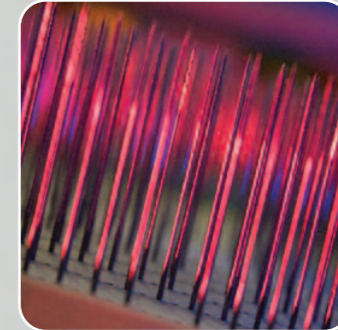


Morgan Thermal Ceramics

Morgan Thermal Ceramics is a business within the Morgan Ceramics Division of The Morgan Crucible Company plc. Morgan Thermal Ceramics supplies optimum engineered insulation solutions to a diverse range of markets and end users. For over 50 years and in all areas of industry where heat plays a role, Morgan Thermal Ceramics has lead the way bringing technical solutions to all problems of heat containment.

We are the clear market leaders in our core products high temperature insulating fibres, insulating firebricks and monolithic refractories. We design, manufacture and install these solutions through an integrated and extensive network in over 50 locations worldwide, with more than 30 manufacturing sites that truly reach all regions of the globe. With our comprehensive product portfolio and global footprint, we have adopted a leading position, within the fields of international projects including chemical processing, iron & steel, power, heat recovery steam generation (HRSG), ceramics & glass, cement, aluminium and non-ferrous, transportation, domestic / OEM and fire protection.

We are committed to environmental sustainability through our product development programmes and we strive to minimise the impact of our operations on the environment.



Superwool® insulating fibre



Morgan Thermal Ceramics solutions

Our Superwool® brand is globally recognised as the leading brand in high temperature low biopersistent fibre insulation, noted for its reliability and environmental benefits. All members of the Superwool® family are exonerated under the current EU H&S regulations.

Morgan Thermal Ceramics developed low biopersistence fibres and has led the revolution in their use in high temperature insulation over the last 20 years. Our Superwool® products are patented technology - Superwool® Plus™ fibre and Superwool® 607® HT™ fibre are available only from Morgan Thermal Ceramics.

Together, Superwool® Plus™ and Superwool® 607® HT™ offer an unequalled range of low biopersistence high temperature insulating fibre products. Our Superwool® brand has consistently lead the market with good value and reliable quality resulting in brand loyalty. Our commitment to research and development ensures we continue to deliver Superwool® fibre products enabling you to be proactive in meeting your environmental and health and safety obligations and ensuring the Superwool® brand continues to succeed for you.



Product Portfolio

The following products are available in a variety of Superwool® grades:

- Blanket
- Bulk
- Modules, Log & Block
- Board
- Vacuum Form & Shapes
- Paper
- Felt
- Textile
- Mastic
- Pyro-Bloc®



Superwool® is globally recognised as the leading brand in high temperature low biopersistent fibre insulation

Superwool® insulating fibre - the leading brand in high temperature low biopersistent fibre insulation

Superwool® fibre is a high-temperature insulating wool composed of man-made vitreous silicate fibres.

Superwool® fibre is exonerated from the carcinogen classification in the European Union under the terms of NOTA Q of European Directive 67/548.

Superwool® fibre has been developed to show improved high temperature characteristics required to act as an alternative to RCF. The Superwool® fibre family of products offer a versatile alternative to traditional insulation solutions for commercial, industrial and transportation applications.

Morgan Thermal Ceramics Superwool® fibre patented technology is available in a variety of forms including bulk, blanket, boards, felt, paper, vacuum-formed, pyro-logs, pyro-blocs, z-blocs and mastic products.



Superwool® product grades

Superwool® Plus™ fibre:

classification 1200°C

An engineered solution which saves energy and respects the environment.

Superwool® 607® HT™ fibre:

classification 1300°C

The only low biopersistent fibre available with a classification temperature of 1300°C.

