papers offer excellent thermal performance over a vide temperature range.

Superwool Plus and Superwool HT Papers are an alternative to traditional solutions due to their unmatched properties of high refractoriness, elevated temperature capabilities and lower thermal conductivity. These papers have excellent non-wetting characteristics for the applications requiring direct contact with molten aluminium.

Superwool provides stability and resistance to chemical attacks. Exceptions include hydrofluoric acid, phosphoric acid and strong alkalis (i.e. NaOH, KOH). Superwool is unaffected by incidental spills of oil or water. Thermal and physical properties are restored after drying.

Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative to support your application requirements.

## Features

- Low bio-persistence fibre
- Excellent thermal insulating performance
- Thin, flexible high-temperature insulation
- Immune to thermal shock
- Low heat storage
- Easily die-cut to form complex shapes for high-temperature gasketing
- Excellent tensile strength
- Low thermal conductivity
- Non-wetting to molten aluminium

## Applications

- Refractory back-up in various industrial applications
- Industrial and domestic appliance gasketing
- Glassware separators and Glass tank refractory back-up
- Non-Ferrous ingot mould liners
- Aluminium transfer system backup insulation
- Parting medium in induction furnaces
- Automotive heat shields and muffler insulation
- Insulation of various consumer goods like ovens, stoves, boilers, electric heaters
- Various molten metal handling applications in steel includes
  - Investment casting mould wrapping
  - Ladle Shroud and nozzle wrapping
  - Ladle back-up
  - Gasketing

## Environmental & Health Safety

Superwool low biopersistent fibres manufactured by Morgan Advanced Materials are not classified as carcinogenic by IARC or under any national regulations on a global basis. They have no requirements for warning labels under GHS (Globally Harmonised System for the classification and labelling of chemicals).

In Europe, Superwool fibres meet the requirements specified under Note Q of European Regulation EC/1272/2008 (on Classification, Labelling and Packaging of substances and mixtures). All Morgan Advanced Materials Superwool low biopersistent fibre products are therefore exonerated from classification and labelling as hazardous in Europe.



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# Superwool® Plus and HT Papers

Product Data Sheet

| Properties | Superwool Plus Paper | Superwool HT Paper |
|---|---|---|
| Color | white | white |
| Classification Temperature, °C (°F), EN 1094-1 | 1200 (2012) | 1300 (2372) |
| Continuous Use Temperature, °C (°F) | 1000 (1832) | 1150 (2102) |
| Density, kg/m$^3$ (pcf), EN 1094-1 | 180 - 250 (11 - 16) | 180 - 250 (11 - 16) |
| Tensile strength, MPa (psi), EN 1094-1 | 0.45 (65) | 0.35 (50) |
| Loss of Ignition, % | <10 | <10 |
| **Permanent Linear Shrinkage, %, after 24 hours, EN 1094-1** | | |
| 1200°C (2192°F) | <4 | - |
| 1260°C (2300°F) | - | <2 |
| 1300°C (2300°F) | - | <2 |
| **Chemical Analysis, %** | | |
| Alumina, $Al_2O_3$ | trace | trace |
| Silica, $SiO_2$ | 62 - 68 | 70 - 80 |
| Calcia, CaO | 26 - 32 | 18 - 26 |
| Magnesia, MgO | 3 - 7 | <5 |
| Other | <1 | <3 |
| **Thermal Conductivity, W/m•K, per ASTM C201** | | |
| 200°C | 0.05 | 0.04 |
| 400°C | 0.07 | 0.07 |
| 600°C | 0.11 | 0.11 |
| 800°C | 0.15 | 0.17 |
| 1000°C | 0.21 | 0.24 |
| 1200°C | - | 0.33 |
| **Thermal Conductivity, BTU•in/hr•ft$^2$, per ASTM C201** | | |
| 500°F | 0.38 | 0.33 |
| 1000°F | 0.66 | 0.67 |
| 1500°F | 1.08 | 1.21 |
| 2000°F | 1.67 | 1.95 |
| 2200°F | - | 2.30 |

## Product Availability

Superwool Plus and Superwool HT Papers are manufactured and available globally, but packaging, thickness, width and length vary by region.

Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative to support providing specific packaging availability for your local business needs.





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# Superwool® Plus Blanket

Product Data Sheet

## Product Description

Superwool Plus Blanket feature exceptional thermal and physical properties. Superwool Plus Blanket is manufactured using patented low shot technology providing ultra low shot fibres resulting in improved handleability and nuisance dust is effectively eliminated. The blankets are flexible, soft to the touch and less irritating during use.

Superwool Plus Blanket exhibits outstanding insulating properties at elevated temperatures. These balnekts have excellent thermal stability and retain their original soft fibrous structure up to its maximum continuous use temperature.

Superwool Plus Blanket is needled from both sides and possess high strength before and after heating, do not contain binder or lubricant and do not emit any fumes or smell during the first firing.

## Features

- Superwool Blankets are immune to thermal shock
- The fibres are opaque to infra-red and so maintain their low thermal conductivity to high temperature
- The fibres absorb very little energy on heating
- The fibres are high purity and non-corrosive
- The fibres are flexible and resilient to mechanical damage

## Applications

- Power generation especially HRSG duct insulation
- Industrial and Commercial Chimney insulation
- Furnace, Boiler and Heater  linings
- Pipe wrap
- Back-up linings in kilns and furnaces
- Consumer goods
- Storage heater insulation
- Metals applications like launder covers
- Welding stress relief

## Environmental & Health Safety

Superwool low biopersistent fibres manufactured by Morgan Advanced Materials are not classified as carcinogenic by IARC or under any national regulations on a global basis. They have no requirements for warning labels under GHS (Globally Harmonised System for the classification and labelling of chemicals).

