ims

Product Portfolio

An SIG insulations company

ims

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IMS is the UK's largest distributor of high temperature insulation and refractory materials

and has an unrivalled portfolio of equipment for die cutting and machining parts.

NATIONAL SUPPORT

The IMS group operate through five UK sites ensuring they can supply materials and technical support when and where, you the customer require our assistance.

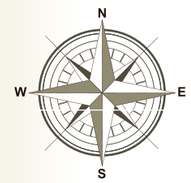
CREDENTIALS

As a subsidiary of SIG and with over forty years' service to the industry, IMS is well placed to offer a vast product range for all applications supported by highly experienced personnel. The machine shops are fully equipped with the latest state of the art CNC machinery, including machining centres, mills, routers, lathes, saws, presses and sanders.

CUSTOMER COMMITMENT

IMS is committed to the customer and our ability to rapidly respond to customer requirements will always remain our priority - it is a key factor in the success of our company. The outstanding growth of IMS is testament to the belief our customers have in our company, its products and the service we provide.

ims UK



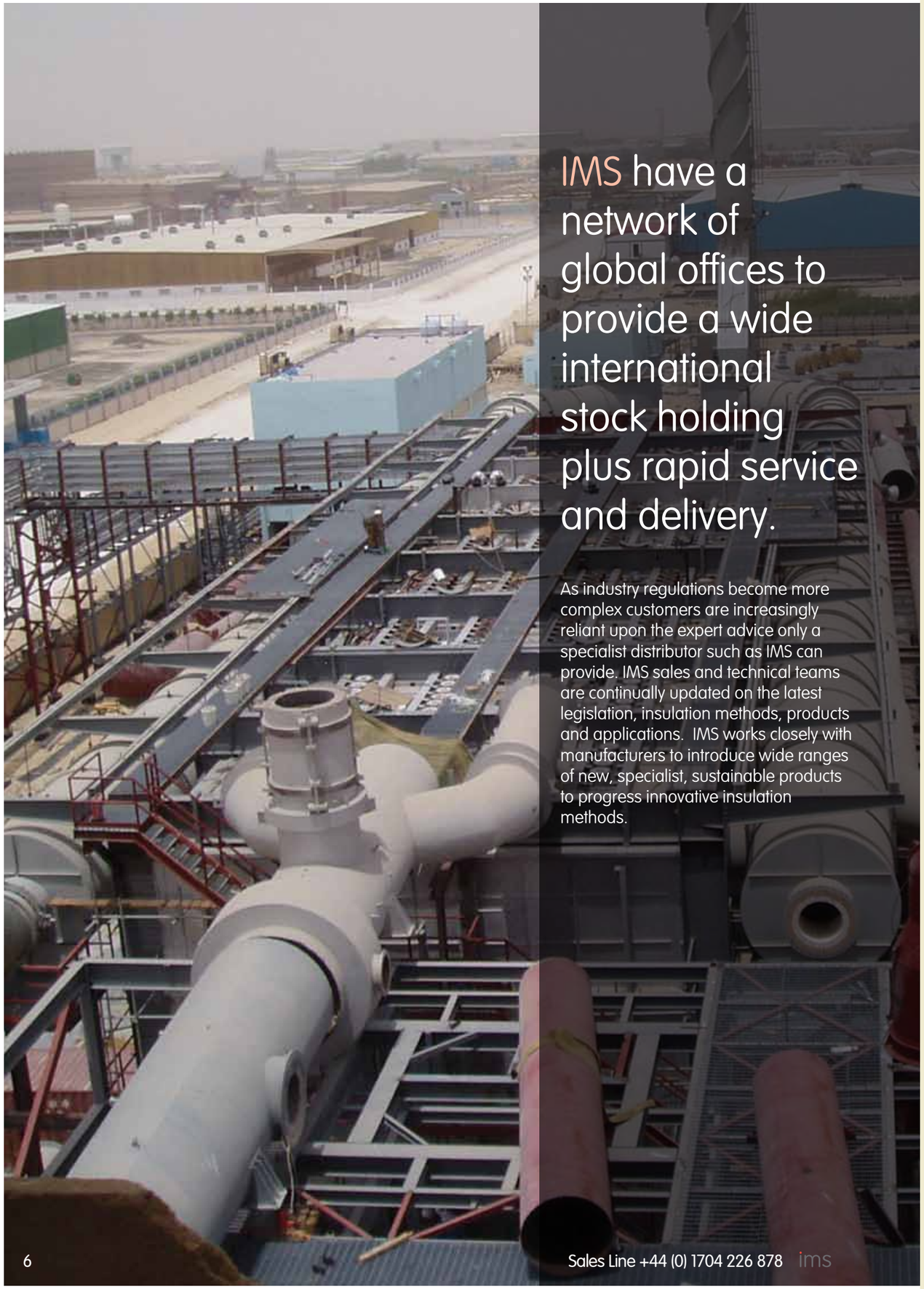
1. IMS Head Office
Unit 15
Slaidburn Industrial Estate
Slaidburn Crescent
Southport
PR9 9YF
T: +44 (0)1704 226878
F: +44 (0)1704 225857

2. IMS Bromborough
Dock Road South
Bromborough
Wirral
CH62 4SP
T: +44 (0)151 645 9000
F: +44 (0)151 645 6987

3. IMS Midlands
Building 62, Third Avenue
Pensnett Trading Estate
Kingswinford, West Midlands
DY6 7XT
T: +44 (0)1384 270761
F: +44 (0)1384 270768

4. IMS Chesterfield
Unit 1
Sheepbridge Centre
Sheepbridge Lane
Chesterfield
Derbyshire
S41 9RX
T: +44 (0)1246 572589
F: +44 (0)1246 572594

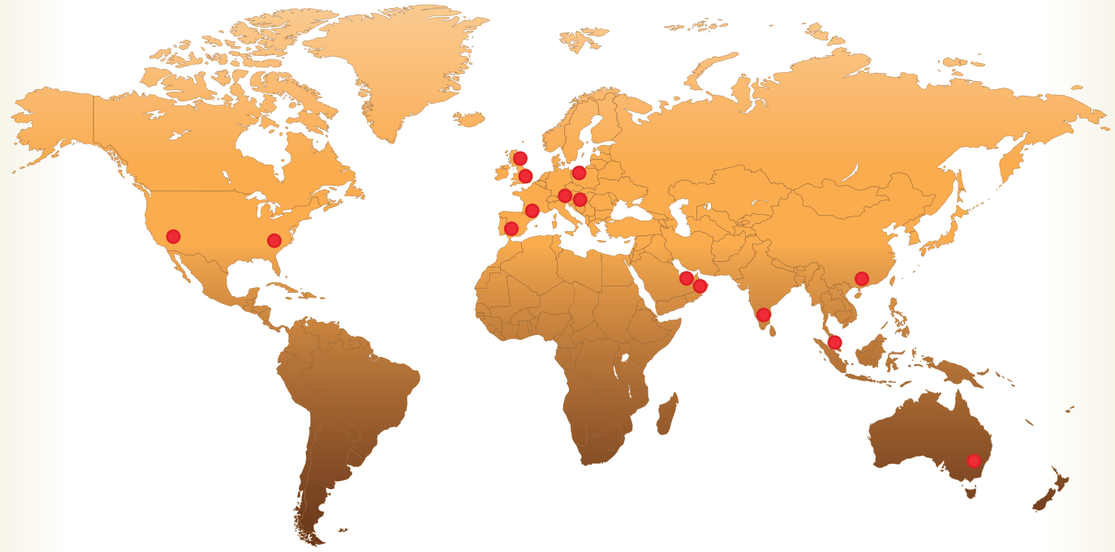
5. IMS Central Refractories
10 Meadow Street
Falkirk
Stirlingshire
FK1 1RP
T: +44 (0)1324 624412
F: +44 (0)1324 626923



IMS have a network of global offices to provide a wide international stock holding plus rapid service and delivery.

As industry regulations become more complex customers are increasingly reliant upon the expert advice only a specialist distributor such as IMS can provide. IMS sales and technical teams are continually updated on the latest legislation, insulation methods, products and applications. IMS works closely with manufacturers to introduce wide ranges of new, specialist, sustainable products to progress innovative insulation methods.

ims Worldwide Offices



IMS Head Office
Unit 15
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PR9 9YF United Kingdom
T: +44 (0) 1704 226878
F: +44 (0)1704 225857

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Dock Road South
Bromborough, Wirral
CH62 4SP United Kingdom
T: +44 (0) 151 645 9000
F: +44 (0) 151 645 6987

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Pensnett Trading Estate
Kingswinford, West Midlands
DY6 7XT United Kingdom
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Unit 1,
Sheepbridge Centre
Sheepbridge Lane
Chesterfield, Derbyshire
S41 9RX United Kingdom
T: +44 (0)1246 572589
F: +44 (0)1246 572594

IMS Central Refractories
10 Meadow Street
Falkirk, Stirlingshire
FK1 1RP United Kingdom
T: +44 (0)1324 624412
F: +44 (0)1324 626923

IMS Dubai
PO: BOX 215851
Unit A3 597-201
Dubai Investment Park 2
Dubai, United Arab Emirates
T: +971 4 885 8399
F: +971 4 885 8398
e: steve.day@ims-dubai.com

IMS China
SIGhti- MIT International
Trade Room 3206 Building No.3 of
Admiral City
No. 131 Minzu Avenue
Nanning Guangxi 530028, P. R. China
T: +36 30 952 2794
F: +36 28 504086

IMS Espana
SiGhti- MIT International Trade S.L.
Ctra. Sarrià a Vallvidrera, 259 local
08017 Barcelona, Spain
T: +34 93 406 9885
F: +34 93 406 9891

IMS Hungary
SIGhti-MIT International Trade
H-2191 BAG Jókai u 44/A
T: +36 30 952 2794
F: +36 28 504086
e: gabor.odor@ims-insulation.com

IMS Machining & Fabrication

IMS specialise in the manufacture, machining and supply of high temperature insulation materials and components for use throughout industry world-wide.

Machining

We have locations across the UK and outlets throughout the world to ensure we provide the most comprehensive range of insulation materials and technical support to our customers. With over forty years service to industry, we have products that serve all industrial sectors including Power Generation, Petrochem, Rail, Offshore, Steel, Aluminium, Glass, Incineration, OEM's and Induction Heating.

IMS works in conjunction with many of the world's leading manufacturers and suppliers of insulation products. With this joint approach you can be assured that you will be receiving products of outstanding quality with the full support of IMS and the material manufacturer.

Customer Service

Our ability to rapidly respond to customer requirements will always remain our priority and has been a key factor in the success of our company to date. The outstanding growth of IMS is testament to the belief our customers have in our company, its products and the high level of service provided.

Capacity

Our UK factories are well equipped with the latest CNC machine centers, lathes, presses and saws. We are able to produce bespoke, intricately machined parts in small quantities all the way up to large contract call off orders.

MACHINES

HIGH SPEED MORBIDELLI ROUTERS
(Universal 3612) CNC

Table cap
3.6mtrs x 1.2mtrs Vacuum matrix

18 / 24 rpm variable point to point
0- 20 feet per min

YANG EAGLES MACHINE CENTRES

XYZ= 1000mm X 500mm X 250mm

Variable Spindle speed 0 - 6000rpm

2 XYZ DPM VERTICAL
CNC / NC machine centres

Table cap
1000mm x 500mm x 200mm

Variable Spindle speed 0-4000rpm

VERTICAL TURRET MILLS / NC

XYZ= 700mm x 300mm x 200mm

Variable spindle speed 0-4000rpm

CNC LATHE COLCHESTER
MULTITURN 2000

Complete with

254 dia Kitigawa power chuck

400mm swing over bed
x 1250mm between centres

NC LATHES

M300 1mtr x 0.2 swing

NC LATHES

Concord 1.5mtr x 0.25 swing

SAWS

3MTR BEAM SAWS

Variable cutting speed 0-3000rpm

Variable Traverse 0- 20mtrs min

Thickness capacity 0-100mm

Max sheet size capacity
3mtr x 3mtr x 0.1mtr

SICAR FLAT BED SAWS

Superior 3200

Variable RPM 0-3000

2.4Mtr X 1.2Mtr capacity

PRESSES

SAMCO PRESSES

Travelling head TH-130

Bed Capacity 1.8mtrs x 0.75mtr x 150 stroke 30 ton

HAWKS BEAM PRESSES

Fixed Beam
1.8mtr x 0.75 x 200mm Stoke

25 ton

FINISHING

DMC UNISAND 2000

Wide belt sander 1300 width capacity

Twin head

Variable feed speed
0-10mtrs min

Variable Height 0-200mm

Ceramic fibre blanket is composed of long, flexible, interwoven fibres manufactured by the "blown" and the "spun" process yielding a strong, lightweight yet durable blanket for applications in a temperature range from 538°C (1000°F) to 1480°C (2700°F).

Fibre blanket is also availble in body soluble grade.

product link

ceramic fibre adhesive
rigidizer
ceramic fibre mastic

format

cut sizes	✔
roll	✔

dimensions

thickness	length	width
6mm	29.28m	610/1220mm
13mm	14.64m	610/1220mm
25mm	7.32m	610/1220mm
38mm	4.80m	610/1220mm
50mm	3.66m	610/1220mm

*1220mm width available to special order.

ceramic fibre blanket

Ceramic fibre blanket has the heat resistance of a hard refractory with five times better insulation value and the following features:

features

- low thermal conductivity
- very low heat storage
- very high tensile strength
- thermal shock resistance
- sound absorption
- quick repairs. Should lining damage occur, furnace can be cooled quickly
- contains no binder, no fumes or furnace atmosphere contamination
- contains no asbestos
- no curing or dry out time, lining can be fired to operating temperature immediately

typical applications

Ceramic Industry

- Kiln car insulation and seals
- Continuous and batch kilns

Steel Industry

- Heat treating and annealing furnaces
- Furnace door linings and seals
- Soaking pit covers and seals
- Furnace hot face repairs
- Reheating furnace and ladle covers

Refining and Petrochemical

- Reformer and pyrolysis lining
- Tube seals, gaskets and expansion joints
- High temperature pipe, duct and turbine insulation
- Crude oil heater linings

Power Generation

- Boiler insulation
- Boiler doors
- Reusable turbine covers
- Expansion seals/pipe coverings

Others

- Insulation of commercial dryers and ovens
- Veneer over existing refractory
- Stress relieving insulation
- Glass furnace crown insulation
- Fire protection

technical data

	LT	RT	HP	HTZ	HT
Maximum Use Temperature °C	1000	1260	1315	1425	1482
Maximum Use Temperature °F	1800	2300	2400	2600	2700
THERMAL SHRINKAGE (%)					
24 Hrs @ 1000°C	2.0	–	–	–	–
24 Hrs @ 1100°C	–	2.0	1.8	–	–
24 Hrs @ 1300°C	0	–	–	2.0	2.0
CHEMICAL ANALYSIS (%)					
AL_2O_3	42 - 46	46 - 48	44 - 50	33 - 37	52 - 54
SiO_2	50 - 60	49 - 55	50 - 56	47 - 51	42 - 46
ZrO_2	–	–	–	13 - 19	–
Fe_2O_3	0.7 - 1.5	0.8 - 1.2	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2
TiO_2	1.5 - 1.9	1.5 - 1.9	0.1 - 0.2	0.1 - 0.2	0.1 - 0.2
DENSITY	64, 96 & 128 kg/m3 (4, 6,& 8 lbs/ft3)				

- All data represents typical results of standard tests conducted under controlled conditions. As such, the information is intended only as a general guide for specifications and design estimates.
- HP and HTZ are manufactured by the "spun" process. This process produces long fibres that give our fibre products more strength.
- LT, RT & HT are manufactured by the "blown" process which produces a finer, softer blanket ideal for applications such as molding around investment casting forms.

ceramic fibre paper

typical applications

- Asbestos paper replacement
- Investment cast mold wrap insulation
- One-time consumable insulating applications
- Back-up lining for metal troughs
- Hot top lining
- Applications where low binder content is required
- Thermal and electrical insulation
- Upgrade for fibreglass paper and blanket products

features

- easy to cut, wrap or form
- temperature stability
- low thermal conductivity
- low heat storage
- resilient
- lightweight
- thermal shock resistant
- good dielectric strength
- high fired tensile strength
- good flame resistance

technical data

MELTING POINT	1760°C (3200°F)			
MAXIMUM USE TEMPERATURE	1260°C (2300 °F)			
CHEMICAL ANALYSIS (%)				
Al_2O_3	46.50%			
SiO_2	53.40%			
Others	0.10%			
L.O.I.	6%			
DENSITY kg/m³ (lbs/ft³)	160 (10)			
DIELECTRIC STRENGTH (Volts/mil)	50			
TENSILE STRENGTH – g/in	1/16"	1/10"	1/8"	1/4"
MACHINE DIRECTION	2700	3500	5000	13050
CROSS DIRECTION	2500	3100	5000	8000

Data are average results of test conducted under standard procedures and are subject to variations. Results should not be used for specification purpose.