Benefits

- Excellent thermal insulation properties
- Free of binder or lubricant
- Thermal stability
- Exonerated from any carcinogenic classification under NOTA Q of European Directive 67/548
- Low thermal conductivity
- Good handleability with no tearing or breakages
- Excellent thermal shock resistance
- Low heat storage capacity
- Inorganic - smoke free
- Flexible and resilient
- Immune to thermal shock
- Good sound absorption
- Potential savings on waste disposal
- Ease of installation saving time and waste
- Potential savings on waste disposal and a reduction in CO₂ emissions
- Lower shot content than all other alkaline earth silicate (AES) and refractory ceramic (RCF) fibres
- Efficient prevention of heat transfer and greater strength with up to 30% more fibres

Why you should use Superwool® fibre for industrial furnace applications

Providing energy saving solutions for industrial furnace applications.

Superwool® insulating fibre is ideal for applications such as annealing furnace linings or used as the back up insulation in higher temperature furnaces. In all cases, it offers improved insulation properties resulting in lower heat losses. Superwool® products are used to line the kiln and kiln cars that make bricks for external brickwork, kilns that fire the sanitary ware and tiles for bathrooms and kitchens.

Key markets:

- Iron & Steel
- Aluminium
- Ceramics

Key applications using Superwool® insulating fibre:

- Reheating furnaces
- Roofs for ladles
- Annealing furnaces
- Roller hearth kilns

Benefits using Superwool® insulating fibre:

- Exonerated from Carcinogen classification under Nota Q of European Directive 67/548
- Lightweight and excellent heat resistance
- Easy and fast installation
- Good mechanical resilience



Why you should use Superwool® fibre in the automotive / transportation industry

Providing engineered solutions to the automotive and transportation industry.

As automotive technologies advance in response to regulatory and consumer preference changes, new materials and systems are required to solve thermal, noise reduction, high temperature filtration and friction related issues. Superwool® insulating fibre can withstand high vibration for many transportation applications.

Key markets:

- Automotive, motorcycles and scooters
- Aerospace
- Trucks and busses

Key applications using Superwool® insulating fibre:

- Filtrations and Friction
- Exhaust systems and heat shields
- Air ducts
- Noise mufflers
- Diesel particulate filters

Benefits using Superwool® insulating fibre:

- Exonerated from Carcinogen classification under Nota Q of European Directive 67/548
- Good vibration performance
- Increase brake friction pad stability
- Good noise reduction
- Flexible for customised shapes
- Meets stringent emission control regulations



Why you should use Superwool® fibre in the HRSG industry

Providing environmental solutions to the heat recovery steam generation (HRSG) industry.

Morgan Thermal Ceramics works with leading companies in combined cycle technology to supply high performance, high temperature ceramic thermal insulation materials for HRSGs. Superwool® Plus™ can be used in both single cycle HRSGs and combined cycle HRSGs giving many benefits and cost savings.

Tests in HRSG steel liner construction have shown that the normal insulation performance can be achieved easily using only 80% of the normal insulation thickness. This allows the duct walls to be reduced in thickness saving costs in the steel mounting studs and more importantly, allowing the HRSG panels to be shipped more efficiently.

Superwool® offers the advantages of low biopersistence, proven insulation performance and availability worldwide from Morgan Thermal Ceramics network of manufacturing facilities. Superwool® Plus™ low biopersistent fibre is a proven solution in HRSG applications, resulting in a lower cost of installed labour and the possibility of engineering into a smaller footprint, which would result in lower costs for the unit.

Key markets:

- Power plants
- Single cycle HRSGs
- Combined cycle HRSGs

Key applications using Superwool® insulating fibre:

- HRSGs
- Duct lining
- Shroud
- Auxiliary burners
- Hot spot repairs
- Stacks
- Silencers

Benefits using Superwool® insulating fibre:

- Exonerated from Carcinogen classification under Nota Q of European Directive 67/548
- Only 80% of the normal insulation thickness is required
- Potential savings in the steel mounting studs
- Potential saving in installation costs
- Resilient and robust
- Velocity resistant
- Flexibility and versatility of anchoring
- No shroud required



Why you should use Superwool® fibre in the domestic / OEM marketplace

Providing energy and environmental solutions in the domestic appliances / OEM marketplace.