In Europe, Superwool fibres meet the requirements specified under Note Q of European Regulation EC/1272/2008 (on Classification, Labelling and Packaging of substances and mixtures). All Morgan Advanced Materials Superwool low biopersistent fibre products are therefore exonerated from classification and labelling as hazardous in Europe.



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# Superwool® Plus Blanket

Product Data Sheet

| Properties | Superwool Plus Blanket |
|---|---|
| Colour | White |
| Classification Temperature, °C (°F) | 1200 (2190) |
| Continuous Use Temperature, °C (°F) | 1050 (1920) |
| Melting Temperature, °C (°F) | 1325 (2400) |
| Density, kg/m$^3$ (pcf) | 64, 80, 96, 128, 160 (4, 5, 6, 8, 10) |
| **Tensile Strength, average, kPa (psi), EN 1094-1** | |
| Measured blanket density, kg/m$^3$ (pcf), 64 (4) | 30 (4.35) |
| 80 (5) | 45 (6.53) |
| 96 (6) | 50 (7.25) |
| 128 (8) | 75 (10.88) |
| 160 (10) | 90 (13.05) |
| **Chemical Analysis, %** | |
| Silica, $SiO_2$ | 62 - 68 |
| Calcium oxide, CaO | 26 - 32 |
| Magnesium oxide, MgO | 3 - 7 |
| Other | <1 |

| Thermal Conductivity, W/m•K, per ASTM C201 | | | | |
|---|---|---|---|---|
| | Superwool Plus Blanket | | | |
| Density, kg/m$^3$ (pcf) | 64 (4) | 96 (6) | 128 (8) | 160 (10) |
| 200°C | 0.06 | 0.05 | 0.05 | 0.04 |
| 400°C | 0.11 | 0.09 | 0.08 | 0.07 |
| 600°C | 0.15 | 0.14 | 0.12 | 0.11 |
| 800°C | 0.24 | 0.21 | 0.18 | 0.16 |
| 1000°C | 0.36 | 0.29 | 0.25 | 0.23 |
| **Thermal Conductivity, BTU•in/hr•ft$^2$, per ASTM C201** | | | | |
| 500°F | 0.50 | 0.42 | 0.40 | 0.33 |
| 1000°F | 0.94 | 0.86 | 0.74 | 0.66 |
| 1500°F | 1.74 | 1.49 | 1.28 | 1.16 |
| 1832°F | 2.49 | 2.01 | 1.73 | 1.60 |
| 2000°F | 2.91 | 2.31 | 2.00 | 1.83 |

## Product Availability

Superwool Plus Blankets are manufactured and available globally, but packaging, density and thickness vary by region. Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative to support providing specific packaging availability for your local business needs.





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# Superwool® Plus Blok Panels

Product Data Sheet

## Product Description

Superwool Plus Blok Panels are made from Superwool Plus fibres, mineral fibres and a small amount of organic binder. Due to this high fibre content, Superwool Plus Blok Panels are strong, lightweight and thermal shock resistant.

All grades of Superwool Plus Blok Panels receive a water repellence treatment to prevent absorption of water or concrete binders. Superwool Plus Blok 1100LQ is a low quartz grade of Superwool Plus Blok 1100.

The panels must be installed so that the side with the product name is in contact with the concrete. When tested on this side, Superwool Plus Blok Panels are classified as non-hydrophilic (NF P 75-305).

Thicknesses over 50mm are obtained by layering together two thinner sheets. For Superwool Plus Blok 800 Panels, it is 60mm.

## Features

- Water repellent
- Resistant to thermal shock
- Good resistance to temperature cycling
- Low thermal conductivity
- Precise geometry and close tolerances
- Homogeneous structure, easy for machining
- Non-brittle
- High fibre content
- Exonerated from any carcinogenic classification
- Lightweight, low heat storage
- Easy to install

## Applications

- Backup insulation for bricks (IFB) and monolithics
- Standalone refractory insulation
- CPI furnaces
- Tunnel kilns
- Ladle backup
- Aluminium pot cells
- Float glass furnace backup

## Environmental & Health Safety

Superwool low biopersistent fibres are exonerated and are not classified as carcinogenic by IARC or under any national regulations on a global basis. They have no requirements for warning labels under GHS (Globally Harmonised System for the classification and labelling of chemicals).

In Europe, Superwool fibres meet the requirements specified under NOTA Q of European Directive 67/548. All Morgan Advanced Materials Superwool low biopersistent fibre products are therefore exempt from the classification and labelling regulation in Europe.