Ceramic fibre paper, is a lightweight refractory material processed from a blend of high purity alumina-silica fibres into a highly flexible, uniform sheet. It is recommended for continuous use at temperatures up to 1260°C (2300°F).

Fibre paper is also availble in body soluble grades with data & MSDS sheets available upon request.

Ceramic fibre paper, has low shrinkage, good handling strength, and low thermal conductivity. It contains a small amount of organic binder for processing which makes it flexible, yet reduces off-gassing and odour during use. Our product has a highly uniform structure due to its controlled basis weight and thickness, assuring homogeneous thermal conductivity and a clean, smooth surface ideal for gasketing or sealing.

Ceramic fibre paper is completely free of asbestos and is designed to be an economic replacement for asbestos paper in most applications.

Ceramic fibre paper is easy to handle and is readily cut with a knife, shears, or standard steel rule dies. Its flexibility allows it to be wrapped or rolled to fit most complex configurations.

product link

ceramic fibre adhesive
rigidizer

format

sheet	✔
gasket	✔
roll	✔
cut pieces	✔

dimensions

thickness	length	width
1mm	various	500/610/1220mm
2mm	various	500/610/1220mm
3mm	various	500/610/1220mm
4mm	various	500/610/1220mm
5mm	various	500/610/1220mm
6mm	various	500/610/1220mm
8mm	various	500/610/1220mm
10mm	various	500/610/1220mm

length and width of ceramic paper in stock may vary from time to time.

ceramic fibre board

Ceramic fibre board is a lightweight refractory material processed with alumina-silica fibres for applications at temperatures up to 1600°C (2900°F).

Ceramic fibre board is a vacuum formed product that resists higher gas velocities than ceramic fibre blanket. It is ideal for furnace, boiler duct and stack lining due to its low thermal conductivity and low heat storage allowing shorter cycle times and quicker access for maintenance.

Also available in body soluble grades. Data and MSDS sheets are available upon request.

typical applications

- Refractory lining for industrial furnaces in walls, roofs, doors, stacks, etc
- Combustion chamber liners, boilers and heaters
- Back-up insulation for brick and monolithic refractories
- Transfer of molten aluminum and other non-ferrous metals
- Expansion joint boards
- Barrier against flame or heat
- Hot face layer for high velocity or abrasive furnace atmosphere

features

- Low thermal conductivity, saves fuel
- Very low heat storage, faster heat and cool-down reducing cycle times
- Light weight. Replaces heavy back-up insulation. Less steel required
- Excellent thermal shock resistance
- Resistant to hot gas erosion
- Resists most chemical attacks
- Easy to cut, handle and install
- Low sound transmission
- Resists penetration by molten aluminum and other non-ferrous metals
- Contains no asbestos

technical data

	1260 LD	1260 MD	1260 HD	1400 LD	1600 LD
MAXIMUM USE LIMIT					
°C	1260	1260	1260	1426	1600
°F	2300	2300	2300	2600	2900
CONTINUOUS USE LIMIT					
°C	1149	1149	1149	1316	1426
°F	2100	2100	2100	2400	2600
MELTING POINT					
°C	1732	1732	1732	1780	1850
°F	3150	3150	3150	3236	3362
DENSITY lbs/ft³	14 - 18	20 - 24	26 - 30	14 - 18	14 - 18
kg/m³	225 - 290	320 - 385	415 - 480	225 - 290	225 - 290
THERMAL SHRINKAGE (%)					
24 hours @ 2200 °F	2 - 3	1 - 2	1 - 2	1 - 2	1 - 2
THERMAL CONDUCTIVITY (W/mK) (Btu in/hr ft² °F)					
316°C (600°F)	0.06 0.5	0.07 0.6	0.10 0.9	0.06 0.5	0.06 0.5
538°C (1000°F)	0.07 0.6	0.08 0.7	0.11 1.0	0.07 0.6	0.07 0.6
760°C (1400°F)	0.09 0.8	0.10 0.9	0.13 1.2	0.09 0.8	0.09 0.8
1094°C (2000°F)	0.13 1.2	0.13 1.2	0.16 1.4	0.13 1.2	0.13 1.2
CHEMICAL ANALYSIS (%)					
AL_2O_3	39 - 41	45 - 47	43 - 45	48 - 50	63 - 65
SiO_2	52 - 54	44 - 46	47 - 49	45 - 47	32 - 34
Others	2 - 3	2 - 3	2 - 3	1 - 2	1 - 2

Organic materials presented in the board will burn out at about 150°C, once these materials have burned out there will be little or no further out gassing. All data represents typical results of standard tests conducted under controlled conditions. As such the information is intended only as a general guide for specifications and design estimates.

format

sheet	✔
cut pieces	✔

dimensions

lengths:	1000, 1220mm
width:	500, 610, 1000mm
thickness:	6, 10, 12, 15, 20, 25, 50, 75, 100mm

ceramic fibre bulk

Ceramic fibre bulk is produced by the fusion of high purity alumina-silica raw materials in an advanced electric arc furnace. The fibres produced are exceptionally clean and consistent in quality and texture.

Ceramic fibre bulk fibres are loose, long and flexible with high refractory properties, and are produced by the “blown” and the “spun” processes. They are used as the base for the production of blanket, moldable, and vacuum formed board and shapes.

Also available in body soluble grades. Data and MSDS sheets are available upon request.

typical applications

- Packing expansion joints in high temperature furnace
- Low mass kiln cars
- Vacuum formed and moldable products
- Ladle insulation

features

- Low thermal conductivity
- Low heat storage
- Excellent thermal shock resistance
- Use limit to 1482 °C (2700 °F)
- Low sound transmission
- Contains no asbestos

technical data

	RT	HP	HTZ	HT
Maximum Use Temperature °C	1260	1315	1425	1482
Maximum Use Temperature °F	2300	2400	2600	2700
THERMAL SHRINKAGE (%)				
24 Hrs @ 1000°C (1800°F)	2.0	–	–	–
24 Hrs @ 1100°C (2000°F)	–	2.0	1.8	–
24 Hrs @ 1300°C (2400°F)	–	–	–	2.0
CHEMICAL ANALYSIS (%)				
AL_2O_3	46-48	44-50	33-37	52-54
SiO_2	49-55	50-56	47-51	42-46
ZrO_2	–	–	13-19	–
Fe_2O_3	0.8-1.2	0.1-0.2	0.1-0.2	0.1-0.2
TiO_2	1.5-1.9	0.1-0.2	0.1-0.2	0.1-0.2

All data represents typical results of standard tests conducted under controlled conditions. As such, the information is intended only as a general guide for specifications and design estimates.

format

20kg bag	✔
25kg bag	✔
40kg bag	✔

ceramic fibre modules

Ceramic Fibre modules can be designed to suit many different applications, in-terms of design, density and method of fixing.

We can offer standard and composite modular systems up to 1600 Centigrade and individual compressed modules up to 2 metres in length. Ceramic Fibre module linings prevent heat loss, increasing furnace productivity and reducing maintenance costs.

Modules are also available in Body soluble grades Data & MSDS sheets are available upon request.

typical applications

Ceramic Industry
- Low mass kiln cars
- Continuous and batch kilns
- Door linings
- Glazing, porcelain furnace linings

Power Generation
- Duct lining
- Heat recovery steam system
- Boiler insulation
- Stack linings

Refining and Petrochemical
- Ethylene furnace roof and walls.
- Pyrolysis furnace lining.
- Reformer furnace roof and walls.
- Boiler linings

Others
- Incineration equipment
- Burner blocks
- Induction furnace covers
- Glass tempering furnace.

Steel Industry
- Ladle pre-heaters and covers
- Heat treat furnace
- Soaking pit covers and seals
- Heaters and reformer lining

features

- Fast and easy installation
- Lower heat storage and fuel costs
- This design creates a very light lining, less steel required
- Several anchor systems

technical data

	RT	HP	HTZ	HT
Use Temperature °C	1260	1315	1425	1482
Use Temperature °F	2300	2400	2600	2700
THERMAL SHRINKAGE (%)				
24 Hrs @ 1000°C	–	–	–	–
24 Hrs @ 1100°C	2.0	1.8	–	–
24 Hrs @ 1300°C	–	–	2.0	2.0
CHEMICAL ANALYSIS (%)				
AL_2O_3	46-48	44-50	33-37	52-54
SiO_2	49-55	50-56	47-51	42-46
ZrO_2	–	–	13-19	–
$Fe2O_3$	0.8-1.2	0.1-0.2	0.1-0.2	0.1-0.2
TiO_2	1.5-1.9	0.1-0.2	0.1-0.2	0.1-0.2
DENSITY	160 & 192 kg/m3 (10 & 12 lbs/ft3)			

Standard Dimensions: Special sizes are available upon request.

product link

ceramic fibre adhesive
rigidizer

vacuum formed shapes

Ceramic fibre vacuum formed shapes are available in a wide variety of shape configurations. These shapes are processed from alumina-silica fibres for applications at temperatures up to 1600°C.

Vacuum formed shapes are manufactured to specific applications, material compositions can be varied with different fillers and chemicals to produce special characteristics such as high strength, density and molten metal non-wetability.

typical applications

- Tundishes, melting crucibles and hot tops for alloy melting
- Heat insulation for industrial heaters
- Small furnaces
- Riser sleeves for foundries
- Head boxes and launders for continuous sheet casting
- Die casting ladles
- Combustion Chambers

features

- Low thermal conductivity saves fuel
- Low heat storage, reduces cycle times
- Lightweight
- Excellent thermal shock resistance
- Resistant to hot gas erosion
- Resists most chemical attacks
- Easy to cut, handle and install
- Resists penetration by molten aluminum and other non-ferrous metals
- Contains no asbestos

technical data

Available on request.

product link

ceramic fibre adhesive
rigidizer
mastic

format

bespoke ✔

ceramic fibre adhesive

Ceramic fibre adhesive is a high temperature, air setting cement for use mainly as a refractory surface coating, although generally used on ceramic fibre substrates it can also be used on porous materials such as insulating fire brick and insulating concretes and will equally enhance their abrasive resistance.

The cement sets to form a strong hard film, which develops a ceramic bond at high temperatures yet maintains excellent resistance to thermal shock. The maximum recommended surface temperature is 1400°C. It can also be used as an adhesive for ceramic fibre products.

application data

Ceramic fibre adhesive can be applied by brushing, dipping or spraying. Surfaces should be free of grease,dirt and dust. The coating thickness on solid surfaces should be as thin as possible, followed by drying at temperatures up to a maximum of 90°C. The viscosity of the cement can be reduced, if required, by the addition of small quantities of clean tap water.

product link

ceramic fibre blanket
ceramic fibre paper
ceramic fibre board
ceramic fibre modules
vacuum formed shapes

format

5kg tub	✔
25kg tub	✔

typical applications

- Surface coating
  At high temperature the cement forms a hard egg-shell ceramic film on most clean and grease free surfaces. This film is completely stable. The majority of ceramic fibre products may be coated with ceramic fibre adhesive as a protection against high gas velocities or against molten metal contact.
- Bonding
  Ceramic fibre adhesive is recommended as a high temperature adhesive to bond ceramic fibre products together, or to attach them to porous refractory surfaces such as insulating fire brick or insulating concretes.

features

- High temperature
- Air setting
- Easy application
- Creates surface hardening
- Increases abrasion resistance

technical data

CLASSIFICATION TEMPERATURE	°C	1400
PROPERTIES MEASURED @ AMBIENT CONDITIONS		23°C/50% RH
COLOUR		white
DENSITY	kg/m^3	1840-1950
COMPRESSIVE STRENGTH	MPa	45
HIGH TEMPERATURE PERFORMANCE		
Specific heat capacity at 100-550°C	kJ/kg.K	1.04-1.14
Melting temperature after drying	°C	1760
Permanent linear shrinkage after 24 hours at		
1000°C	%	2.15
1260°C	%	3.2

rigidizer

Rigidizer is applied to the surface of ceramic fibre blanket, or other high temperature ceramic fibre insulations by spraying or brushing. After air-drying, ceramic fibre rigidizer firms-up the refractory ceramic fibre, giving it tougher, more abrasion resistant characteristics. It is normally applied after the ceramic fibre is installed.

Rigidizer can be shipped in 5 litre or 25 litre plastic drums. 5 litres of rigidizer covers approximately $5m^2$ brushed or 100 square feet when sprayed.

typical applications

- Ceramic furnaces
- Oil heaters
- Petrochemical heaters
- Steel treatment furnaces
- Molten metal transportation

technical data

MAXIMUM USE LIMIT	980°C		1800°F
BULK DENSITY - As Shipped	1.21g/cc		$75lbs/ft^3$
WEIGHT per Gallon (5 Litres)	4.5kg		10lb
COVERAGE Per 5 litres		Approximately	
Area Brushed	$5m^2$		$50ft^2$
Area Sprayed	$10m^2$		$100ft^2$
COLOUR		Bluish-White	
SPECIFIC GRAVITY	At 25°C (77°F)		1.21
VISCOSITY	At 25°C (77°F)		5 Centipoise
ph		9.8	
SHELF-LIFE		1 year	
CHEMICAL ANALYSIS (%)			
Silica – SiO_2		+99%	
Alkali – Na_2O		0.32%	
Sulfates as NA_2SIO_4		0.04%	
Chlorides as NaCl		0.01%	

The test data shown above are based on average results of control test and are subject to normal variations on individual test. These results cannot be taken as maximum or minimum requirements for specification purpose.

product link

ceramic fibre blanket
ceramic fibre paper
ceramic fibre board
ceramic fibre modules
vacuum formed shapes

format

5 litre tub	✔
25 litre tub	✔

Ceramic fibre mastic is used to prevent heat loss caused by the deterioration of the existing lining and can be installed using a trowel, a caulking gun or a pump.

Ceramic fibre mastic is a multipurpose form of ceramic fibre dispersed in a sticky, cohesive binder system that adheres to most ceramic and metallic surfaces.

Ceramic fibre mastic is available in two forms, 1200ºC and 1600ºC.

Mastic is normally applied with trowel, spatula or other suitable tooling.

product link

ceramic fibre blanket
ceramic fibre paper
ceramic fibre board
ceramic fibre modules
vacuum formed shapes

format

5kg tub	✔
25kg tub	✔
50kg tub	✔
500ml cartridge	✔

ceramic fibre mastic

typical applications

- To form troughs or liners for non-ferrous metal transfer
- Gaskets and seals around burner blocks
- Protection of metallic parts from heat
- Pump into voids in badly damaged back-up insulation
- Gaskets and seals for chimneys and stacks
- Boiler doors seals and thermal insulation
- To fill voids and cracks in refractory surface

features

- Low thermal conductivity
- Low heat storage
- Reduces fume emission around refractory
- Excellent thermal shock resistance
- Resistance to gas velocity
- Easy to install
- Adheres to most ceramic and metallic surfaces
- Excellent corrosion resistance
- Inert to most chemicals
- Impermeable to molten aluminum, zinc, copper, lead
- Contains no asbestos
- Ready to use

technical data

MAXIMUM USE LIMIT	1200 °C (2190 °F)		1600ºC (2900ºF)	
DENSITY (kgs/m³)				
Wet	1050 - 1230		1400 -1600	
Dry	705 - 740		900 - 1100	
THERMAL SHRINKAGE (%)				
24 hrs @ 1093 °C (2000 °F)		2.8		2.6
THERMAL CONDUCTIVITY	W/m²K	BTU-in hr Ft²ºF	W/m²K	BTU-in hr Ft²ºF
500°F	0.06	0.5	0.06	0.5
1000°F	0.12	1.0	0.12	1.0
1500°F	0.15	1.2	0.15	1.2
CHEMICAL ANALYSIS (%)				
AL_2O_3	40 - 42		66	
SiO_2	55 - 57		33	
Fe_2O_3	Trace		Trace	
MgO	Trace		Trace	
K_2O	Trace		Trace	
Other	2 - 3		Trace	

supermag body soluble blanket

typical applications

- Aluminium homogenizing furnace linings
- Back-up insulation for dense refractory
- Annealing furnace linings
- Stress relieving blankets
- Heat treatment furnace linings
- Crude heater linings
- Co-generation duct linings
- Reusable insulation pads
- Expansion joints

features

- Low thermal conductivity
- Very low heat storage
- Very high tensile strength
- Thermal shock resistance
- Low weight
- Excellent corrosion resistance

technical data

MAXIMUM USE LIMIT	1200ºC	2200ºF
THERMAL SHRINKAGE		%
24 Hrs @ 850ºC (1562ºF)		< 1
24 Hrs @ 1000ºC (1832ºF)		1.1
24 Hrs @ 1100ºC (2012ºF)		1.2
CHEMICAL ANALYSIS (%)		
SiO_2		58 - 65
CaO		29 - 34
SiO_2		58 - 65
MgO		3 - 5
AL_2O_3		0.5 - 0.8
Fe_2O_3		0.3 - 0.5
DENSITY	64, 96 + 128 kg/m³ (4, 6, 8 lbs/ft³)	

• All data represents typical results of standard tests conducted under controlled conditions. As such, the information is intended only as a general guide for specifications and design estimates.