Manufacturers of domestic appliances such as ovens and storage heaters have long appreciated Superwool® insulating fibre for its high temperature resistance and totally odour free properties.

Superwool® insulating fibre satisfies increasing demand in the heater industry for more efficient, lighter and smaller units.

Superwool® insulating fibre offers thin insulation with low thermal conductivity giving advantages with designs in reducing the thickness of material or simplifying assembly.

In cooking appliances, thermal insulation is used predominantly in ovens and ranges, where it prevents heat loss through conduction in gas, electric and dual fuel appliances. It is also used in some electric and dual fuel cooking tops to prevent heat transfer.

Key applications using Superwool® insulating fibre:

- Domestic and commercial cooking equipment
- Heaters: boilers/spa and pool heaters
- Small and large appliances: iron, cooker, microwaves
- Hearth: fireplace logs, panels, flue liners

Benefits using Superwool® insulating fibre:

- Exonerated from Carcinogen classification under Nota Q of European Directive 67/548
- Soft to the touch, operator satisfaction
- Virtually dust free
- No odor or smoke emissions
- High thermal cycling resistance
- Improved physical and mechanical properties



Typical applications and markets we serve

Tunnel kiln cars | typical application: Expansion joints

- product: **Superwool® 607® HT™ blanket**
- Temperature: 1060-1150°C. Good resiliency. Good brick compatibility.

Cast slab production kiln | typical application: Insulating steel ducts for high temperature drying

- product: **Superwool® Plus™ blanket**
- Superwool® 607® Blanket was used for insulating the steel ducts for high temperature drying (500-600°C) of our Casal cast slab production kiln to avoid condensation of SO₂ (Sulphur Oxide).
 - 2 x Superwool® 607® 96kg/m³ 25mm thickness was used including an aluminium sheet.

LNG vessels | typical application: LNG underground storage tanks

- product: **Superwool® 607® HT™ blanket**
- Using 2 x Superwool® 607® 96kg/m³ 50mm thickness
 - Superwool® blanket was used for the heat treatment of the LNG vessel following fabrication, to be disposed of after single use. Material was lifted to the top of the mobile working platform. A pipe was passed through the centre of the roll for support while rolling out, and the leading edge drawn over the vessel.

OEM | typical application: Wall boiler insulation

- product: **Superwool® 607® WB board**
- Approved by leading wall boiler manufacturers because of its high thermal cycling resistance and good insulation performance.

typical application: Protective sleeves for heating tubes in an exhaust gas boiler

- product: **Superwool® 607® HT™ shapes**
- Temperature can be as high as 1100°C with high speed gas velocities (possible hardening the surface of the piece for increased gas velocity resistance).
 - High thermal shock resistance and good insulation performance.

Aluminium | typical application: Anodes

- product: **Superwool® 607® HT™ blanket / paper**
- When anodes require changing the electrolytic pot is emptied, Superwool® 607® HT™ blanket is applied on top of the anode in order to retain the heat of the anode and have faster preheating of the pot cell when the anode is changed.
 - Superwool® 607® HT™ Paper used as Gasket Cup test with molten aluminium (800°C). Good thermal performance. Non wet ability of Superwool® 607® HT™ Paper with molten aluminium. Good insulation resistance.

typical application: Carbon bake

- product: **Superwool® Plus™ paper / mastic / textiles**
- The low shrinkage and high tensile strength makes Superwool® Plus™ suitable for gaskets (peep hole, burner port, flue joint) and expansion joints in carbon bake furnaces. Mastic versions of the product are extremely effective in carbon bake pit corner sealing applications. Superwool® is also available in braid form for sealing.

typical application: Cast house

- product: **Superwool® Plus™ modules / VF shapes / blanket**
- We can also supply modules for the furnace exhaust hood. Launder gaskets, launder cover blankets, paper seals for spouts and filter inserts and filter boxes, vacuum formed spouts, launder insulation, and a range of thermal and sealing applications.

typical application: Pot lines

- product: **Superwool® Plus™ board / blanket**
- Board and blanket for pot line start up kits, blanket insulation for cell covers, collector bar expansion joints and seals for cast iron rodding.