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# Superwool® Plus Blok Panels

Product Data Sheet

| Properties | Superwool Plus Blok 800 | Superwool Plus Blok 1000 | Superwool Plus Blok 1100 | Superwool Plus Blok 1100 LQ | Superwool Plus Blok AL |
|---|---|---|---|---|---|
| Region of Manufacture | Europe | | | | |
| Color | White/Tan | | | | |
| Classification Temperature, °C (°F) | 1000 (1832) | 1100 (2012) | 1100 (2012) | 1100 (2012) | 1000 (1832) |
| Density, kg/m$^3$ (pcf) | 320 (19.97) | 320 (19.97) | 320 (19.97) | 320 (19.97) | 320 (19.97) |
| Modulus of Rupture, MPa (psi) | 0.7 (101.5) | 0.8 (116) | 0.8 (116) | 0.9 (130.5) | 0.8 (116) |
| Compressive strength @ 10% deformation, MPa (psi) | 0.3 (43.5) | 0.3 (43.5) | 0.3 (43.5) | 0.3 (43.5) | 0.3 (43.5) |
| Loss of Ignition, LOI, % after 2 hours heating @ 800°C (1472°F) | 5.5 | 5.0 | 5.0 | 5.0 | 5.5 |
| Water absorption after 2 hours, % | 2 | 2 | 2 | 2 | 2 |
| Permanent Linear Shrinkage, %, 24 hours, ENV (1094-1) | | | | | |
| 1000°C (1832°F) | 1.4 | - | - | - | 2.0 |
| 1100°C (2012°F) | - | 1.4 | 1.3 | 1.3 | - |
| **Chemical Analysis, %** | | | | | |
| Alumina, $Al_2O_3$ | 13.9 | 15.1 | 10.1 | 16.2 | 18.7 |
| Silica, $SiO_2$ | 61.2 | 59.4 | 59.5 | 56.5 | 54.0 |
| Calcium oxide + Magnesium oxide, CaO + MgO | 18.3 | 19.4 | 28.2 | 24.6 | 20.9 |
| Ferric oxide + Titanium oxide, $Fe_2O_3$ + $TiO_2$ | 3 | 3.8 | 1.2 | 1.3 | 4.7 |
| Alkalis, as $Na_2O$+$K_2O$ | 3.6 | 2.3 | 1 | 1.4 | 2.4 |
| **Thermal Conductivity, W/m•K (BTU•in/hr•ft$^2$), per ASTM C201** | | | | | |
| 200°C (392°F) | 0.05 (0.35) | 0.06 (0.42) | 0.05 (0.35) | 0.05 (0.35) | 0.05 (0.35) |
| 300°C (572°F) | 0.05 (0.35) | 0.06 (0.42) | 0.06 (0.42) | 0.06 (0.42) | - |
| 400°C (752°F) | 0.06 (0.42) | 0.07 (0.49) | 0.07 (0.49) | 0.07 (0.49) | 0.07 (0.49) |
| 500°C (932°F) | 0.07 (0.49) | 0.09 (0.62) | 0.08 (0.56) | 0.08 (0.56) | - |
| 600°C (1112°F) | 0.08 (0.56) | 0.1 (0.69) | 0.09 (0.62) | 0.09 (0.62) | 0.1 (0.69) |
| 800°C (1472°F) | 0.12 (0.83) | 0.13 (0.90) | 0.12 (0.83) | 0.12 (0.83) | 0.13 (0.90) |
| 900°C (1652°F) | - | - | - | - | 0.14 (0.97) |
| 1000°C (1832°F) | - | - | 0.16 (1.11) | 0.16 (1.11) | - |

## Product Availability

Superwool Plus Blok are manufactured and packaged for Europe regional business. Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative to support packaging availability for your regional business needs.

| | |
|---|---|
| **Standard sizes, mm (in)** | 1000 x 600 (39.4 x 23.6) |
| **Thickness, mm (in)** | 25mm, 30mm, 40mm, 50mm, 60mm, 70mm, 80mm, 90mm and 100mm<br>(1in, 1.2in, 1.6in, 2in, 2.4in, 2.75in, 3.15in, 3.5in, 3.9in)<br>*Thicknesses over 50mm (2in) are obtained by bonding together two thinner sheets except for Blok 800 which is available in 60mm (2.4in)* |
| **Packaging details** | Superwool Plus Blok Panels are packed on pallets. 1225mm x 1020mm (48in x 40in).<br>Protected with cardboard and shrink wrapped with recyclable plastic. |





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# Superwool® Plus and HT Boards

Product Data Sheet

## Product Description

Superwool Boards are manufactured from our market leading low biopersistent Superwool Bulk fibres, refractory fillers, organic and inorganic binders. Superwool Boards offer excellent thermal and physical performance in high-temperature applications. Superwool offers an alternative to traditional solutions due to its high refractoriness and excellent non-wetting characteristics with molten aluminum. Superwool provides stability and resistance to most types of chemical attack. Thermal and physical properties are restored after drying.

- Superwool Plus Board H is recommended when a high strength material is required
- Superwool Plus Board 85 is ideally suitable for applications up to 1000°C (1830°F)
- Superwool Plus Board LTI is recommended for applications where thin, rigid insulating panels are required such as domestic boilers
- Superwool HT Board offers the highest classification temperature up to 1300°C (2370°F)
- Superwool HT Board C is specially designed for application up to 1000°C (1830°F) requiring cycling resistance and high mechanical performances as in domestic boilers

## Benefits

- Thin boards is easily die-cut and all boards can be cut with a hacksaw blade allowing precise shapes to be made.
- Good thermal shock resistance allows use in applications with large variations in temperature
- Low heat storage capacity
- Can be used in direct contact with flame
- Very low thermal conductivity
- Exonerated from any carcinogenic classification under nota Q of directive 97/69 EC

## Applications

- Molten aluminum contact
- Furnace, kiln, and oven hot face linings
- Flue and chimney linings
- Insulation as backup to firebrick, insulating firebrick, refractory monolithics and rammed shapes
- Appliance and heat processing insulation

## Environmental & Health Safety

Superwool low biopersistent fibres are exonerated and are not classified as carcinogenic by IARC or under any national regulations on a global basis. They have no requirements for warning labels under GHS (Globally Harmonised System for the classification and labelling of chemicals).