• This product is exonerated from any carcinogen classification in the countries of the European Union under provisions of nota Q of European Commission Directive 97/69/EC.

Supermag blanket is a high temperature body soluble fibre that utilises a unique spinning technology to create a special fibre with superior thermal and mechanical properties. This special fibre is made from a blend of calcium, silica and magnesium having the ability to support continuous temperatures up to 1200ºC.

product link

ceramic fibre blanket
ceramic fibre paper
ceramic fibre board
ceramic fibre modules
vacuum formed shapes

format

cut sizes	✔
roll	✔

dimensions

thickness	length	width
6mm	29.28m	610/1220mm
13mm	14.64m	610/1220mm
25mm	7.32m	610/1220mm
38mm	4.80m	610/1220mm
50mm	3.66m	610/1220mm

*1220mm width available to special order.

fibre moist felt

Ceramic fibre moist felt is made from high-strength ceramic fibre blanket impregnated with an inorganic rigidizing agent that hardens when exposed to air.

Moist felt is ideal for insulation of complex shapes as it retains the shape to which it has been moulded after it dries.

The product is packed in a clear polythene bag to maintain the wet binder during shipment and prior to use. Care should be taken when handling the packed product as damage to, or freezing of the packaging can activate the drying process or make the material unusable.

Curing of the product can be accomplished by air drying over a period of several days or by immediate exposure to temperature in the application. Curing of the product simply removes the water content from the inorganic binder.

chemical analysis - calcined basis

Aluminium Oxide – Al_2O_3	25-35%
Silica – SiO_2	65-75%
Alkali – Na_2O	<0.5%

product link

ceramic fibre adhesive
rigidizer
ceramic fibre mastic

format

Roll ✔

dimensions

lengths: 1000mm
width: 610mm
thickness: 6, 12, 25mm

typical applications

- Insulation of complex shapes
- Hot face layer for kilns and furnaces

features

- excellent velocity resistance
- high strength
- excellent insulation properties
- excellent resilience

technical data

MAXIMUM USE TEMPERATURE		1000ºC
MELTING POINT		1790ºC
COLOUR		White
DENSITY (when dry) Kg/m³		200-300
TENSILE STRENGTH PSI	Wet Dry	17 50

SAFFIL

1600ºC blanket, mat & bulk

typical applications

SAFFIL BLANKET
is used to form stack bonded and convoluted modules for use in the lining of kilns furnaces and heaters in all industry sectors.The modules are supplied in the form of mechanically fixed or veneering modules. Saffil blanket is extremely resilient and flexible which makes it an ideal material for expansion gap filling, seals and as a backing lining in the construction of industrial furnaces and kilns.

SAFFIL BULK
when used as a main component of modules,boards and papers provides cost effective levels of thermal stability unmatched by other commercially available insulating fibres. Low thermal shrinkage translates directly into long life and reduced fuel and maintenance costs,while low thermal conductivity gives superior insulation properties to products containing SAFFIL LA bulk products.Blended products manufactured using SAFFIL,alumino-silicate fibres and proprietary binder systems give exceptional,cost effective performance up to 1600ºC.

features

- Withstand high temperatures
- Excellent stability at high temperatures
- Excellent insulation properties
- Flexible and resilient
- Cost effective
- Low shot content
- No Health issues with silica content
- Probably the safest high temperature fibre product

technical data

		BLANKET	BULK	
MAXIMUM USE LIMIT		1600°C	1600ºC	
PROPERTIES MEASURED AT AMBIENT (23ºC/50% RH)				
Colour		White	White	
Solubility in water		Insoluble	Insoluble	
Odour		Odourless	Odourless	
Fibre Diameter (Median)	Micron	3.0 - 3.5	3.0 - 3.5	
Shot content (Non fibrous material)		negligible	negligible	
Tensile Strength		MPa	–	–
PROPERTIES WHEN EXPOSED TO HIGH TEMPERATURE				
Melting Point ºC		>2000	>2000	
Shrinkage (6 Hours @ 1500ºC) %		<4	<4	
Loss on ignition (2 Hours @ 800ºC) %		0	0	
SPECIFIC HEAT CAPACITY @ 1000ºC		1.00kj/kg.K	1.00kj/kg.K	
STANDARD AVAILABILITY		BLANKET	BULK	
Density (Kg/m³)		96	35	–
Length (mm)		14600	14800	–
Width (mm)		610	610	–
Thickness (mm)		13	35	–

SAFFIL alumina fibres are high purity polycrystalline fibres designed for use in applications up to 1600ºC. Since their development in the early 1970's SAFFIL fibres have been used successfully to overcome problems in demanding high temperature insulation and many other speciality applications.

chemical analysis - calcined basis

Aluminium Oxide – Al_2O_3	95-97%
Silica – SiO_2	3-5%
Trace Elements	<0.5%
Polypropylene scrim added by weight	<3%

product link

ceramic fibre adhesive
rigidizer
ceramic fibre mastic

format

Blanket ✔
Bulk ✔

dimensions

as stated left

ceramic fibre ropes, tapes & textiles

A wide variety of textiles are produced either by converting ceramic blanket or by processing refractory ceramic fibre yarn into woven products. A variety of product forms can be produced.

Ceramic fibre textiles are suitable for use at elevated temperatures approaching 1400°C, maintaining flexibility for use in thermal sealing and filling applications in areas such as door seals, expansion joints and gland packings.

classification temperature

Alumino-Silicate:	1260°C
Inconel Wire:	1100°C
Glass Filament:	550°C

product link

ceramic fibre adhesive
rigidizer
ceramic fibre mastic

format

see next page

dimensions

see chart right

typical applications

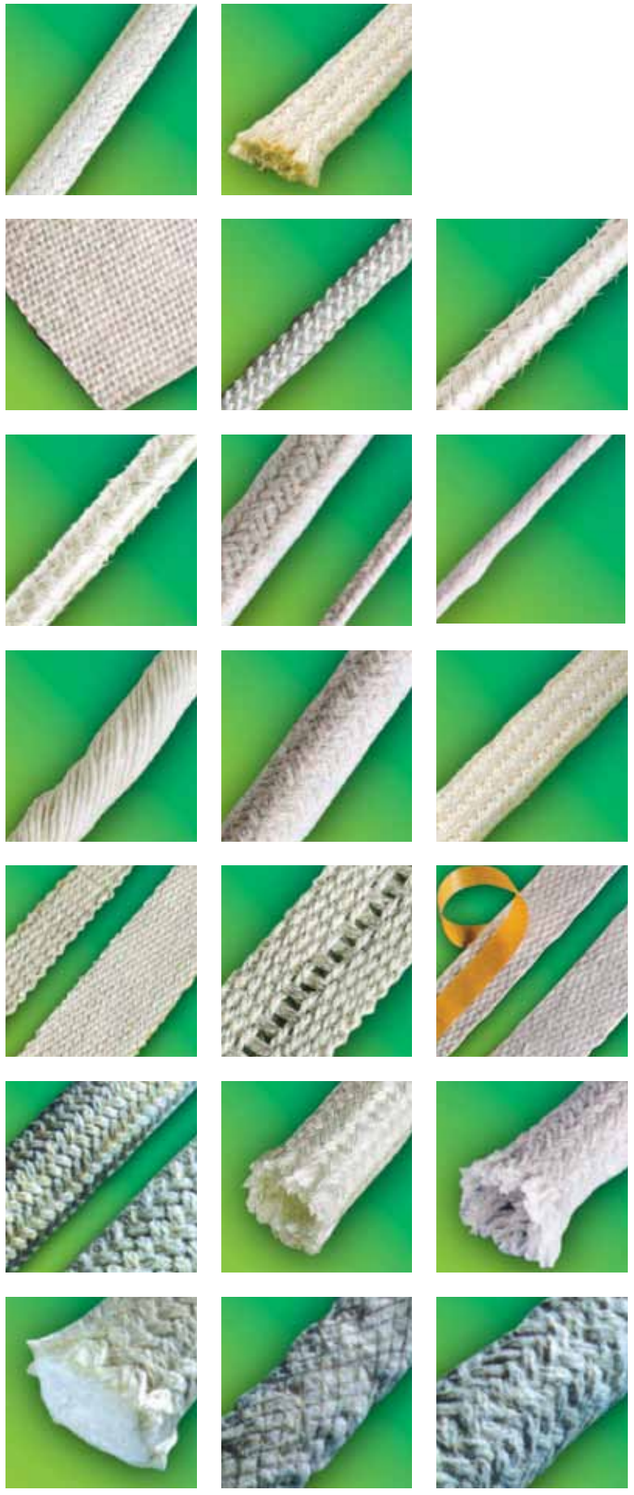
- Yarn
- Cloth
- Cabled rope (high density)
- Cabled rope (low density)
- Rope lagging
- Twisted rope
- Webbing
- Ladder tape

dimensions

SECTION mm	TWISTED Rope	CABLED ROPE (High density)	CABLED ROPE (Low Density)	ROPE Lagging
	ROLL LENGTHS			
4	200	–	–	–
6	100	100	–	–
9	50	50	50	25
12	50	50	50	–
13	–	–	–	25
15	50	50	50	25
19	–	–	–	25
20	25	25	25	–
20	25	25	25	–
25	–	25	25	25
30	–	25	25	–
38	–	–	–	–
40	–	20	20	–
50	–	20	20	25
75	–	–	–	25

WEBBING Width (mm)	Thickness (3mm)
25	25
40	25
50	25
75	25
100	25

LADDER TAPE Width (mm)	Roll Length (m)
25	25
40	25
50	25
75	25
100	25



TYPES AVAILABLE

Yarn

Yarn is manufactured from ceramic fibre. This yarn is the base of all the ceramic textile range of products. The yarn is reinforced with either a glass filament or a fine inconel wire.

Cloth

Cloth is woven from a glass or inconel wire reinforced yarn.

Cabled rope (high density)

High density cabled rope is manufactured from yarn which is either glass filament or inconel wire reinforced. It is composed of 3 pre-twisted strands each containing a predetermined multiple of yarns which are twisted together to form a flexible, high density rope.

Twisted rope

Twisted rope consists of a multiple of ceramic yarn strands which can be either glass filament or inconel wire reinforced. They are twisted together to give the required final product diameter. This gives a soft rope product that is relatively easily compressed and is particularly suitable as a seal between uneven surfaces.

Webbing

Webbing is woven from either glass or inconel wire reinforced ceramic yarn.

Ladder tape

Ladder tape is woven from either glass or inconel wire reinforced ceramic yarn. It has a similar weave to cloth on the outer edges, but an open weave in the centre allowing for ease of installation over studs. It is ideal as a gasketing material.

Cabled rope (low density)

Low density cabled rope is manufactured from ceramic roving which is glass filament reinforced. It is composed of 3 pre-twisted strands each containing a predetermined multiple of ceramics yarns which are twisted together to form a flexible, low density rope.

Rope lagging

Rope lagging consists of a strip of ceramic blanket that is overbraided with a glass yarn. This produces a highly insulating rope product of medium density, which is also compressible and flexible. As an alternative, this product could also be overbraided with either a cotton yarn or a fine inconel wire.

"Lifestyle" is an extensive range of vacuum formed shapes manufactured by IMS Group for the domestic fires market.

Years of development and research have been invested in order to produce what we consider to be a market leading range of synthetic fire backs, liners, pebbles, coals and logs.

The "Lifestyle" brands unique formulation enables us to capture and re-create the texture and appearance of coal, stone and bark as well as being odourless, dust free and able to withstand up to 1400°C.

Our expertise and manufacturing process enables us to produce a wide range of profiles and finishes to suit all designs and makes of fires and surrounds.

product link

ceramic fibre adhesive
rigidizer
ceramic fibre mastic
ceramic fibre ropes and tapes

ceramic shapes "lifestyle" range

products

- Logs
- Coals
- Liners
- Pebbles
- Matrices
- Fire Backs

features

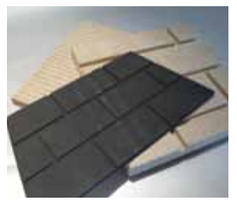
- Dust free
- Odour free
- Hard wearing
- Superior quality
- Authentic appearance
- Coals have realistic glowing core

technical data

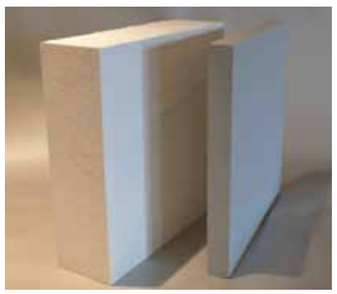
For pricing information, availability and specific technical data, please contact our sales team

fire components

vermiculite



ropes, seals & adhesives



calcium silicate

IMS supply the complete lining system for the fire manuracturing market. Shaped or sheet vermiculite from Skamol, bricks, fire cast tiles, cements and ropes. We offer a one stop shop for bespoke linings.

lifestyle shapes

technical data

contact us for tecnical data

dalfratex®

textile cloths, tapes, sleevings, cords, braided packings, ropes, bulk fibres & batts

DALFRATEX® is a range of inorganic fibres and textiles that are capable of operating continuously at 1000ºC and up to 1600ºC for limited periods. They will not melt or vaporize until temperature exceeds 1700ºC, and have a high resistance to thermal shock.

DALFRATEX® products also provide flexible electrical insulation at temperatures as high as 1000ºC. Products are available as textile cloths, tapes, sleevings, cords, braided packings, ropes and also as bulk fibres and batts.

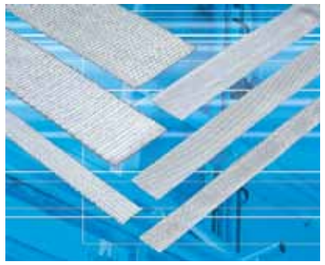
DALFRATEX® products are composed of continuous filaments of amorphous silica, which combine the flexibility of fibres and textiles, with the refractory properties of silica.

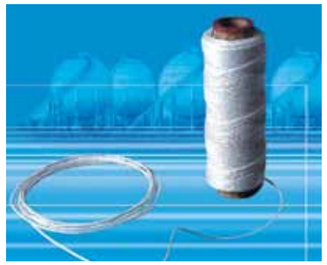
In order to service the needs of a wide range of applications the majority of DALFRATEX® products are available in two basic forms: standard and pre-shrunk. The standard form shrinks during initial heating and products of this type have letter 'U' incorporated into the code number. As their name implies, the pre-shrunk forms have been factory treated to confer better dimensional stability in high temperature use.

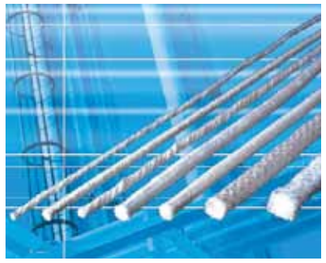
In addition to these forms a wide range of sacrificial organic finishes are available which may be applied to particular products where required for specific end uses.

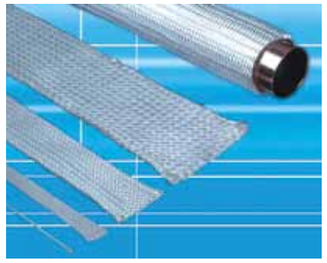
chemical analysis - calcined basis

Silica – SiO_2	98.57%
Alumina – $Al2O_3$	0.47%
Iron Oxide – Fe_2O_3	0.08%
Lime – CaO	0.05%
Magnesia – MgO	0.07%
Titania – TiO_2	0.30%
Alkalis – $Na_2O + K_2O$	0.13%
Boric Oxide – B_2O_3	0.06%









typical applications

- Aerospace (gas turbine and rocket engines)
- Metallurgical/steel production
- Glass manufacture
- Fire protection
- Electrical heating
- Pipeline and vessel fabrication
- Gas production
- Nuclear power
- Electricity generation
- Petrochemical

features

- Low thermal conductivity
- Low heat storage
- Reduces fume emission around refractory
- Excellent thermal shock resistance
- Resistance to gas velocity
- Easy to install
- Adheres to most ceramic and metallic surfaces
- Excellent corrosion resistance
- Inert to most chemicals
- Impermeable to molten aluminum, zinc, copper & lead
- Contains no asbestos

technical data

Batt Data CODE NUMBER	THICKNESS DENSITY (mm)	NOMINAL SURFACE DENSITY (g/m²)	NOMINAL LENGTH (m)	NOMINAL WIDTH (mm)	NOMINAL BULK (kg/m³)
B-1	3.8	300	2.2	915	80
B-2	6.3	600	2.2	915	96
B-3	9.4	825	2.2	915	88
B-4	12.5	1000	2.2	915	80
B-8	25.0	2000	2.2	915	80

Minimum Length 1.0m Maximum Length 2.7m

Cloth Data CODE NUMBER	NOMINAL THICKNESS (mm)	NOMINAL WIDTH (mm)	NOMINAL WEIGHT (g/m²)	YARN TYPE	TYPE OF WEAVE
C-H	0.9	825	630	Plain	Satin
C-19	1.6	825	1250	Plain	Satin
UC-H/D	0.9	910	640	Plain	Satin
UC-19/D	1.6	910	1260	Plain	Satin
UC-19/AR	1.7	910	1300	Plain	Satin

Nominal Roll Length 45m

Rope Data CODE NUMBER	NOMINAL DIAMETER (mm)	NOMINAL WEIGHT (g/m)
R-B3	9	70
R-B4	12	110
R-B6	19	230
R-B8	25	385
R-C10	10	40
R-C13	13	60
R-C25	20 to 25	60
R-C40	40	260

The 'B' Series ropes are supplied in pre-shrunk condition and have a light coating applied to assist manufacture.
The 'C' series ropes are supplied pre-shrunk and without coating.