Non-ferrous/aluminium tilting furnaces | typical application: Flexible launders inserts

- product: **Superwool® Plus™ blanket**
- Flexible launder inserts offer a complete solution for tilting furnace metal transfer and can be installed with minimal plant modification providing both long life and ease of replacement. An inner lining of high temperature textile is insulated with a layer of 25mm Superwool® Plus™ blanket. This insulation allows the outer textile support layer to withstand the operating temperatures of the molten alloy, which gives additional support to the multiple layers to support the mass of the molten flow. The inner lining withstands repeated casts while remaining flexible for many casting cycles. The strength of the fabrication and the design of the installation fully support the weight of the molten alloy flow from the furnace, thus allowing complete replacement of the rigid launder section tilting mechanism.

Glass | typical application: Float glass

- product: **Superwool® 607® HT™ blanket**
- Currently used by a leading manufacturer of flat glass in its float glass furnace as insulation for float glass preheating using board and blanket.

typical application: Glass casting moulds

- product: **Superwool® 607® HT™ VF board**
- Molten glass corrosion resistance and good surface aspect of the glass limiting machining thickness required.

Iron & steel | typical application: Insulation when repairing coke oven

- product: **Superwool® 607® HT™ blanket**
- Standard applications for Superwool® 607® HT™ in coke oven battery are 5hrs @ 1315°C.
 - Gaskets/seals for coke oven doors.
 - Protection for workers if they have to work in front of the kiln with Superwool® 607® HT™ blanket.
 - Good insulation performance.
 - Good protection of workers.

typical application: Ladle slide gate insulation

- product: **Superwool® 607® HT™ blanket**
- Temperature: 1100°C: after two castings, the blanket thickness (on the edge but also in the middle of the piece) is still at 20mm (25mm before casting).
 - Good dimension stability and good insulation performance.

typical application: Tundish cover and stopper insulation

- product: **Superwool® 607® HT™ board - Superwool® 607® HT™ VF shapes**
- Tundish cover in Superwool® 607® HT™ board and stopper insulation in two halves Superwool® 607® HT™ VF shapes.
 - Estimated temperature: 1200-1300°C.

typical application: Tundish dryer cover insulation

- product: **Superwool® 607® HT™ board / Superwool® 607® HT™ VF shapes**
- Good dimension stability and good thermal performance. Humidity resistance. 900°C high humidity.

typical application: Shrouding tube gaskets

- product: **Superwool® 607® HT™ VF shapes**
- Between ladle collector nozzle and ladle shroud seat. Good dimension stability.
 - Keeping a very good seal during casting. High thermal shock performance.

typical application: Ingot casting ladle shrouds

- product: **Superwool® 607® HT™ VF shapes**
- Between ladle collector nozzle and ingot feeder tube. Good mechanical strength.
 - Keeping a very good seal during casting. High thermal shock performance.

typical application: Roller inserts

- product: **Superwool® 607® HT™ VF shapes**
- Placed at the extremity of the rollers in the wall linings; surrounded by heavy refractory.
 - Easy to take shape away for maintenance.
 - Good insulation properties.

typical application: Riser sleeves

- product: **Superwool® 607® HT™ VF shapes**
- Good thermal shock performance.
 - Good molten steel resistance. **Test for approval:** 90 seconds exposure in molten steel (1600°C).

typical application: Steel heat treatment furnace

- product: **Superwool® 607® HT™ blanket**
- Used as back of JM23 in heat treatment furnace at 1100-1150°C max.

typical application: Annealing furnace doors

- product: **Superwool® 607® HT™ blanket**
- Using layer by layer technique: working temperature = 980°C.
 - Easy installation because of good mechanical properties.
 - Good insulation performance.