In Europe, Superwool fibres meet the requirements specified under NOTA Q of European Directive 67/548. All Morgan Advanced Materials Superwool low biopersistent fibre products are therefore exempt from the classification and labelling regulation in Europe.



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# Superwool® Plus and HT Boards

Product Data Sheet

| Properties | Superwool Plus H | Superwool Plus 85 | Superwool Plus LTI | Superwool HT C | | Superwool HT |
|---|---|---|---|---|---|---|
| Colour | Tan | Tan | Tan | Tan | Tan | Tan |
| Classification Temperature, °C (°F) | 900 (1650) | 1000 (1800) | 1100 (2010) | 1150 (2100) | | 1300 (2370) |
| Density, kg/m$^3$ (pcf) | 520 (32.45) | 320 (19.97) | 350 (21.84) | 380 (24) | 480 (30) | 360 (22.46) |
| Modulus of Rupture, MPa (psi), *unfired | 3.5 (507.5) | 0.8 (116) | 1.5 (217.5) | 1.4 (203) | 2.6 (377) | 1.4 (203) |
| Thickness, mm (in) | 20-25 (0.8-1) | 20-50 (0.8-2) | 6-15 (0.24-0.6) | 20-50 (0.8-2) | 6-18 (0.24-0.72) | 10-50 (0.4-2) |
| Compressive strength @ 10% deformation, MPa (psi) | 1.1 (159.5) | 0.3 (43.5) | 0.3 (43.5) | 0.5 (73) | 0.6 (87) | 0.3 (43.5) |
| Water absorption after 2 hours, % | 2 | 2 | - | - | - | - |
| Permanent Linear Shrinkage, %, 24 hours, EU made products per EN (1094-1) | | | | | | |
| 900°C (1652°F) | 1.2 | - | - | - | - | - |
| 1000°C (1832°F) | - | 0.9 | - | - | - | - |
| 1100°C (2012°F) | - | - | 1 | - | - | - |
| 1150°C (2100°F) | - | - | - | 1.6 | 1.6 | 1.6 |
| **Chemical Analysis, %** | | | | | | |
| Alumina, $Al_2O_3$ | 11.2 | 10.1 | 4.4 | 6 | 8 | 1.4 |
| Silica, $SiO_2$ | 70.5 | 59.5 | 67 | 72 | 73 | 77.5 |
| Calcium oxide + Magnesium oxide, CaO + MgO | 15.1 | 28.2 | 27.4 | 20 | 17 | 20.3 |
| Ferric oxide + Titanium oxide, $Fe_2O_3 + TiO_2$ | 1.6 | 1.2 | 0.6 | 1 | 1 | 0.1 |
| Alkalis, as $Na_2O+K_2O$ | 1.6 | 1 | 0.6 | 1 | 1 | 0.7 |
| Loss on Ignition, LOI, after 2 hours heating, 800°C (1472°F) | 10 | 5 | 5 | 5.5 | 5.5 | 3 |
| **Thermal Conductivity, W/m•K (BTU•in/hr•ft$^2$•°F), per ASTM C201** | | | | | | |
| 200°C (392°F) | - | - | - | - | - | 0.05 (0.35) |
| 300°C (572°F) | 0.12 (0.83) | 0.07 (0.486) | 0.08 (0.56) | 0.07 (0.49) | 0.07 (0.49) | - |
| 400°C (752°F) | 0.13 (0.90) | 0.08 (0.56) | 0.09 (0.62) | 0.09 (0.62) | 0.09 (0.062) | 0.08 (0.56) |
| 500°C (932°F) | - | 0.08 (0.56) | - | - | - | - |
| 600°C (1112°F) | 0.15 (1.04) | 0.11 (0.76) | 0.12 (0.83) | 0.12 (0.83) | 0.12 (0.83) | 0.11 (0.76) |
| 800°C (1472°F) | - | 0.12 (0.83) | 0.15 (1.04) | 0.15 (1.04) | 0.15 (1.04) | 0.15 (1.04) |
| 1000°C (1832°F) | - | 0.16 (1.11) | - | - | - | 0.2 (1.39) |
| 1200°C (2192°F) | - | - | - | - | - | 0.26 (1.80) |





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# Superwool® Plus and HT Boards

Product Data Sheet

## Product Availability

Superwool Plus Board H, 85, LTI Boards and Superwool HT and Superwool HT C Boards are manufactured in Europe. Packaging is listed for the Europe regional business. Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative to support packaging availability for your regional business needs.

| Dimensions |
|---|
| Superwool Plus and Superwool HT Boards are available as standard size 1200mm x 1000mm |
| Superwool Plus Boards can be supplied with aluminium foiling on request. |

| Tolerances | | | |
|---|---|---|---|
| Superwool Plus H | 20mm thickness, max +/-1 | 25mm thickness, max +/-2 | |
| Superwool Plus 85 | 20mm thickness, max +/-1 | 25-50mm thickness, +/-2 | |
| Superwool Plus LTI | 6-9mm thickness, max +/-0.5 | 10-15mm thickness, max +/-1 | |
| Superwool HT | 10-20mm thickness, max +/-1 | 25-50mm thickness, max +/-2 | |
| Superwool HT C | 6mm thickness, max +/-0.5 | 10-20mm thickness, max +/-1 | 25-50mm thickness, max +/-2 |

Boards can be packed in cartons or on pallets which are shrink wrapped with recyclable plastic.