Cordage Data CODE NUMBER	NOMINAL DIAMETER (mm)	NOMINAL WEIGHT (g/m)	STANDARD PACKAGE	NOMINAL PACKAGE	NOMINAL LENGTH per PACKAGE (m)
D-T3	2.0	4000	100	–	–
D-T4	3.0	6200	50	–	–
D-T2	1.2	1200	–	0.25	210
D-T20	0.9	740	–	0.25	340

All cord can be supplied in pre-shrunk or in natural condition and are coated.

Tape Data CODE NUMBER	NOMINAL THICKNESS (mm)	NOMINAL WIDTH (mm)	NOMINAL WEIGHT (g/m)	STANDARD PACKAGE (m)
T-3	0.4	20	6	30
T-5	0.4	30	9	30
T-85	4.0	22	37	–
T-86	4.0	45	75	–
T-105	4.5	70	127	–
UT-124/50	3.5	50	–	–
Self Adhesive				
T-H/25	1.0	25	16	–
T-H/50	1.0	50	32	–
T-H/75	1.0	75	48	–
T-19/25	1.6	25	32	–
T-19/50	1.6	50	63	–
T-19/75	1.6	75	94	–
UT-19/50	1.8	50	63	–

Sleeving Data CODE NUMBER	NOMINAL BORE (mm)	NOMINAL WALL THICKNESS (mm)	STANDARD PACKAGE (m) STATED	INDICATIVE YIELD AT DIAMETER (m/kg)
S-R4	3.2	0.5	30	–
S-R6	4.8	0.5	30	–
S-R8	6.4	0.6	20	–
S-R25	20.0	1.0	15	–
S-R32	25.0	1.0	15	–
S-F16	10.0	0.4	30	–
S-F20	13.0	0.5	30	–
S-F25	20.0	0.5	20	–
S-F30	25.0	0.5	20	–
S-8	30.0	1.0	–	–
S-47	10.0	5.0	–	–
S-43	50	–	–	9 at 50mm
S-44	65 to 75	–	–	9 at 65mm
S-46	75 to 85	–	–	7 at 75mm

All sleevings can be supplied in pre-shrunk or in natural condition; with or without a coating.

Packaging Data CODE NUMBER DIAMETER	NOMINAL DIMENSIONS (mm) (m/kg)	APPROXIMATE YIELD
UR-K12	12	23
UR-K15	15	11
UR-K19	19	15
UR-K25	25	4.5

filter cloth and sock

During molten aluminium production processes it is often a necessity to filter the metal to remove impurities, inclusions and dross prior to casting. The filter cloth products produced by ims assist in removing these unwanted particles.

The filter cloth range of products consists of woven glass fabrics coated with either phenolic resin or fine ceramic slurry to ensure that the product maintains its integrity during use. There are many weave styles to choose from and our technical staff are on hand to discuss your requirements.

It is important to consider the production process when selecting your fabric style. Long and/or aggressive production processes normally require 4 or 6 strand woven cloth styles whilst 3 strand woven cloth styles perform satisfactorily in standard alloy production.

Filter Sock

During the aluminium billet casting process it is advisable to filter the molten metal whilst it transitions through the launder system. A “filter sock” (sometimes called “launder sock”) is ideal for this application.

During the casting process the filter sock is held in the launder system via “loops” sewn into the filter sock, which are hung over metal fixings attached to the launder metalwork or alternatively by being inserted between two launder sections. Should the filter sock be inserted between launder sections it is necessary to have a compressible high temperature gasket sewn into a flange at the open end of the filter sock to ensure no metal leakage between the launder joints.

IMS offer filter cloths with a wide range of “open areas” to accommodate all process requirements.

format

cut	✔
bespoke	✔
roll	✔

dimensions

lengths: 100m

width: 915 - 1500mm

Foundry Filtration

During the casting process it is advisable to filter the molten metal. Filter cloth discs are ideal for this process. Due to the high risk of “inclusions” causing rejects in the finished cast item it is advisable to use a filter cloth disc with an extremely low L.O.I. ims have developed a filter cloth with less than 2.0% L.O.I. for this particular process.

Consideration should be given to metal flow rate and cleanliness requirements prior to selecting filter cloth size.

typical applications

- Launder sock/windsock filters
- Foundry filters
- Baffle bags
- Distribution bags
- Combo bags
- Spout socks
- Channel bags

features

- Manufactured to your exact requirements
- Ease of application
- Low cost
- Improves metal quality
- Improves first time reject rate
- Reduces metal turbulence

technical data

STYLE	WEAVE TYPE	STRANDS per cm	HOLES per cm^2	OPENING SIZE mm^2	OPEN AREA %
L60	leno	18x18	4	16	60
L55	leno	23x25	6	9	55
L56	leno	27x27	7	7	56
L40	leno	30x28	9	5	40
P50	plain	35x35	12	4	50
P48	plain	40x40	15	3	50
P45	plain	36x36	13	3.5	45
P40	plain	38x38	15	2.5	40
P32	plain	50x46	22	1.5	32

gaskets

IMS lead the way in gasket fabrication, with a diverse material base in stock and the latest technology for gasket design and manufacture.

We work closely with our customers to develop the right product for their needs and have a wealth of experience in specifying the right materials and tools for the job.

typical applications

- Automotive
- Aerospace
- Glass
- Aluminium and steel
- Domestic applications

Gaskets are available in the following formats

paper

- Body soluble
- Ceramic
- 1400 and 1600 grade

blanket

- Body soluble
- Ceramic
- 1400 and 1600 grade

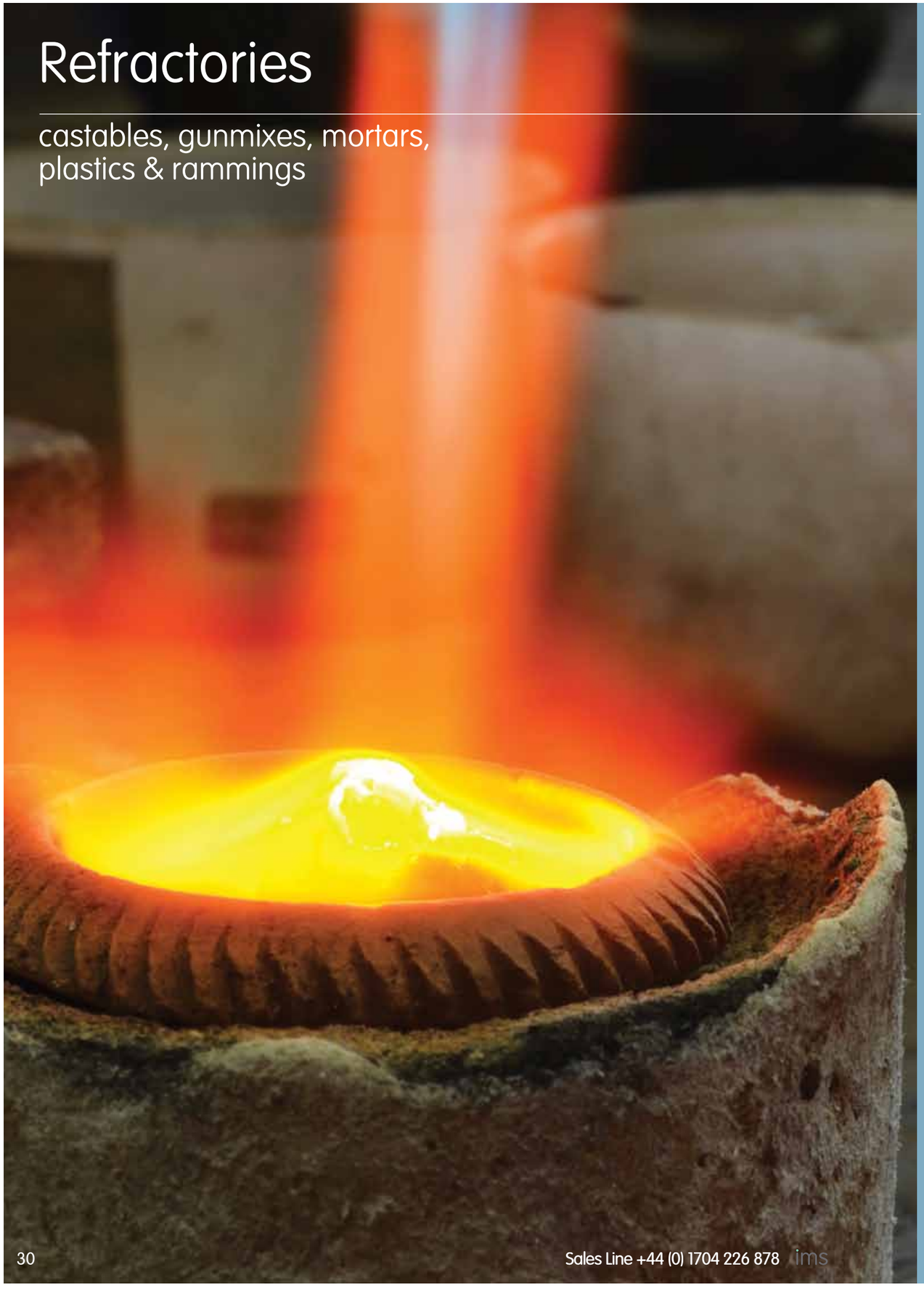
felt

- Body soluble
- Ceramic
- 1400 and 1600 grade

millboard

format

bespoke	✔



Refractories

castables, gunmixes, mortars, plastics & rammings

Refractories

castables, gunmixes, mortars, plastics & rammings

Insulating Castables and Gunmixes

IMS supply a comprehensive range of Insulating Castables and Gunmixes which are generally used as back-up insulation behind a hot face material such as a Dense or Low Cement Castable. Temperature gradients, thermal efficiency, atmospheric conditions and strength generally determine the choice of material along with the maximum service temperature requirement. Certain applications where temperature and abrasion resistance are not an issue allow the use of insulation castable as a one shot hot face lining therefore exhibiting excellent thermal characteristics. Materials can be installed by casting or gunning techniques the method chosen is generally dependant upon application, access and cost.

Dense Castables and Gunmixes

IMS supply a comprehensive range of Dense Castables and Gunmixes which exhibit excellent strength and abrasion resistance. These materials can be used as a one shot lining or more commonly as a hot face material with an insulation grade as a back up lining. Again application conditions form a major part in the correct choice of material, whatever the application IMS can supply a suitable material. The hot face lining is the working lining of the vessel therefore it is essential that the chosen material exhibits the required characteristics to obtain optimum life. Resistances to thermal shock, abrasion, chemical attack, reducing atmospheres are a few of the key factors determining choice of material along with the maximum service temperature requirement. Materials can be installed by casting and gunning techniques. The method chosen is generally dependant upon access and cost.

Plastics and Ramming mixes

IMS supply a comprehensive range of Plastics and Ramming mixes which are both clay and chemically bonded materials, installed by ramming techniques. Clay bonded materials exhibit a good green strength when allowed to air dry. Chemically bonded materials form their strength during the curing or heat treatment process. The choice of material is dependant upon temperature, atmospheric conditions, chemical attack and application; Phosphate or chemically bonded materials show excellent resistance to chemical or slag attack. The coarse grained nature of both these generic materials allows for good abrasion and thermal shock resistance. They are ideally suited for use in restricted areas such as boilers, ladle linings & burner quarls.

Low Cement Monolithics

IMS supply a comprehensive range of Low Cement Monolithics which exhibit extremely high hot strength and abrasion resistance characteristics. These materials are more technically advanced than the family of dense castables and show low porosity and good resistance to slag's where molten metals attack the refractory. In addition to their excellent performance characteristics we have materials available for every conceivable application; these materials are termed "free-flow" materials which can be installed by pumping or casting. The term free flow means they do not need vibrating into position therefore aiding installation. We also offer a range of multi-purpose Low Cement Castables which can be pumped, vibrocast or act as a free flow material. The strict water addition determines the mode of installation.

Silicon Carbide mixes

IMS supply Silicon Carbide materials which by their nature possess excellent volume stability right through their temperature range along with high abrasion resistance and thermal shock characteristics. These materials are designed as free flow materials to eliminate the need for vibrating the product into place; thus eliminating grain segregation and maintaining a high strength profile. These materials are designed for specialist applications and can be installed by casting or pumping into place.

Mortars

IMS supply a range of exclusive mortars exhibiting both high refractoriness and bond strength. We supply both dry and ready mixed materials depending upon preference. The materials produced cater for a wide temperature range and for more arduous applications where the materials are prone to attack and reducing atmospheres, we have a hybrid range of products which show excellent resistance to attack therefore retaining their original integrity for extended periods. IMS mortars are renowned for their use in the most exacting of environments.

IMS provide extensive pre-casting facilities.

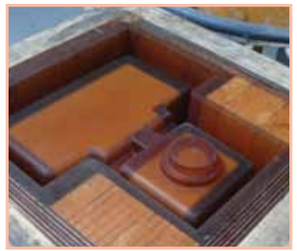
pre-casting

Material selection

It is important to ensure the correct selection of castable prior to casting. When selecting castable consideration should be given to the demands of the application. The choice of material can ultimately depend upon cost and relative performance, however the complexity and required surface finish together with the physical volume of the cast shape can also be determining factor. Our technical staff are on hand to offer advice should this be required.

Mould manufacturing

The mould type used in the casting process often determines the finished quality of the fired shape. IMS provide an in-house mould-making service, where moulds can be manufactured from polystyrene, wood, plastic, plaster and steel substrates. Customers can supply their own pre-manufactured moulds into which IMS cast the refractory. In these instances it may be necessary for us to refurbish or in certain cases replace the existing mould.



Casting

Once material selection has been completed and the moulds have been produced casting of the shape is undertaken. IMS cast shapes using several casting techniques including vibration, vibroflow, free-flow, and slip. Consideration is given to the material shrinkage during the firing/drying process and the mould is manufactured “oversize” to accommodate this effect. The firing/drying process removes any excess water from the shape before despatch.

pre-casting

Drying/Firing

Drying/Firing of the cast shape is carried out in our state of the art kilning department. Following firing the cast shape undergoes final inspection. Rigorous testing methods following stringent internal controls ensure that the finished shape meets the customer requirements.

Inspection and despatch

As soon as the shape has been passed by our inspection department it is shrink-wrapped to reduce moisture ingress during transit and then made ready for customer collection or delivery.

All casting processes undertaken by IMS follow process controls as set out in the company ISO 9001 (2000) policy document available on request.

Castables

plastics and ramming mixes

Key Brands

	Alumina Content%	Installed Density T/m³	Temperature Rated °C	Bond
Super G	60.0	2.38	1650	Clay Bond
Greenpak 45	45.8	2.31	1600	Clay Bond
Greenpak 85P	85.0	2.97	1700	Phosphate
Greenpak 90P	92.0	3.00	1800	Phosphate
BluRam HS	72.0	2.55	1650	Phosphate
Jadepak 88P	87.0	3.17	1800	chrome/phosphate
Greengun 85P	85.0	2.97	1700	phosphate

Key Attributes

- Excellent Thermal Cycling Properties
- Good Resistance to Chemicals and Slags
- Versatile /Ready to Use

Typical Applications

- Burner Blocks
- Boiler Linings
- Furnace Walls
- Combustion Chambers
- Molten Steel /Iron
- Thermal Shock Applications
- General Maintenance
- All reverberatory furnaces

product link

All ceramic products
Anchor Systems
Bricks

format

25kg boxes ✔

Key Attributes

- Excellent Abrasion Resistance
- Non Wetted / Close Porosity
- High Strength

product link

All ceramic products
Anchor Systems
Bricks

supplied

loose 25Kg bags ✔

cement monolithics

typical applications

- Aluminium Furnaces
- Tundishes
- Heat Treatment Cars
- Kiln Cars
- Incinerators
- Arc Roofs
- Non Ferrous Ladles
- Precast Shapes
- Rotary Kiln Linings

Key Brands

	Alumina Content%	Installed Density T/m³	Temperature Rated °C	Installation Technique
Ultragreen 45	47.0	2.31	1650	Vibrocast
Versaflow 55ARC	56.0	2.44	1650	Vibrocast
Versaflow 65ALC	66.5	2.69	1430	Vibrocast
Greentec 170LG	72.7	2.30	1700	Gunning
Arelcrete 1600LC	57.5	2.40	1600	Vibrocast
Albond	81.0	2.82	1400	Vibrocast
Hicast Extra	82.2	2.70	1700	Vibrocast

greencast 94

Greencast 94 is a dense 94% tabular alumina hydraulic setting castable, suitable for temperatures up to 1870°C in oxidising atmospheres.