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# Superwool® Prime Blankets

Product Data Sheet

## Product Description

Superwool Prime Blankets, our newest fibre chemistry for applications requiring high performance with a classification temperature of 1300°C (2370°F), feature exceptional thermal and physical properties. Superwool Prime Blankets made using patented low shot technology offer improved mechanical performance with exceptional handleability. In addition, the blankets are flexible, soft to the touch, and less irritating during use due to the low shot fibre.

Superwool Prime Blankets exhibit outstanding insulating properties at elevated temperatures. Superwool Prime Blankets have excellent thermal stability and retain their original soft fibrous structure to its maximum continuous use temperature. Superwool Prime Blankets do not contain binder or lubricant and do not emit any fumes or smell during the first firing.

## Features

- Superior thermal conductivity
- Classification temperature of 1300°C (2370°F)
- Excellent handleability, flexibility, and tensile strength
- Low biopersistent fibre results in no carcinogen classification labelling

## Benefits

- Improved energy efficiency and heat storage from better insulation system providing opportunity for reduced CO2 emissions
- Excellent thermal performance in applications requiring high-temperatures allowing for design flexibility
- High tensile strength offers excellent choice in applications requiring more handling, flexing or vibration

## Product Availability

Superwool Prime Blankets are available in the following thicknesses by density. Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative to support providing specific packaging availability for your local business needs.

| Thickness, mm (in) | Density, kg/m$^3$ (pcf) | | | | |
|---|---|---|---|---|---|
| | 64 (4) | 80 (5) | 96 (6) | 128 (8) | 160 (10) |
| 6 (0.24) | | | | X | |
| 13 (0.51) | X | | X | X | |
| 25 (0.98) | X | X | X | X | X |
| 38 (1.52) | | | X | X | |
| 50 (1.97) | | | X | X | |

## Environmental & Health Safety

Superwool low biopersistent fibres are exonerated and are not classified as carcinogenic by IARC or under any national regulations on a global basis. They have no requirements for warning labels under GHS (Globally Harmonised System for the classification and labelling of chemicals).

In Europe, Superwool fibres meet the requirements specified under NOTE Q of European Directive 67/548. All Morgan Advanced Materials Superwool low biopersistent fibre products are therefore exempt from the classification and labelling regulation in Europe.



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# Superwool® Prime Blankets

Product Data Sheet

| Properties | Superwool Prime Blanket |
|---|---|
| Colour | White |
| Classification Temperature, °C (°F), EN 1094-1 (2008) | 1300 (2370) |
| Continuous Use Temperature, °C (°F) | 1150-1200 (2100-2190) |
| Melting Temperature, °C (°F) | 1438 (2600) |
| Density, kg/m$^3$ (pcf), EN 1094-1 (2008) | 64, 80, 96, 128, 160 (4, 5, 6, 8, 10) |
| **Tensile Strength, kPa (psi), EN 1094-1** | |
| Measured Density, 64 kg/m$^3$ (4 pcf) | 25 (3.62) |
| 80 (5) | 37 (5.37) |
| 96 (6) | 50 (7.25) |
| 128 (8) | 72 (10.44) |
| 160 (10) | 105 (21.75) |
| **Chemical Analysis, % weight basis after firing** | |
| Silica, $SiO_2$ | 64 - 70 |
| Calcium oxide, CaO | 29 - 35 |
| Other | <3 |

| Thermal Conductivity, W/m•K, per ASTM C201 | Superwool Prime Blanket | | | | |
|---|---|---|---|---|---|
| Density, kg/m$^3$ (pcf) | 64 (4) | 80 (5) | 96 (6) | 128 (8) | 160 (10) |
| 200°C | 0.07 | 0.06 | 0.06 | 0.05 | 0.06 |
| 400°C | 0.12 | 0.10 | 0.10 | 0.09 | 0.09 |
| 600°C | 0.19 | 0.17 | 0.16 | 0.13 | 0.13 |
| 800°C | 0.31 | 0.26 | 0.23 | 0.20 | 0.18 |
| 1000°C | 0.46 | 0.38 | 0.33 | 0.28 | 0.25 |
| 1200°C | 0.64 | 0.53 | 0.45 | 0.38 | 0.33 |
| **Thermal Conductivity, BTU•in/hr•ft$^2$, per ASTM C201** | | | | | |
| 500°F | 0.56 | 0.48 | 0.49 | 0.42 | 0.47 |
| 1000°F | 1.16 | 1.00 | 0.95 | 0.81 | 0.80 |
| 1500°F | 2.22 | 1.87 | 1.67 | 1.42 | 1.30 |
| 1832°F | 3.19 | 2.64 | 2.29 | 1.94 | 1.73 |
| 2000°F | 3.74 | 3.10 | 2.66 | 2.25 | 1.98 |
| 2200°F | 4.48 | 3.69 | 3.13 | 2.65 | 2.30 |





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# Superwool® Plus and HT Pyro-Bloc® Modules

Product Data Sheet

## Product Description

Superwool Plus and Superwool HT Pyro-Bloc Modules feature exceptional thermal and physical properties. With classification temperatures of 1200°C (2192°F) and 1300°C (2372°F), Superwool Pyro-Bloc Modules feature excellent performance in high erosion application atmospheres. Our Superwool Plus Pyro-Bloc Modules are manufactured using patented low biopersistent fibre manufacturing technology that produces an ultra low shot fibre product that features an improved handleability and nuisance dust is effectively eliminated.