It has high mechanical strength with excellent resistance to impact and abrasion. High chemical purity confers excellent resistance to chemical attack.

typical applications

Petrochemical Industry:
Including secondary reformer linings, fluid catalytic cracking unit, transfer and riser lines, fixed bed hydrocracking unit linings, waste heat boiler tube sheets in sulphur and ammonia plants, coal gasification ducting.

Metal/Mineral Processing:
Including high temperature cyclones, burner pipe linings, ladles for iron, copper and brass.

chemical analysis - calcined basis

Silica – SiO_2	Trace
Alumina – Al_2O_3	95.0%
Iron Oxide – Fe_2O_3	0.1%
Lime – CaO	4.6%
Magnesia – MgO	0.2%
Alkalis – $Na_2O + K_2O$	0.3%

technical data

MAXIMUM RECOMMENDED TEMPERATURE	3400°F	1870°C
QUANTITY REQUIRED – Net	156 lb/ft³	2500 Kgs/m³
BULK DENSITY	lb/ft³	Kgs/m³
Cured and Then Dried at 220°F(105°C)	159 - 167	2550 - 2680
Heated at 1500°F(820°C)	153 - 159	2450 - 2550
WATER REQUIRED FOR MIXING	Approximately	
Per 100 Kgs	2.1 gal	9.5 Litres
MAXIMUM TIME FROM ADDING WATER TO PLACING MATERIAL		
Minutes	20	
PERMANENT LINEAR CHANGE – ASTM C113 AND C865		
Expansion or Shrinkage		
Cured and then dried at 220°F(105°C)	Nil	
Heated at 1500°F(820°C) and then cooled	0.05 - 0.2% Shr	
Heated at 2000°F(1100°C) and then cooled	0 - 0.2% Exp	
Heated at 2500°F(1370°C) and then cooled	0.1 - 0.5% Shr	
Heated at 2900°F(1600°C) and then cooled	0 - 0.3% Shr	
Heated at 3300°F(1820°C) and then cooled	1.0 - 2.0% Shr	
MODULUS OF RUPTURE – ASTM C133 AND C865 lb/in² MPa		
Cured and then dried at 220°F(105°C)	1015 - 1595	7.0 - 11.0
Heated at 1500°F(820°C) and then cooled	870 - 1450	6.0 - 10.0
Heated at 2000°F(1100°C) and then cooled	725 - 1305	5.0 - 9.0
Heated at 2500°F(1370°C) and then cooled	870 - 1450	6.0 - 10.0
COLD CRUSHING STRENGTH – ASTM C133 AND C865		
Cured and then dried at 220°F(105°C)	5076 - 8410	35.0 - 58.0
Heated at 1500°F(820°C) and then cooled	5076 - 8410	35.0 - 58.0
Heated at 2000°F(1100°C) and then cooled	3625 - 6090	25.0 - 42.0
Heated at 2500°F(1370°C) and then cooled	5076 - 8410	35.0 - 58.0
PARTICLE SIZE – ASTM C92		
Retained on 6 Mesh Tyler Screen	Less than 1%	
THERMAL CONDUCTIVITY at a Mean Temperature of	Btu-in ft² hr°F	W/mK
400°F(205°C)	18.3	2.64
800°F(425°C)	15.3	2.21
1200°F(650°C)	13.0	1.87
1600°F(870°C)	12.5	1.80
2000°F(1095°C)	13.1	1.89

product link

All ceramic products
Anchor Systems
Bricks

format

25kg boxes ✔

Key attributes

- User friendly products
- High temperature resistant
- 45 to 85% Alumina – "Fit for purpose"

product link

All ceramic products
Anchor systems
Bricks

format

loose ✔

dense castables and gun mixes

typical applications

- Aluminium Furnaces
- Tundishes
- Heat Treatment Cars
- Kiln Cars
- Incinerators
- Arc Roofs
- Non Ferrous Ladles
- Precast Shapes

key brands

	Alumina Content%	Installed Density T/m³	Temperature Rated °C	Installation Technique
Mizzou	60.0	2.22	1650	Hand Cast
Greenspray 16	47.0	2.05	1600	Gunning
Arelcrete 1400	45.0	2.10	1400	Hand Cast
Arelcrete 1600	48.7	2.32	1600	Hand Cast
Midcast	76.0	2.56	1550	Hand Cast
Guncrete 160	50.3	2.08	1600	Cast / Gun
KS4	45.0	1.89	1400	Cast / Gun
Ex HS Castable	39.9	2.20	1250	Cast / Gun

insulating castable

typical applications

- Flues
- Stacks
- Controlled Atmosphere Furnaces
- Petro Chem Transfers
- After Burners
- Waste Heat Boilers
- General Insulating Backup

key brands

	Alumina Content%	Installed Density T/m³	Temperature Rated °C	Thermal Cond.W/mk	Installation Technique
Superlite	8.0	0.48	870	0.17	Cast/Gun
Coolcast	22.7	0.72	1100	0.22	Cast
Kastolite 23 LI	33.4	0.80	1260	0.29	Cast/Gun
Kastolite 26 LI	44.6	1.30	1427	0.45	Cast/Gun
Kastolite 25	37.0	1.30	1370	0.44	Cast/Gun
Kastolite 30 LI	57.0	1.44	1650	0.55	Cast
Insulite	37.1	1.35	1370	0.35	Cast
Insulcast	31.3	1.38	1200	0.46	Cast
IC12	35.0	1.70	1300	0.64	Cast

Key attributes

- Thermally insulating
- Flexible installation characteristics
- Densities ranging from 0.5 to 1.5 T/m³
- Low iron compositions

product link

All ceramic products
Anchor systems
bricks

format

loose ✔

Key attributes

- Supplied dry and ready mixed
- Air and heat setting
- Range of purities and temperatures

product link

All ceramic products
Anchor systems
Bricks

format

25kg tubs ✔

cements and mortars

typical applications

- Dense and Insulation Brick Jointing

key brands

	Alumina Content%	Setting	Temperature Rated °C	Supplied	Usage/1000 brick
Sairset	43.0	Air	1700	Ready Mixed	350Kg
KD2	53.0	Heat	1650	Dry	275Kg
No. 36	70.0	Air	1760	Ready mixed	350kg
Wrightset Super	37.5	Air	1600	Ready Mixed	250Kg
Greenset 94P	98.0	Air	1870	Ready Mixed	375Kg
Jadeset Super	87.0	Air/heat	1870	Ready Mixed	375kg

Basic Refractories

IMS supply a range of basic Refractories for glass and steel production which include: Steel and non ferrous metals

Basic Refractories

Steel and non ferrous metals

Magnesia Carbon Bricks

Burnt Magnesia Bricks

Burnt Magnesia-Chromite Bricks

Chemically Bonded Magnesia Bricks

Chemically Bonded Magnesia –Chromite Bricks

Ramming masses

Including ladle Backfill

Gunning mixes & Mortars

Gouging rods- Our pointed and jointed gouging rods are designed especially for the air carbon arc metal removal process which melts metal with an electric arc, then blows it away with a jet of ordinary shop compressed air. The formulation ensures excellent arc stability and efficient metal removal rates. Full data is available upon request.

Our range is designed for use in all types of steel and non-ferrous metal industries, we can modify the individual specifications to suit the operating conditions within individual furnaces or vessels in-terms of molten metal's and slag's. Full product data is available upon request in each area.

Glass Industry

IMS Products include:

Fusion cast bricks & blocks

Special shapes

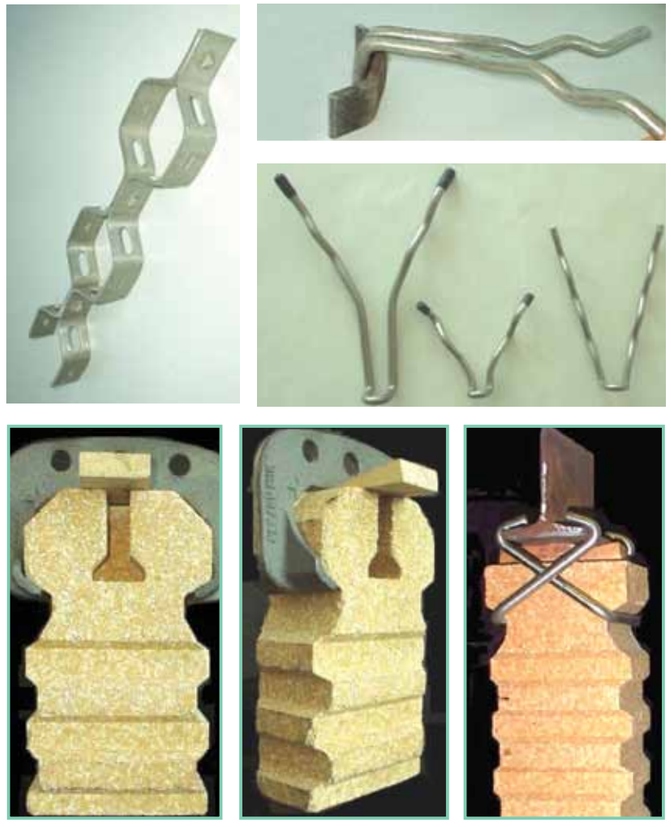
Low Iron High Burnt Magnesia Brick

Zircon Patch

This is purely an overview of our full product range, we specialise in project development, again full Data is available upon request

anchor systems

Refractory materials must be anchored in place to support the lining i.e. roof/nose arch and to fix the refractory lining to the furnace casing. IMS provide a vast range of fixings for this purpose. Anchors are available in metallic and ceramic format.



features: metallic anchors

- generally economical and practical to use
- temperature limitations can restrict application

metallic anchors - fixing methods

- Stick welding – usual method
- Stud welding – when large quantities are involved to reduce installation time
- Bolt on via Drill casing – for ease of future replacement or demolition
- Cleat Welded to casing – to accept floating anchor
- Wedge Anchor – for veneered repairs where the anchor is wedged directly into the refractory

metallic anchors - temperature rating

304SS (18/8) Cr/Ni%	<3mm section 800ºC >6mm section 900ºC
321SS (18/8) Cr/Ni%	<3mm section 800ºC >6mm section 900ºC
310SS (25/20) Cr/Ni%	<3mm section 1000ºC >6mm section 1100ºC
Inconel 601 (23/60) Cr/60%	<3mm section 1100ºC >6mm section 1200ºC

anchor systems

metallic anchor - grade

304SS
Extensively used in general industry
Available in most forms
Best suited for low thermal cycling applications (800ºC max)
Offers good resistance to oxidation scaling up to 750ºC
At elevated temperatures, properties are reduced and subject to embrittlement

316SS
Added Molybdenum enhances resistance of chemical attack up to 800ºC
Available in most forms

321SS
Added Molybdenum enhances resistance to weld deterioration
Good strength & oxidation resistance up to 800ºC
Best suited where a higher performance against general corrosion is required

310SS
Most widely used in refractory anchorage
Increased content of Cr & Ni provides good oxidisation resistance
Good strength at elevated temperatures
(1100ºC max) and against thermal shock

Inconel 601
Superior Resistance to thermal cycling
Good resistance against hot corrosion, oxidation and carburisation
High strength up to 1200ºC
NOT SUITABLE for environments containing Sulphur gases

Floating Wall Anchors

Wiggly 'V' type. Used in walls: Cleat is welded to casing, anchor sits in cleat.

Rotary Kiln Anchors

A 'V' tack welded to a square cleat, which is welded to the casing.

Hex-mesh Anchors

For thin linings, petrochemical applications

Crook Anchors

For tight/different spaces. Used for veneered/patch repairs, with a wedge anchor.

Y-Anchors

2 part anchor for multi-component linings. The stud part of the anchor will retain back-up layers of board, whilst the V can anchor castable.

V-Anchors

For single component lining or back-up layer.

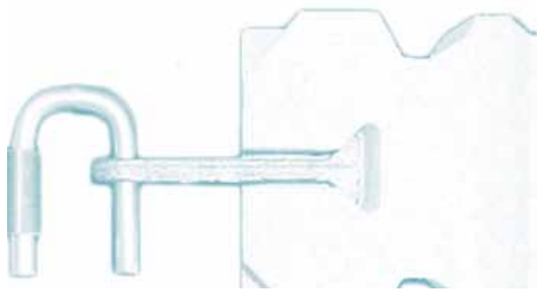
features: ceramic anchors

- suitable for high temperature applications
- used when anchorage is required through to the hot face lining
- greater cross sectional area/key

ceramic anchors - temperature rating

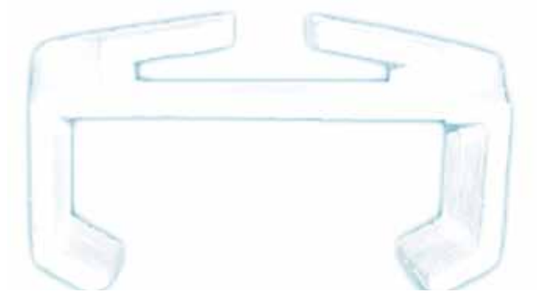
ALUMINA CONTENT	
40-50%	1400ºC
60-70%	1500ºC
80%	1600ºC
90+%	1800ºC

anchor systems



Ceramic Anchors in Walls

Multi-component system to allow lateral and vertical movement/ expansion.



Ceramic Anchors in Roofs

- C-Clips

Various designs of C-Clip available to accommodate many beam sizes and shapes.

Ceramic Anchors in Roofs

- RH's

Anchor brick used with 'roof Hanger'. Roof hangers available in different lengths. Can be custom made to fit different beam sizes & profiles.

moler bricks

Moler bricks are mainly used as back up insulation in industrial furnaces behind refractory linings.

They are also used in large chimney linings, where their high strength and good insulating properties make them ideal. They are also used in aluminium reduction cells where their low alumina content means very little or no crystal growth.

technical data

Maximum temp	900 °C							
Density	g/cuM	400	500	600	700	750	800	900
Cold crushing strength	Mpa	1.0	1.5	2.0	2.5	6.5	3.0	10

refractory bricks

IMS supply a comprehensive range of refractory bricks with Alumina contents of 40-95 %. All of which exhibit excellent mechanical strength.

Our fire brick range is based on Flint clay giving both low iron and alkali contents. Our higher alumina range use various minerals to give 60% and 80% alumina materials , for the highest Alumina contents tabular and fused Alumina is used.

technical data

Alumina- Al_2O_3 %	40-42	45	50	60	KAB 60%	80	95
Silica Si_2O	52.0	52.0	42.0	32.0	32	5.0	3.0
Iron Fe_2O_3	2.5%	0.80	1.90	1.70	1.0	1.0	0.3
Bulk Density g/cu.cm	2.2	2.2	2.3	2.3	2.5	2.5	3.02
Apparent porosity %	22	18	21	22	18	19	19
Cold crushing Mpa	30	35	35	50	75	55	63

Refractory bricks are available in many shapes and sizes please check with us for price and availability

IMS supply a comprehensive range of Insulating fire bricks (IFB) both European and Chinese manufactured for use in applications from 1000 to 1850C. Each grade of brick is formulated to meet specific thermal and physical properties.