Superwool Plus and Superwool HT Pyro-Bloc Modules come standard with a Y-Anchor or M-Anchor system for an easy installation and affixing to furnace, boiler or kiln linings. Pyro-Bloc Modules exhibit outstanding insulating properties at elevated temperatures and have excellent thermal stability and retain their original soft fibrous structure up to its maximum continuous use temperature. Additionally, Pyro-Bloc Modules monolithic structure permits maximum module-module compression and easily conforms to irregular steel shell surfaces during installation.

Please review the best internal anchoring hardware options with your regional Morgan Advanced Materials-Thermal Ceramics Sales Representative and Applications Engineering team. Additionally, we recommend following the Pyro-Bloc Design and Installation Guidelines for either Y-Anchor or M-Anchor hardware.

## Features

- Excellent thermal stability results in reliable and consistent thermal insulating performances:
- Immune to thermal shock
- Binder or lubricant free
- Thermal stability
- Low heat storage
- High erosion resistance no damage up to 50 m/sec :
  - Superwool Plus Pyro-Bloc tested at 1200°C (2192°F)
  - Superwool HT Pyro-Bloc tested at 1300°C (2372°F)
- Excellent resistance to chemicals and pollutants, especially alkali metals
- Excellent tensile strength
- Good sound absorption

## Applications

- Power generation especially HRSG stack and duct insulation
- Petrochemical and Refinery applications:
  - Ethylene Cracking Furnaces
  - Ammonia, Hydrogen and Methanol Reformers
  - Delayed Cokers and Refinery Heaters
  - Flare Stacks
- Industrial Furnace, Boiler and Heater linings
  - Iron & Steel
  - Ceramics

## Environmental & Health Safety

Superwool low biopersistent fibres manufactured by Morgan Advanced Materials are not classified as carcinogenic by IARC or under any national regulations on a global basis. They have no requirements for warning labels under GHS (Globally Harmonised System for the classification and labelling of chemicals).

In Europe, Superwool fibres meet the requirements specified under Note Q of European Regulation EC/1272/2008 (on Classification, Labelling and Packaging of substances and mixtures). All Morgan Advanced Materials Superwool low biopersistent fibre products are therefore exonerated from classification and labelling as hazardous in Europe.



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# Superwool® Plus and HT Pyro-Bloc® Modules

Product Data Sheet

| Properties | Superwool Plus Pyro-Bloc Module | Superwool HT Pyro-Bloc Module |
|---|---|---|
| Colour | White | White |
| Classification Temperature, °C (°F), EN 1094-1 (2008) | 1200 (2190) | 1300 (2370) |
| Continuous Use Temperature, °C (°F) | 1100 (2010) | 1200 (2190) |
| °Melting Temperature, °C (°F) | 1325 (2400) | 1425 (2600) |
| Density, kg/m³ (pcf), EN 1094-1 (2008) | 160, 192 (10, 12) | 160, 192, 240 (10, 12, 15) |
| Loss of Ignition, %, EN 1094-1 (2008) | | |
| 2 hrs @ 800°C (1472°F) | <1 | <1 |
| Linear Shrinkage, %, after 24 hours, EN 1094-1 (2008) | | |
| 1000°C (1832°F) | <1.5 | 0.2 |
| 1100°C (2012°F) | - | 0.5 |
| 1200°C (2192°F) | - | 0.8 |
| Chemical Analysis, % | | |
| Silica, $SiO_2$ | 62-68 | 70-80 |
| Calcium Oxide, CaO | 26-32 | 18-26 |
| Magnesium Oxide, MgO | 3-7 | <5 |
| Other | <1 | <3 |

| Thermal Conductivity, W/m•K, ASTM C201 | Superwool Plus Pyro-Bloc Modules | | Superwool HT Pyro-Bloc Modules | | |
|---|---|---|---|---|---|
| Density, kg/m³ (pcf) | 160 (10) | 192 (12) | 160 (10) | 192 (12) | 240 (15) |
| 200°C | 0.06 | 0.05 | 0.15 | 0.08 | 0.06 |
| 400°C | 0.11 | 0.09 | 0.17 | 0.12 | 0.10 |
| 600°C | 0.17 | 0.15 | 0.21 | 0.17 | 0.15 |
| 800°C | 0.24 | 0.21 | 0.30 | 0.25 | 0.22 |
| 1000°C | 0.32 | 0.28 | 0.40 | 0.33 | 0.29 |
| 1200°C | - | - | 0.54 | 0.44 | 0.39 |
| Thermal Conductivity, BTU•in/hr•ft²•°F, ASTM C201 | | | | | |
| 500°F | 0.51 | 0.42 | 1.06 | 0.63 | 0.51 |
| 1000°F | 1.04 | 0.90 | 1.37 | 1.07 | 0.93 |
| 1500°F | 1.71 | 1.49 | 2.09 | 1.74 | 1.54 |
| 1832°F | 2.22 | 1.94 | 2.78 | 2.29 | 2.01 |
| 2000°F | 2.50 | 2.20 | 3.21 | 2.64 | 2.34 |
| 2200°F | - | - | 3.77 | 3.06 | 2.71 |

## Product Availability

Superwool Pyro-Bloc Modules are manufactured and available globally, but packaging, density and thickness availability will vary by region.