Insulating fire bricks are manufactured utilising exceptionally high purity clays and Alumina, up to the 32 grade IFB we use a burn out process to give a uniform pore size distribution to maximise the insulating properties. For the highest temperature rating bubble alumina is used

Insulating fire bricks

typical applications

- Primary Hot face linings
- Back up insulation in Kilns and furnaces
- Flue insulation
- Petro chemical applications
- Hot blast stoves

features

- Good insulating properties
- Strong compressive strength
- Low heat storage
- High purity
- Tight dimensional tolerances

Typical chemical analysis

Grade	20	23	26	28	30	32	33	34	34HP
Alumina- Al_2O_3	38.6	38.6	47.0	66.8	70.0	78.0	91.0	99.0	99.5
Silica- SiO_2	48.0	48.0	48.6	30.7	28.0	21.0	7.0	0.7	<0.1
Iron- Fe_2O_3	0.40	0.40	0.70	0.30	0.30	0.20	0.15	0.1	<0.1

technical data

Grade		20	23	26	28	30	32	33	34	34HP
Temperature °C		1100	1260	1425	1540	1650	1750	1800	1850	1850
Density Kg/M		560	600	770	880	1040	1200	1550	1550	1550
Cold crushing		0.7	0.9	1.9	2.3	3.0	3.1	15	12.5	12.5
Strength Mpa Thermal conductivity										
Mean temp	200	0.14	0.15	0.23	0.32	0.40	0.55	0.95	1.40	1.40
	600	0.18	0.20	0.28	0.35	0.41	0.60	0.90	1.10	1.60
	800	0.24	0.24	0.33	0.36	0.46	0.62	0.90	1.10	1.10

brick sizing guide

squares & splits or scone

Standard No	Inches	Sizes mm
1	9 x $4^1/_2$ x 3	230 x114 x 76
2	9 x $4^1/_2$ x $2^3/_4$	230 x114 x 70
3	9 x $4^1/_2$ x $2^1/_2$	230 x114 x 64
4	9 x $4^1/_2$ x 2	230 x114 x 52
5	9 x $4^1/_2$ x $1^1/_2$	230 x114 x 38
6	9 x $4^1/_2$ x $1^1/_4$	230 x114 x 32
7	9 x $4^1/_2$ x 1	230 x114 x 25
8	9 x $4^1/_2$ x $^3/_4$	230 x114 x 19
9	9 x $4^1/_2$ x $^1/_2$	230 x114 x 13

soaps, pup or closer

Standard No	Inches	Sizes mm
10	9 x 3 x 3	230 x 76 x 76
11	9 x 3 x $2^1/_2$	230 x 76 x 64
12	9 x 3 x $2^1/_4$	230 x 76 x 57
13	9 x $2^1/_2$ x $2^1/_2$	230 x 64 x 64
14	9 x $2^1/_2$ x $2^1/_4$	230 x 64 x 57
15	9 x 3 x 3.$2^1/_2$	230 x 76 x 76.64

also split and or bullnosed soaps

end key, end wedge - end arch, bullhead

Standard No	Inches	Inside Dia.		Sizes mm	Inside Dia.		
16	9 x $4^1/_2$ x 3	$2^1/_4$	for 414	230 x 114 x 76	73	for	10506
17	9 x $4^1/_2$ x 3	$2^1/_4$	for 198	230 x 114 x 76	70	for	5029
18	9 x $4^1/_2$ x 3	$2^1/_4$	for 90	230 x 114 x 76	64	for	2286
19	9 x $4^1/_2$ x 3	$2^1/_4$	for 54	230 x 114 x 76	57	for	1372
20	9 x $4^1/_2$ x 3	2	for 36	230 x 114 x 76	52	for	914
21	9 x $4^1/_2$ x 3	$1^1/_2$	for 18	230 x 114 x 76	38	for	457
22	9 x $4^1/_2$ x $2^1/_2$	$2^1/_4$	for 162	230 x 114 x 64	57	for	4115
23	9 x $4^1/_2$ x $2^1/_2$	2	for 72	230 x 114 x 64	52	for	1829
24	9 x $4^1/_2$ x $2^1/_2$	$1^1/_4$	for 42	230 x 114 x 64	44	for	1067
25	9 x $4^1/_2$ x $2^1/_2$	$1^1/_2$	for 27	230 x 114 x 64	38	for	686

side arch, side wedge - side key, culvert

Standard No	Inches	Inside Dia.		Sizes mm	Inside Dia.		
26	9 x $4^1/_2$ x 3	$2^3/_4$	for 99	230 x 114 x 76/70	for	10506	
27	9 x $4^1/_2$ x 3	$2^1/_2$	for 45	230 x 114 x 76/64	for	5029	
28	9 x $4^1/_2$ x 3	$2^1/_4$	for 27	230 x 114 x 76/57	for	2286	
29	9 x $4^1/_2$ x 3	2	for 18	230 x 114 x 76/52	for	1372	
30	9 x $4^1/_2$ x 3	$1^1/_2$	for 9	230 x 114 x 76/38	for	914	
31	9 x $4^1/_2$ x $2^1/_2$	$2^1/_4$	for 81	230 x 114 x 76/57	for	457	
32	9 x $4^1/_2$ x $2^1/_2$	2	for 36	230 x 114 x 64/52	for	4115	
33	9 x $4^1/_2$ x $2^1/_2$	$1^1/_4$	for 21	230 x 114 x 64/44	for	1829	
34	9 x $4^1/_2$ x $2^1/_2$	$1^1/_2$	for 13	230 x 114 x 64/38	for	1067	

also bullnosed key or arch

feather ends, end wedge, on flat

Standard No	Inches	Sizes mm
60	9 x $4^1/_2$ x 3 /0	230 x114 x 76/0
61	9 x $4^1/_2$ x $2^1/_2$ /0	230 x114 x 64/0

on edge

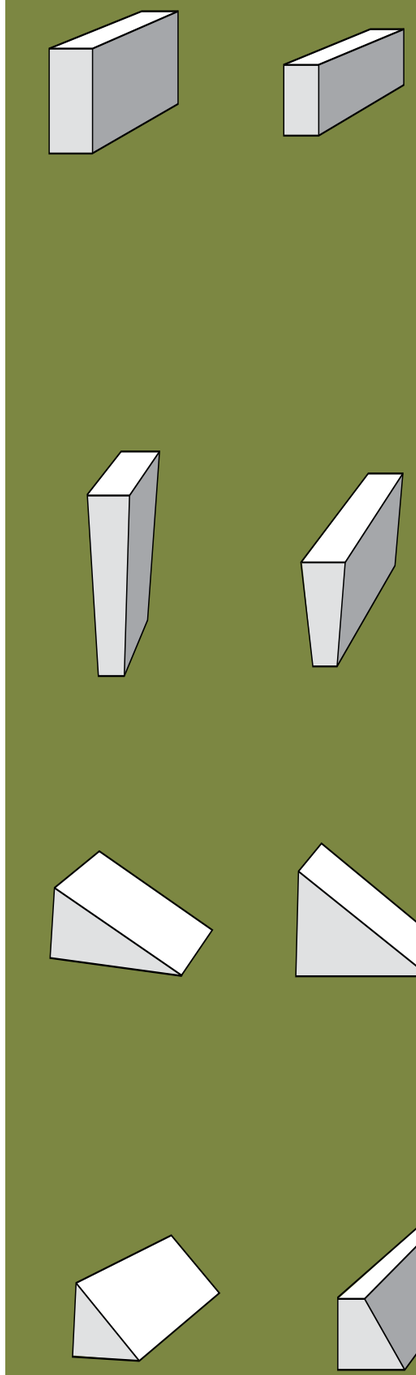
Standard No	Inches	Sizes mm
62	9 x 3 x $4^1/_2$/0	230 x 76 x 114/0
63	9 x $2^1/_2$ x $4^1/_2$/0	230 x 64 x 114/0

feather sides, feather edge or side wedge

Standard No	Inches	Sizes mm
58	9 x $4^1/_2$ x 3 /0	230 x114 x 76/0
59	9 x $4^1/_2$ x $2^1/_4$ /0	230 x114 x 64/0

bevel sides, side skew or splay

Standard No	Inches	Sizes mm
72	9 x $3^1/_2$ $4^1/_2$x 3	230 x 76 x 114/0
73	9 x 2 $4^1/_2$ x 3	230 x 64 x 114/0
73	9 x $2^1/_4$ $4^1/_2$x 3	230 x 64 x 114/0



Silicon carbide is available in two formats, sintered or reaction bonded.

Both materials exhibit extreme hardness along with a high thermal conductivity. Silicon Carbide is commonly used in bearing and rotary seal applications where it's hardness and conductivity improves seal and bearing performance.

Reaction bonded silicon carbide displays excellent properties at elevated temperatures and can be used in aggressive refractory applications.

Silicon carbide materials exhibit good erosion and abrasion resistance, properties which can be utilised in a wide array of demanding applications .

Silicon Carbide Production Methods

Silicon Carbide is derived from powder or grain, produced from carbon reduction of silica. It is produced as either fine powder or a large bonded mass, which is then crushed. To further purify and remove the silica, it is washed with hydrofluoric acid.

There are three main ways to manufacture the main grades:

- mixing silicon carbide powder with materials such as glass or metal, which is then treated to allow the second phase to bond.
- mixing the powder with carbon or silicon metal powder, which is then reaction bonded.
- densified silicon carbide powder is sintered through the addition of boron carbide or other sintering aids.

silicon carbide

typical applications

- Silicon Nitride bonded Silicon Carbide bricks are very effective for the upper side wall linings of aluminium reduction cells
- Aluminium pot/cell insulation
- Kiln furniture
- Incineration
- Power Generation

features

- High thermal conductivity
- Excellent oxidation resistance
- Chemically resistant to molten cryolite
- High strength
- Non-wetting by aluminium
- Improved service life
- Low gas permeability
- Low porosity
- Excellent crushing strength
- High modulus of rupture
- Extreme hardness
- Superior thermal shock resistance
- Low coefficient of thermal expansion
- Maximum service temperature in excess of 1500˚C

silicon carbide nitride bonded

(block, brick & tile)

additional finishing services

IMS offers a high tolerance machining facility, we are able to offer a variety of services including:

- CNC machining and grinding
- Threading
- Turning

technical data

		SiC72	SiC75	SiC78
APPARENT POROSITY	%	≤17	≤16	≤18
BULK DENSITY	g/cm^3	≥2.60	≥2.69	≥2.55
MOR (20ºC)	MPa	≥40	≥50	≥45
HMOR (1400ºC)	MPa	≥48	≥52	≥50
CSS	MPa	≥140	≥150	≥120
CHEMICAL ANALYSIS				
SiC	%	≥71.0	≥73.0	≥78.0
Si_3N_4	%	≥23.0	≥21.0	≥18.0
Iron Oxide – Fe_2O_3	%	≤0.5	≤0.5	≤0.5

Nitride bonded Silicon Carbide has become the ideal sidewall lining for the aluminium reduction cell process. With high strength and high thermal conductivity, it also exhibits excellent oxidation resistance, cryolite melt and resistance to molten aluminium. IMS NBSC also has very low thermal expansion.

product link

all ceramic products
refractories
anchor systems

format

bespoke ✔

dimensions

bespoke

sifca®

SIFCA® is an acronym which stands for Slurry Infiltrated Fibre Castable. SIFCA® is a patented pre-cast refractory composite composed of low cement refractory slurry and stainless steel fibre. It is a combination of up to 16 volume percent stainless steel fibres and any one of four (4) slurry types.

Under appropriate conditions, SIFCA® shapes can have a service temperature range up to 3000ºF (1649ºC).

The unique characteristics of this product are; thermal shock resistance, impact resistance, compressive strength and refractoriness when compared to steel or cast iron shapes. At elevated operating temperatures, SIFCA® replaces cast iron and steel parts that are oxidising.

SIFCA® is also a direct replacement for conventional pre-cast refractory shapes in structural or support applications. SIFCA® shapes, unlike standard pre-cast shapes, can be bolted to the same structure as the steel or cast iron it is replacing.

product link

all ceramic products
refractories
anchor systems
bricks

format

pre-cast shape ✔

typical applications

Iron and steel applications:

- Steel ladle retainer rings
- Reheat furnace door jambs
- Reheat furnace door perimeters
- Iron ladle pour spouts
- Slag out sections
- Torpedo ladle throats
- Composite tundish covers
- Blast furnace trough and runner covers
- Replace water cooled metal sections

Non-ferrous applications:

- Furnace door jambs
- Sills and lintels
- Cruse bottoms
- Trough and launder sections
- Metal stirring tools
- Syphon tips
- Furnace door perimeters
- Roof perimeters
- Skim blades

features

- Thermal shock resistance
- Impact resistance
- Compressive strength
- Refractoriness

technical data

SLURRY CHARACTERISTICS:	Low Cement Castable Technology
SLURRY TYPES:	SIFCA® High Alumina SIFCA® AL High Alumina; Non-Ferrous Metal Resistant SIFCA® PLUS SC Silicon Carbide; Non-Ferrous Metal Resistant
SERVICE TEMPERATURE:	Up to 3000ºF or 1649ºC
WEIGHT REQUIRED FOR CONSTRUCTION (with fibre):	169lbs/ft^3 - 2707kg/m^3

Sifca® fibres

mica muscotherm®

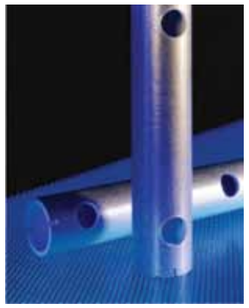
ms500, p700, flx & fbr

Muscotherm® ms500 & p700 are mica based products suitable for continuous operating temperatures up to 700°C. Manufactured from muscovite or phlogopite mica paper together with silicone resins the materials are resistant to high temperature.

Muscotherm® ms500 & p700 exhibit high flexural and compressive strengths together with very low thermal conductivity. The products are ideally suited for environments where hard wearing materials are required.

Muscotherm® flx is a mica based product similar to the ms500 & p700 rigid grades, however, the mica is impregnated with a resin, which remains flexible after polymerisation. The material remains sufficiently pliable to take the shape of the part being insulated. Muscotherm® flx is suitable for continuous operating temperatures up to 500°C.

Muscotherm® fbr is flexible mica paper bonded to 1260 grade ceramic fibre paper. The product exhibits exceptionally low thermal conductivity whilst operating at high temperatures. The product is ideally suited to applications where temperatures need to be greatly reduced but thickness of insulation is restricted.



typical applications

- Heated platen press
- Injection modules
- Thermal barriers
- Induction furnaces
- Power switchgears
- Heaters
- Sheathings
- Separators
- Household products
- Insulation foil
- Induction coil insulation
- Furnace insulation
- Thermal & electrical general insulation

features

- Low conductivity
- High temperature resistance
- Low moisture absorption
- Good dimensional stability
- Good flexural strength
- Excellent compressive strength
- Excellent for wrapping pipes & tubes
- Good electrical properties

technical data

	COLOUR	DENSITY Kg/m³	MAX CONTI. °C	THERMAL CONDUCTIVITY W/mK	COMPRESSIVE STRENGTH @ 200°C MPa	TENSILE STRENGTH MPa	FLEXURAL STRENGTH MPa
ms500	Silver/Grey	2150	500	0.30	250	150	230
p700	Grey/Green	2300	700	0.30	240	110	170
flx	Silver/Grey	1850	500	0.40	–	–	–
fbr	Grey & white	450	1150	0.10	–	–	–

	WATER ABSORPTION 24hr/23ºC %	DIELECTRIC STRENGTH 400°C/1 hour kV/mm	TRACKING RESISTANCE V	VOLUME RESISTIVITY @400°C Ω.cm	DIELECTRIC LOSS 160°C %	RELATIVE PERMATIVITY 400°C	ARC RESISTANCE L3
ms500	<1	13	500	$>10^{12}$	<1	7	2.2.1.0
p700	<1	13	525	$>10^{12}$	<1	6.5	2.2.1.0
flx	–	5	–	–	–	–	–
fbr	–	7	–	–	–	–	–

format

sheet	✔
tube	✔
rod	✔
roll	✔
machined part	✔

dimensions

lengths:	1000, 2000mm* ms500 p700 3000mm* flx fbr
width:	1000mm
thickness:	0.25mm - 50mm

ptfe

Engineering thermoplastics have developed into a major and still growing family of raw materials, which demonstrate in-place benefits and have proved themselves cost-effective in operation.

The benefits compared with metal include high strength-to-weight ratios, good corrosion resistance, electrical and thermal properties and low co-efficients of friction.

PTFE is a tough, flexible engineering thermoplastic with outstanding electrical and chemical resistance. PTFE is stable from –250°C to 250°C. Incredible strength and almost chemically inert PTFE also has the lowest co-efficient of static and dynamic friction of any known solid.

typical applications

- Slide plates/pipes
- Slip plates
- Wear plates
- Chemical /electrical and nuclear engineering
- Sleeving to pipes,tanks valves and pumps

features

- Exceptional wear resistance
- High impact strength
- Good flexural strength
- Easily machined
- Good cryogenic operating temperature

technical data

GRADE		VIRGIN	25% GLASS FILLED
PROPERTIES	Uni	Typical Values (from-to)	Typical Values (from-to)
SPECIFIC GRAVITY	-	2.14 - 2.20	2.18 - 2.23
TENSILE STRENGTH	N/mm^2	20 - 35	15 - 16
ELONGATION AT BREAK	%	210 - 400	200 - 260
COMPRESSIVE STRENGTH 1% DEFORMATION	N/mm^2	4.00 - 4.50	7.0
DEFORMATION UNDER LOAD 14 N/mm^2 for 24hrs	%	10 - 15	7 - 9
HARDNESS	(shoreD)	50 - 60	60 - 63
FRICTION COEFFICIENT - dynamic	-	0.05	0.07
THERMAL CONDUCTIVITY	W/mK	0.20	0.43
VOLUME RESISTIVITY	Ohm/cm	1017	1015
SURFACE RESISTIVITY	Ohm	1015	1014

format

sheet	✔
tube	✔
rod	✔
machined parts	✔

dimensions

details on application.

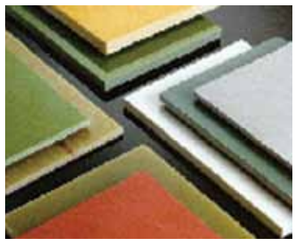
epoxy & polyester glass

th200, 220, 250 & gp03

Th200, th220 & th250 are high strength, high temperature resistant products made from epoxy and polyimide resins combined with glass fibres and rovings.

Th200, th220 & th250 exhibit high compressive strength together with excellent electrical insulating properties at high temperatures. The combined performance of flexural and compressive strength at elevated temperatures ensure that the “th” range of products are unmatched in the epoxy.

GP03 polyester resin bonded glass mat laminate is a product which falls in price and performance between the phenolic paper grades and the high performance woven glass type. GP03 is a good electrical insulator with higher temperature capability than the phenolic paper materials. It is reasonably strong and rigid with assessed flammability characteristics. GP03 is not as easy to machine as phenolic paper grades and would not usually be chosen for wearing applications.



typical applications

th200, 220 & 250:

- Bus bar supports
- Terminal supports
- Connecting plates
- Motor slot wedges
- Pole washers
- Brush-holder supports
- Terminal boards
- Armature insulation
- Cable cleats
- Threaded rods

gp03:

- Induction-furnace components
- Induction-heater components
- Coil Posts
- Mounting blocks
- Output panels
- Gland plates
- Buss bar supports
- Cable cleats

features

th200, 220 & 250:

- Low conductivity
- High temperature resistance
- Low moisture absorption
- Good dimensional stability
- Good flexural strength
- Excellent compressive strength

gp03:

- Good electrical insulators
- High temperature resistance than phenolic
- Low moisture absorption
- Good dimensional stability
- Good flexural strength

technical data

	COLOUR	DENSITY Kg/m³	MAX CONTINUOUS °C	THERMAL CONDUCTIVITY W/mk	COMPRESSIVE STRENGTH @ 20°C MN/m²	COMPRESSIVE STRENGTH @ 180°C MN/m²
TH200	Green	1850	200	0.25	300	115
TH220	Yellow	1850	220	0.22	500	300
TH250	Green	2000	250	0.23	300	450
GP03	Red/Grey/White	1850	155	0.30		

format

sheet	✔
tube	✔
rod	✔
machinable	✔

dimensions

length: 2400mm
width: 1200mm
thickness: up to 50mm

epoxy & silicone glass

g7, 10, 11, efr4 & s7

IMS offer a range of high quality epoxy & silicone resin bonded glass fabric laminates. They have very high mechanical strength with low moisture absorption and exhibit excellent electrical properties.

They are rigid materials with good dimensional stability and resistance to a wide range of working environments. These high performance materials are used for a very wide variety of applications where high strength, stability and electrical performance are required.

Applications such as electrical insulation in turbine generators, cryogenic superconducting magnets, bolt insulations for structures, jigs for electrochemical machining and structural insulation for high performance electronics, are typical of the uses for these materials.

typical applications

- Terminal supports
- Insulation spacers-phase barriers
- Connecting plates
- Motor slot wedges
- Pole washers
- Bus-bar supports
- Brush-holder supports
- Terminal boards
- Converter board panels
- Armature insulation
- Protecting boards
- Cable cleat

features

- Good thermal conductivity and performance
- High strength
- High operating temperature
- Good machinability

technical data

GRADE		G7	G10	G11	EFR4	S7
DENSITY	kg/m³	1850	1850	1850	1900	1900
STRENGTH						
Compressive	MPa	280	240	250	300	280
MAXIMUM SERVICE TEMPERATURE	°C	155	160	180	130	200
THERMAL CONDUCTIVITY	W/mK	0.28	0.30	0.30	0.42	0.4

format

sheet	✔
tube	✔
rod	✔
machinable	✔

dimensions

length: 1200mm, 2000, 2400mm
width: 1020mm, 1200mm
thickness: 0.8mm - 50mm

srbf and srbp

f1, 2 & 3 and p1, 2 & 3

f1, f2 & f3 are multi purpose insulation materials manufactured from fine, medium and course weave phenolic cotton materials. They are strong and tough with very good wear resistance and as such are good for general mechanical applications. f1, f2 & f3 show good electrical properties.

These tend to be superior in the finer weaves. In general the medium and course weave grades are used for larger and more rugged components. The finer weave grades are chosen for their superior machined finish, higher dimensional stability and improved strength in thin section.

p1, p2 & p3 are multi purpose insulation materials manufactured from phenolic paper materials. These materials are strong, rigid and very economical. Choice of grades depends upon voltage or other insulation requirements. p1, p2 & p3 are not normally used in applications demanding high impact strength and all round toughness. They are however used in applications where rigid non metallic insulation materials are required. The grades all exhibit low moisture absorption.

typical applications

srbf:

- General insulation
- Mechanical insulation
- High/low voltage insulation
- Wear plates
- Fine toothed gears
- Cams
- Geneva wheels
- Actuating arms
- Insulating sleeves
- Bushes

srbp:

- Terminal boards
- Mounting panels
- Tag strips
- Coil formers
- Insulating sleeves
- Bushes
- Busbar supports
- Tool handles
- Coil supports
- Insulating spacers
- Special purpose plugs and sockets

features

srbf:

- Low water absorption
- High voltage insulation
- Good wear resistance
- Dimensional stability
- Good machinability

srbp:

- Low voltage insulation
- Good machinability
- Good electrical insulation
- Good impact strength
- Resistant to most oils

format

sheet	✔
tube	✔
rod	✔
machinable	✔

dimensions

lengths:	1200mm
width:	1200mm
thickness:	0.8mm - 100mm

technical data

	COLOUR	DENSITY Kg/m³	MAX CONTINUOUS °C	DIELECTRIC STRENGTH KV	SHEAR STRENGTH MPa	COMPRESSIVE STRENGTH MPa
f1	Brown	1350	120	23	105	350
f2	Brown	1350	120	8	100	320
f3	Brown	1350	120	10	100	315
p1	Brown	1350	100	25	100	300
p2	Brown	1350	100	25	100	320
p3	Brown	1350	100	55	100	350

mycalex

Mycalex is a ceramoplastic material that bridges the performance characteristics between engineering plastics and ceramics.

It is a compression molded glass bonded synthetic mica that has excellent thermal shock resistance, machinability and homogeneity.

typical applications

- Transportation braking systems
- Semiconductor test and handling devices
- Glass manufacturing and handling
- Cryogenic devices

features

- High thermal shock resistance
- Operating temperature to 425°C
- Dimensionally stable
- High compressive strength
- Arc resistant
- Electrically insulative

format

bespoke	✔

technical data

DENSITY	MAX TEMPERATURE °C	STRENGTH N/mm²	ARC RESISTANCE Seconds Compressive	ELECTRIC STRENGTH V/mil Flexural
425	>300	>100	375	395

sindanyo h91 & l21

Sindanyo H91 & L21 have been developed to provide outstanding service in demanding thermal and electrical applications, where a quality high strength machinable engineering board is required.

Sindanyo H91 & L21 are Portland cement based products reinforced with selected fibres. The products display good insulation properties, are non asbestos and non-combustible.

Sindanyo H91 & L21 exhibit low thermal conductivity characteristics which result in excellent insulative qualities. The products are strong, rigid, and show high strength at elevated temperatures.

Sindanyo H91 & L21 offer good impact resistance and all round toughness. They are easily machined and cut and therefore lends themselves to being ideal materials for machined components. Finished components offer high definition.

typical applications

- Arc chute materials
- End/coil/muffle plates
- Brazing/soldering plates
- Muffle/core plates
- Support plates/rods and guides
- Machined components
- Grippers/stops/pads

features

- Asbestos free
- Operates up to 700°C
- Machined part definition
- Can be threaded/tapped
- Hard wearing
- Resistant to most acids/alkalis

technical data

	DENSITY Kg/m³	THERMAL CONDUCTIVITY	MAX CONTINUOUS °C	FLEX STRENGTH Mpa	SHRINKAGE %	COMPRESSIVE STRENGTH Mpa
H91	1750	0.50	700	30	-	115
L21	2000	0.50	230	20	-	95

format

sheet	✔
tube	✔
rod	✔
machinable	✔

dimensions

lengths:	1245mm
width:	945mm
thickness:	3 - 75mm

cemtherm®

Cemtherm® is a Portland cement based product reinforced with selected fibres. Heat treated after manufacture the product displays good insulation properties, is non-asbestos and non-combustible.

Cemtherm® is manufactured to withstand higher temperatures, loads and electrical conditions with less shrinkage and degradation compared to other non-asbestos formulas. It is a high density non-asbestos board used in a wide variety of applications where a combination of high strength, thermal stability, electrical insulation or machine ability is required.

Cemtherm®'s low thermal conductivity provides excellent insulative results. The product is strong, rigid and exhibits high strength at elevated temperatures.

Cemtherm® offers good impact resistance and all-round toughness. It is easily machined and cut and therefore lends itself to being an ideal material for machined components.

Cemtherm® is an ideal material for replacement of asbestos cement based products and can be supplied silicone coated or impregnated for improved moisture resistance.

typical applications

- Base plates
- Duct leg insulation
- End/coil/muffle plates
- Brazing/soldering plates
- Muffle/core plates
- Support plates/rods and guides
- Machined components
- Grippers/stops/pads

features

- Asbestos free
- Operates over 500°C
- Machined definition
- Can be threaded/tapped
- Hard wearing
- Resistant to most acids/alkalis
- Excellent electrical properties

technical data

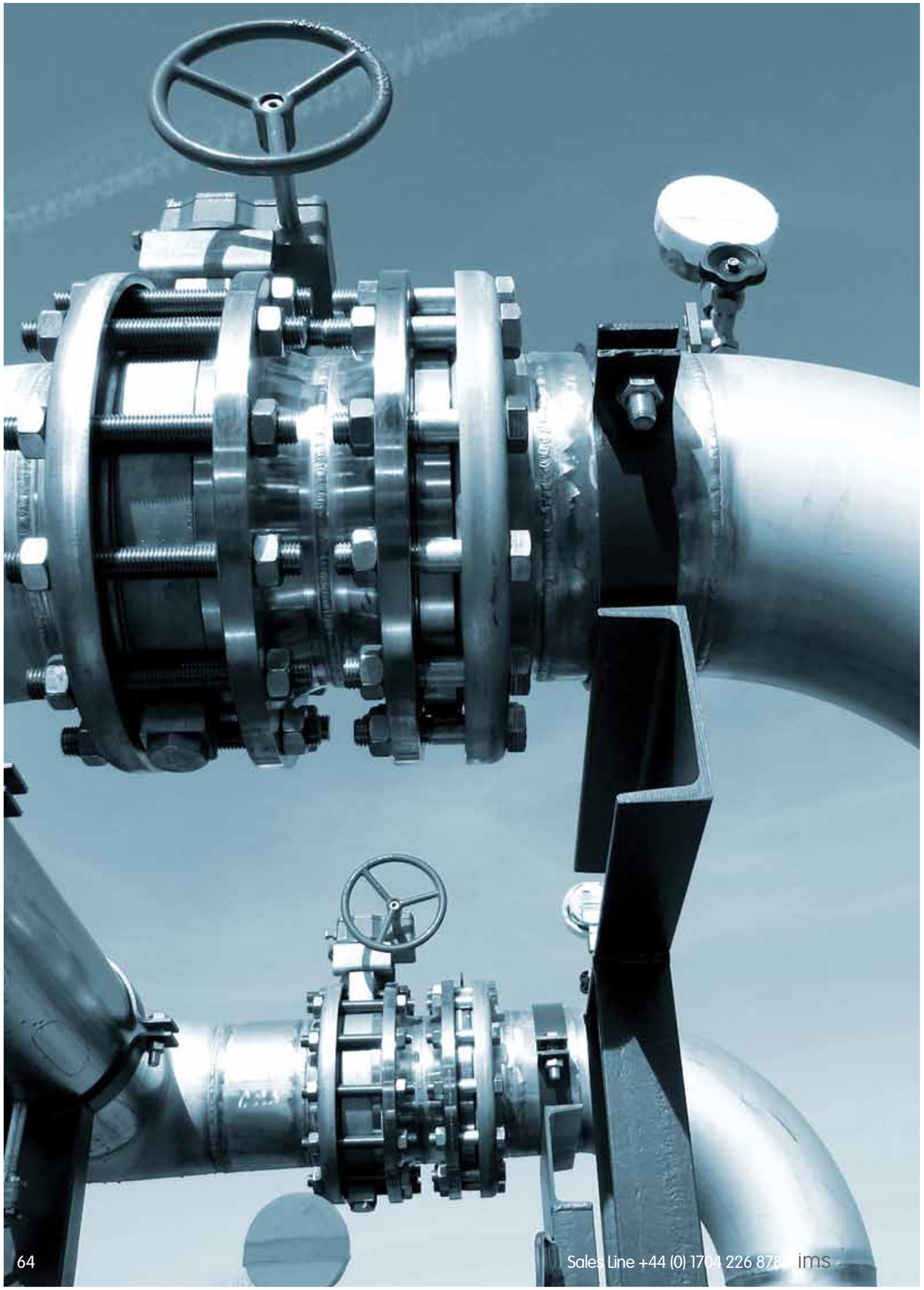
DENSITY Kg/m³	THERMAL CONDUCTIVITY @ 121°C W/mK	MAX CONTINUOUS °C	FLEX STRENGTH @ 100°C Mpa	SHRINKAGE @ 538°C %	COMPRESSIVE STRENGTH Mpa
1570	0.34	538	29	0.44	90
MODULUS OF RUPTURE dry kg/cm²	**MODULUS OF RUPTURE (Density)²**	**VOLUME RESISTIVITY ohm-cm (ASTM D 257)**	**SURFACE RESISTIVITY ohm-cm (ASTM D 257)**	**ARC RESISTANCE Seconds (ASTM D 495)**	**DIELECTRIC STRENGTH volts/mil (ASTM D 495)**
211	0.32	1.25×10^{13}	1.59×10^{16}	272	56

format

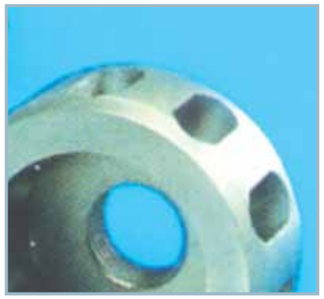
sheet	✔
tube	✔
rod	✔
machinable	✔

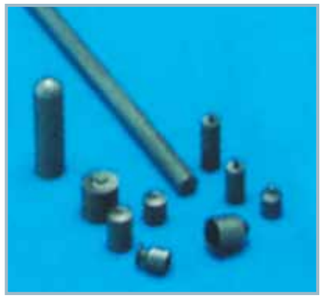
dimensions

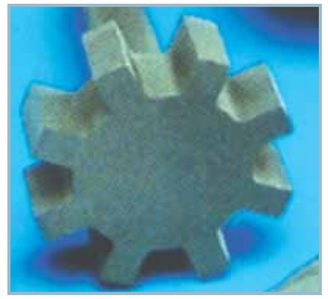
lengths:	2440, 1220mm
width:	1220, 915mm
thickness:	10 - 75mm



graphite mechanical parts







typical applications

- Impellors
- Rotors
- Shafts
- Tubes
- Crucibles
- Heating Rods
- Molten metal pump parts

technical data

	VALUES
GRAIN SIZE (maximum/average) mm	0.5/0.2
BULK DENSITY (g/cm^3)	1.72
SPECIFIC RESISTANCE (μ ohm-m)	680
BREAKING STRENGTH (Mpa)	
Flexural	26
Compressive	42
Tensile	17
ELASTICITY MODULUS COMPRESSIVE (Gpa)	11.5
COEFFICIENT THERMAL EXPANSION (10-6/°C)	1.6
COEFFICIENT THERMAL CONDUCTIVITY (W/m°C)	177
POROSITY (%)	18
ASH (%)	0.1

IMS provide a wide range of extruded and machined graphite materials in varying densities and strengths.

Graphite parts can be treated with an aluminium phosphate treatment thus reducing oxidisation at temperatures above 400°C.

Oxidizing resistant components are used in in-line or degassing station systems. IMS uses proprietory graphite compositions with proprietory coatings to ensure optimum graphite quality with maximised life expectancy.

format

Bespoke ✔

Monalite is the industry standard product for aluminium industry containment and flow control consumable components.

Monalite M1 - standard grade for floats, spouts, stopper pins.