Please contact your regional Morgan Advanced Materials - Thermal Ceramics representative to support providing specific packaging availability for your local business needs.



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# Superwool® Sealcoat™ HT

**Product Description**

Superwool Sealcoat HT insulation is composed of Superwool HT, a low bio-persistent fiber, organic polymers, inorganic binders and other proprietary ingredients. This product is a pliable, low shrinkage, putty-like material that is supplied wet and premixed, ready for installation by a pneumatically applied system. The product is designed to seal furnace lining cracks and can be used as a hot face coating over fiber insulation and other refractory surfaces to restore and improve lining performance.

**Aluminum Resistant Cup Test**

7075 alloy, 1500°F (816°C), 72 hours -
no penetration

**Features**

- Pliable, putty-like material composed of low bio-persistent fibers, proprietary ingredients and inorganic binders
- Ready to use
- Resistant to thermal and mechanical breakdown
- Non-wetted in molten aluminium

**Applications**

- Grout refractory joints and gaps
- Hot face coating over fiber or dense refractory
- Seals furnace lining cracks
- Back-up lining
- Furnace maintenance and emergency repairs

**Installation**

The HS-100 Extrusion pump is a piston extrusion pump which has been modified to pump Superwool Sealcoat HT in a fast, efficient manner. These modifications optimize the pump's capabilities to provide a complete delivery system. The Sealcoat Spray Nozzle assembly is designed to work in conjunction with the HS-100 Extrusion pump. The combined system allows for an efficient wet gunning technology. Sealcoat can also be applied by trowel or caulking gun.

**Availability**

| Products | 1 gallon pail | 5 gallon pail | 11 oz caulking tube | 32 oz caulking tuber |
|---|---|---|---|---|
| Superwool Sealcoat HT | X | X | X | X |

# Superwool® Sealcoat™ HT

| Mastics Product Name | Superwool Sealcoat HT |
|---|---|
| Fiber Class | AES |
| Material Grade | Coating |
| **Physical Properties** | |
| Color | off white |
| Continuous Use Temperature, °F | 2800 |
| Continuous Use Temperature, °C | 1538 |
| Classification Temperature, °F | 2900 |
| Classification Temperature, °C | 1593 |
| Density, dried @ 230°F, pcf | 32-36 |
| Denisty, dried @ 110°C, kg/m$^3$ | 513-577 |
| Density, wet, pcf | 75 |
| Denisty, wet, kg/m$^3$ | 1201 |
| Yield, cubic ft / gal | 0.13 |
| Yield, cubic m / L | 0.004 |
| Solids, % | 46 |
| Shelf life, months | 12 |
| Aluminum Resistant cup test | |
| 1500°F (816°C), 707.5 alloy, 72 hours | No penetration |
| Modulus of Rupture, MOR, dried, psi | |
| 230°F | 200 |
| 2400°F | 210 |
| Modulus of Rupture, MOR, dried, MPa | |
| 110°C | 1.38 |
| 1315°C | 1.45 |
| Compressive strength @ 10% deformation, dried, psi | |
| 230°F | 150 |
| Compressive strength @ 10% deformation, dried, MPa | |
| 110°C | 1.04 |
| Compressive strength @ 10% deformation, fired, psi | |
| 2000°F | 225 |
| 2400°F | 230 |
| Compressive strength @ 10% deformation, fired, MPa | |
| 1093°C | 1.55 |
| 1315°C | 1.59 |

# Superwool® Sealcoat™ HT

| Mastics Product Name | Superwool Sealcoat HT |
|---|---|
| Permanent Linear Shrinkage, %, 24 hours | |
| 2000°F (1093°C) | -1.4 |
| 2400°F (1316°C) | -1.4 |
| 2600°F (1426°C) | -1.5 |
| 2800°F (1538°C) | -1.6 |
| **Chemical Analysis, % weight basis after firing** | |
| Silica, $SiO_2$ | 86 |
| Calcium oxide, CaO | 12 |
| Other | 2 |
| **Thermal Conductivity, BTU•in/hr•ft², per ASTM C201** | |
| 500°F | 0.8 |
| 1000°F | 1 |
| 1500°F | 1.4 |
| 2000°F | 2 |
| **Thermal Conductivity, W/m•K, per ASTM C201** | |
| 260°C | 0.11 |
| 538°C | 0.14 |
| 816°C | 0.2 |
| 1093°C | 0.29 |

Data sheet

ENGLISH

# Superwool® VF Shapes and Boards

**Metric information** - Page 2

## Description

Vacuum-forming allows the production of a variety of configurations, tailored to the particular application and ranging from simple sections (such as tubes, cones and flat shapes) to complex shapes (such as combustion chambers).

Good cohesive strength high operating temperature and excellent insulating properties make Superwool® Plus™ VF and Superwool® HT™ VF products suitable for various applications.

**Superwool® Plus™ VF** is a vacuum formed insulating product made from a mixture of Superwool® Plus™ fibres, refractory constituents and organic binders.

**Superwool® Plus™ Strong VF** is produced by the addition of selected refractory fillers in order to maximize the mechanical properties and the resistance to erosion of the final product.

**Superwool® Plus™ Carton** is produced by the addition of selected Superwool®Plus™ fibres, both organics and inorganics binders. Boards in Superwool®Plus Carton are thin and rigid.

**Superwool® HT™ VF** is a vacuum formed insulating product, made from mixture of Superwool®HT™ Fibres, refractory constituents and organic binders.

**Superwool® HT 2™ VF** offers record performances compared to the original formula because of its resistance to higher temperature, while maintaining a low thermal conductivity and good resistance to erosion. Use in conditions with repeated shocks must be avoided.

**Superwool® Plus™ LB™ and Superwool® HT™ LB VF** are tailored products, flexible and offer a good resistance and facilitate installation in which, rigid products are not suitable.

## Type

Vacuum formed shapes & boards manufactured from high temperature insulation wool.

## Classification temperature

From 1200°C to 1450°C

The maximum continuous use temperature depends on the application. Unaffected by most chemicals except strong alkalis, phosphoric acid and molybdenum. For further advise please contact your local Morgan Thermal Ceramics partner.

## Standard grades

**Superwool® Plus™ VF**
Standard formula based on Superwool® Plus™ Fibre

**Superwool® Plus Strong™ VF**
Dense formula based on Superwool® Plus™ Fibre

**Superwool® Plus™ Carton**
Thin boards or cutting pieces based on Superwool® Plus ™ Fibre

**Superwool® HT™ VF**
Standard formula based on Superwool® HT™ fibre

**Superwool® HT 2™ VF**
Dense formula based on Superwool® HT™ fibre and additives
High resistance against molten iron and steel

**Superwool® Plus™ LB™ and Superwool® HT™ LB VF**
Flexible formulae based on Superwool® Plus™ VF fibres or Superwool® HT™ VF fibres

## Typical applications

- Riser sleeves and crucibles for ferrous and non ferrous molten metals
- Stopper nut insulation
- Ladle shroud gasket
- Nozzle insulation in continuous casting
- Roller inserts in roller hearth furnace
- Glass casting mould
- Tube insulation end in tube fumes boiler
- Insulation for domestic appliance
- Furnace insulation

## Benefits

- Easy to use
- 'Tailor made' shapes
- Homogeneous structure
- Low thermal conductivity
- Good erosion resistance and rigidity
- Excellent hardness properties
- Excellent thermal shock resistance
- Low heat storage, lightweight
- Good cycling performance (standard formula)
- Molten iron & steel resistance
- No reaction with alumina based bricks in application in the range of typical use temperature
- Flame resistant
- Easy to machine
- Exonerated from any carcinogenic classification under nota Q of directive 97/69 CE

Data sheet

Metric information

# Superwool® VF Shapes and Boards

## Special treatment

Superwool hardener or Superwool cement may be applied should it be necessary to surface treat or glue to other substrates.

Superwool® Boards and Shapes (except Superwool® HT LB) can be pre-fired should it be necessary.

| | Superwool® Plus™ VF | Superwool® Plus™ Strong VF | Superwool® Plus™ Carton | Superwool® Plus™ LB | Superwool® HT™ VF | Superwool® HT 2™ VF | Superwool® HT™ LB |
|---|---|---|---|---|---|---|---|
| **Classification temperature °C** | 1200 | 1200 | 1200 | 1200 | 1300 | 1450 | 1100 |
| **Colour** | White/tan | White/tan | White/tan | White/tan | White/tan | White/tan | White/tan |
| **Density, kg/m³** | 280 | 380 | 290 | 260 | 320 | 335 | 250 |
| **Modules of rupture, MPa** | | | | | | | |
| Unfired | 1.15 | 2.01 | 1.47 | Flexible | 1.1 | 1.87 | Flexible |
| Fired | 0.52 | 0.9 | - | - | - | - | - |
| **Loss of ignition, %** | 5 - 7 | 5 - 7 | 7 | 5 - 7 | 6 | 4 | 5 - 7 |
| **Compressive strength, MPa** | | | | | | | |
| 5 % compression | 0.13 | 0.3 | - | - | - | - | - |
| 10 % compression | 0.16 | 0.38 | - | - | - | - | - |
| **Thermal Conductivity, ASTM C-201, W/m K** | | | | | | | |
| à 400°C | 0.08 | 0.09 | 0.07 | 0.08 | 0.10 | 0.08 | 0.04 |
| à 600°C | 0.12 | 0.12 | 0.10 | 0.12 | 0.13 | 0.12 | 0.08 |
| à 800°C | 0.16 | 0.14 | 0.15 | 0.16 | 0.19 | 0.18 | 0.15 |
| à 1000°C | 0.2 | 0.17 | - | 0.20 | 0.24 | 0.25 | 0.24 |
| à 1200°C | - | - | - | - | 0.31 | 0.33 | 0.25 |
| à 1300°C | - | - | - | - | - | 0.38 | - |
| **Permanent linear shrinkage after 24 hours isothermal heating, %** | | | | | | | |
| 1100°C | <2 | <2 | <2 | - | - | - | <2 |
| 1250°C | - | - | - | <2 | <2 | - | - |
| 1400°C | - | - | - | - | - | <2 | - |

## Superwool® Plus™ Carton

## Standard dimensions in mm:

1000*500*3 mm
1000*500*4 mm
1000*500*5 mm
1000*500*6 mm
1000*500*8 mm

Other thicknesses and sheet sizes can be supplied to special order.


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