Monalite M1A - low shrinkage product ideal for launders, holding tanks or more critical spouts.

product link

all ceramic products
Carbon Calsil®
Boron Nitride

format

sheet	✔
tube	✔
rod	✔
machinable	✔

dimensions

lengths: 1220, 1500, 3000mm
width: 1220mm
thickness: 12.7, 101.6mm

monalite m1 & m1a

typical applications

- Floats
- Spouts/dip tubes
- Feeder tips
- Stopper pins
- Transition rings
- Launders & Holding furnaces

features

- Thermal shock resistant
- Non-wetting to molten metals
- Low shrinkage
- Maximum temperature l000°C
- Machinable to close tolerances

technical data

GRADE		M1	M1A
DENSITY	kg/m³	850	970
STRENGTH			
Flexural	MPa	8	10
Compressive	MPa	15	18
MAXIMUM SERVICE TEMPERATURE	°C	850	1000
SHRINKAGE – Linear @ 750°C for 24hrs	%	0.10	0.01
THERMAL CONDITION @ 750°C	W/mK	0.26	0.27

carbon calsil®

Carbon Calsil® exclusively available from IMS, is an "advanced carbon fibre re-enforced calcium silicate".

It has been designed specifically to be nonwetting and mechanically strong. Carbon Calsil® offers very low shrinkage as well as being highly resistant to thermal shock. Carbon Calsil® is the material of choice for use in aluminium casting such as transition rings, down spouts, sprue bushes and distribution plates.

mechanical/chemical properties

- Machinable to very close tolerances
- Non-wetting to most non-ferrous molten metals
- Excellent compressive and flexural strength

thermal properties

- Service temperature to 1000°C
- Low shrinkage and coefficient of thermal expansion
- Low thermal conductivity
- Highly resistant against thermal shock

typical applications

- Floats
- Spouts / dip tubes
- Feeder tips
- Stopper pins
- Transition rings
- Launders & Holding furnaces

features

- Thermal shock resistant
- Non-wetting to molten metals
- Low shrinkage
- Maximum temperature l000°C
- Machinable to close tolerances

technical data

DENSITY	kg/m³	820
STRENGTH		
Compressive	N/cm2	980
MAXIMUM SERVICE TEMPERATURE	°C	850
SHRINKAGE – Linear @ 750°C for 24hrs	%	0.20
THERMAL CONDITION @ 400°C	W/mK	0.146

product link

all ceramic products
Boron Nitride

format

sheet	✔
tube	✔
rod	✔
machinable	✔

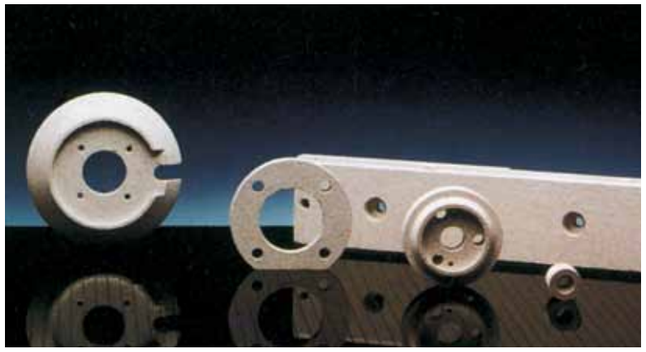
dimensions

lengths: 1210, 1500mm
width: 910, 1200mm
thickness: 12, 100mm

monolux 500 & 800

Monolux is a general purpose rigid engineering insulation board, used in plate or machined component form.

Monolux 500 is a high density form, where greater impact resistance, strength or machining properties are required, for use up to 500°C. Monolux 800 is a high density product with increased compressive strength to 27MPa, and will withstand temperatures up to 800°C.



typical applications

- Platen press insulation
- Ovens and dryers
- Load bearing pipe supports
- Heat shields
- Thermal breaks
- Boiler baffle plates
- Holders
- Ducts and trunking
- Air conditioning

features

- Formulated without asbestos or ceramic fibres
- Non-combustible to BS476 Pt 4 1990
- Moisture resistant
- Low thermal capacity and conductivity
- Easily machinable to close tolerances
- Strong - up to 27MPa compressive strength

technical data

GRADE		500	800	Notes
DENSITY	kg/m³	768	950	
STRENGTH				
Flexural	MPa	7	10	
Compressive	MPa	13	27	@ 10% compaction
MAXIMUM SERVICE TEMPERATURE	°C	500	800	
SHRINKAGE – Linear	%	0.29	0.40	@ 750°C, 24 hrs

format

sheet	✔
machinable	✔

dimensions

lengths:	1220, 2440mm
width:	1220mm
thickness:	12.7, 50.8mm

duratec 750 & 1000

Duratec is a high density versatile machinable engineering material manufactured in calcium silicate.

Using the latest manufacturing technology the product is pressed to produce exceptional dimensional stability and thermal performance. Duratec is supplied in two grades and a range of sizes up to 100mm with tolerance sanded surfaces. Duratec is non-combustible and suitable for operating in electrical and thermal environments up to 1000°C. Duratec 1000 exhibits low shrinkage, Duratec 750 exhibits higher strength.

The strength of Duratec is substantially maintained at maximum temperature, Duratec 750 actually increasing in strength at elevated temperatures.

typical applications

- Induction furnace casings
- Billet heater end plates
- Foundry core plates
- Brazing, soldering and welding jigs
- Electrical insulation components
- Element supports
- Arc chutes

features

- Formulated without asbestos or ceramic fibre
- Maximum temperature 1000°C
- Compressive strength to 90MPa
- Good arc resistance, anti-tracking & electrical insulation
- Low outgassing under vacuum conditions
- Machinable to close tolerance/high definition

technical data

GRADE		1000	750
DENSITY	kg/m³	1350	1400
STRENGTH			
Flexural	MPa	18	23
Compressive	MPa	31	55
MAXIMUM SERVICE TEMPERATURE	°C	1000	1000
ARC RESISTANCE	ST273A	-	Cat 1
ELECTRICAL STRENGTH	kV/m	4700	7300
COMPARATIVE TRACKING INDEX		600	>500

format

sheet	✔
tube	✔
rod	✔
machinable	✔

dimensions

lengths:	1500, 3000mm
width:	1220mm
thickness:	6, 100mm

Calsil 800 - a low density product in thickness from 20mm to 150mm available in slab, molded section or machined format, for 800°C use.

Calsil 1000 - Tougher, higher temperature product for efficient fibre-free back-up insulation.

Calsil 1100 - introduced for the higher temperature furnace use in the aluminium industry, Calsil 1100 combines the efficiency, thermal ability and health safe issues of calcium silicate for replacing fibrous back-up insulation.

product link

all ceramic products
all refractories
bricks

format

sheet	✔
moulded	✔
tube	✔
machinable	✔

dimensions

lengths: 1000, 1200mm
width: 500, 600, 1000mm
thickness: 20, 150mm

calcium silicate 800, 1000 & 1100

typical applications

- Back-up insulation for furnaces, reduction cells (pot lines)
- Pipe supports
- Heat shields
- Thermal breaks
- Pipe-sections
- Insulating boxing

features

- Formulated without asbestos or ceramic fibres
- Exceeds BS3958 Pt 2 1982 for insulation materials
- Lightweight
- Low thermal conductivity @ 0.054W/mk
- Up to 1100°C operating temperature

technical data

GRADE		800	1000	1100	Notes.
DENSITY	kg/m³	260	290	290	
STRENGTH					
Flexural	MPa	0.7	0.8	0.9	
Compressive	MPa	1.3	1.5	1.8	@ 10% compaction
MAXIMUM SERVICE TEMPERATURE	°C	800	1000	1100	for back-up use
SHRINKAGE – Linear	% @ temp	>2 @ 800	>2 @ 1000	>2 @ 1000	
THERMAL CONDUCTIVITY	W/mK	0.145	0.145	0.145	@ 750°C

Zircar rs100 & 1200 are ceramic fibre reinforced structural alumina products.

Both have compressive and flexural strengths in the range of plastics like G7 and G10 but exhibit such properties up to its 1260°C service temperature.

Zircar rs100 & 1200 have mechanical properties exceeding those of Transite and other asbestos based materials. This means that Zircar rs100 & 1200 are suitable replacements for rigid asbestos containing products and are inorganic and non-flammable. Zircar rs100 & 1200 undergo little or no out-gassing on heating. They are not brittle and have high impact properties. Zircar rs100 & 1200 are strong rigid materials which provide excellent performance at high temperatures with good impact resistance and all round toughness.

RSLE57 is a low expansion high strength reinforced silica matrix composite product. Designed for use as a high strength insulator in induction hot press applications with temperatures as high as 1100°C, RSLE57's very low thermal expansion coefficient and high density combine to give it thermal shock resistance not found in other structural ceramic matrix composite materials. RSLE57 exhibits exceptional non-wetting properties when used in contact with molten aluminium making it useful in numerous molten aluminium contact applications. RSLE57 is 100% organic free and contains no refractory ceramic fibre. It is readily machined to precision tolerances with conventional tooling.

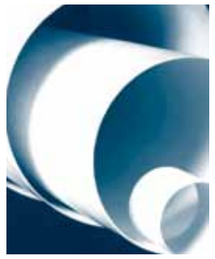
format

sheet	✔
machinable	✔

dimensions

lengths:	610, 915, 1220mm
width:	610, 915mm
thickness	3 - 75mm

zircar
rs100, 1200 & rsle57



RS101 & RS201 cylinders are ceramic fibre reinforced structural alumina products with useful properties to 1260°C. These high temperature products offer high strength, moderate thermal conductivity and excellent electrical insulation. They retain their strength and utility to levels far exceeding maximum use temperatures of reinforced plastics and asbestos cement replacements. Both grades are 100% inorganic, non flammable and contain no asbestos. The high alumina content makes them resistant to many environments including molten aluminium.

RS10l & RS201 cylinders undergo little or no outgassing on heating, are not brittle and may be cut and machined with standard tooling.

typical applications

rs100 & 1200:

- Oven construction and shelving
- Coil plates
- Electrical terminal blocks
- Heating element supports
- Brazing fixtures

rsle57:

- Induction coil posts
- Furnace components
- Coil liners
- Insulation plates
- Troughs
- Terminal blocks
- Insulators
- Glass pushers

features

- Asbestos free
- Non-combustible
- Retained strength at elevated temperatures
- Good impact resistance
- Good flexural strength
- Good arc resisting, anti-tracking and electrical insulating properties
- Moisture resistant coating available
- Able to withstand temperatures up to 1260°C

technical data

	COLOUR	DENSITY Kg/m³	MAX TEMP °C	SHRINKAGE @ 800°C %	THERMAL CONDUCTIVITY @ 800°C W/mK	COMPRESSIVE STRENGTH MPa
rs100	White/Tan	2100	1260	<2	0.64	69
rs1200	White	2160	1300	<2	0.67	55
rsle57	White	2100	1100	<1	0.61	48

	MOISTURE CONTENT @ 100°C %	L.O.I. @ 800°C %	VOLUME RESISTIVITY Ω.cm	SURFACE RESISTANCE Ω	DIELECTRIC STRENGTH V/mil	ARC RESISTANCE sec.
rs100	0-2	1-2	$7.2x10^{11}$	$2.3x10^{11}$	71	>420
rs1200	0-2	1-2	$7.2x10^{11}$	$2.3x10^{11}$	71	>420
rsle57	0-2	0-1	$7.5x10^{9}$	–	43	–

zircar
rs-101 & rs-201

typical applications

- Induction melting or heating equipment
- Aluminium casting equipment
- General high temperature engineering insulation
- For thermal and/or electrical insulation use

features

- Asbestos free
- High strength
- Custom sizes
- Easily machined
- Good insulation properties

technical data

	COLOUR	DENSITY Kg/m³	CONTINUOUS MAX POINT °C	MELTING CONDUCTIVITY °C	THERMAL 24hrs @ 1000°C @ 1000°C	SHRINKAGE %
rs-101	White/Buff	1600	1260	1500	0.47	<1
rs-201	White/Buff	2080	1260	1500	0.55	<1

	COMPRESSIVE STRENGTH MPa	THERMAL EXPANSION °C	MODULUS OF RUPTURE @ 20°C MPa	DIELECTRIC STRENGTH volts/mil	VOLUME RESISTIVITY Ω.cm	SURFACE RESISTIVITY Ω
rs-101	13	$8x10^{6}$	16.5	55	$7.2x10^{11}$	$2.3x10^{11}$
rs-201	13	$8x10^{6}$	16.5	26	$1.7x10^{12}$	$1.3x10^{13}$

zircar dd / dm

typical applications

- Asbestos board replacement
- Oven contraction
- Induction heating liners and coil fixtures
- High temperature gasketing
- Moulded shapes
- Tubes, trays and boats
- Non-ferrous metal handling
- Hot furnace repairs

features

- 1200 max temp
- Moldable
- Easily machined

technical data

	COLOUR	FORMAT	SHRINKAGE	DENSITY %	MAX kg/m3	TEMPERATURE °C
DD	white	rigid	n/a	1300	1200	
DM	white	moldable	10	1400	1200	

Zircar Refractory sheet type dd + dm are structural high alumina product supplied in thin sheet form. Composed of high purity alumina, reinforced with high alumina ceramic fibres.

zircar type dd

Type DD is a rigid sheet which can be moistened with water to become moldable. This product is ideally suited to insulate and protect shapes of a non standard nature, where machined insulation parts would be impractical.

After drying, the material regains it strength and other performance characteristics.

zircar type dm

Type DM is another form of moldable with a resulting density higher than that of DD. Type DM is ideally suited for forming exceptionally intricate and complicated shapes from a flat sheet format. After drying the material regains it strength and other performance characteristics.

product link

rs-101 & rs-201

adhesives coatings sealants

format

rs-101 & rs-201		dd/dm	
tube	✔	sheet	✔
		machinable	✔

dimensions

lengths:	1220mm
width:	945mm
thickness:	4.75, 12.70mm

Millboard Nefalit

nefalit 7

Nefalit 7 is composed of rockwool fibres and has a classification temperature of 850°C. It has a low dust level when cut and it is easily pressed giving low tool wear. Providing a good definition to the finished piece, with enough mechanical strength to aid handling or installation, even on the thinner materials.

nefalit 11

Nefalit 11 is composed of wollastonite fibres and has a classification temperature of 1100°C. This millboard has a very good tracking index making it ideal protection against electrical arcs. As with all millboards it can be used for burner, boiler and dryer gaskets.

nefalit bio

Bio Millboard exhibits the same properties as standard high temperature millboards. By blending together different fibres, binders, and additives, creating a millboard that has a high tensile strength and can resist or contain heat up to 1200°C.

bm1000

bm1000 is a brand new formulation, designed with performance and low cost in mind. It has been specially formulated for the gasket cutting market. Other applications well suited to bm1000 are furnace construction, steel and smelting, non-ferrous, electrical, thermal, chemical, pharmaceutical, aeronautical, automotive and naval applications.

ad1200

ad1200 is calcium silicate based rigid board. It has a hydrophobic treatment and is ideal within the Induction furnace environment. Combining its high mechanical strength, the ability to 'bend' to the required profile and the unique 2m x 1m format make it the only choice for this application. ad1200 is extensively used for the centrifugal spin casting industry as gaskets to hold in the molten steel at temperatures of up to 1600°C, due to its excellent mechanical strength.

format

sheet	✔
cut pieces	✔
gaskets	✔

dimensions

lengths	1000, 1500, 2000mm
width:	1000mm
thickness:	2, 12mm

millboard nefalit
7, 11, bio, bm1000 & ad1200

features

nefalit 7
- Thermal shields
- Fire protection
- Inner coating of industrial furnaces
- Can be coated with an aluminium paint for steam protection and heat reflection
- 850°C Temperature rating

nefalit 11
- Protection against electrical arcs
- Burners
- Boilers
- Dryers
- Actuators
- 1100°C Temperature rating

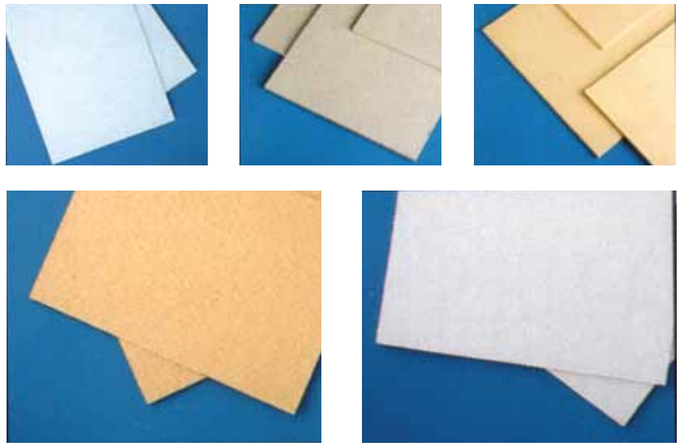
nefalit Bio
- Contains no harmful fibres
- Contains no ceramic or asbestos

fibres
- Classified group 3 (IARC)
- 1200°C operating temperature
- Easily cut and folded

bm1000
- Ferrous and non-ferrous smelting industries
- Electrical
- Thermal - high temperature use in furnaces
- Chemical and pharmaceutical

ad1200
- Hydrophobic
- Flexible
- 1200°C classification temperature
- Health safe
- Can be die cut

millboard nefalit
7, 11, bio, bm1000 & ad1200



typical applications

- Furnace construction
- Steel and smelting
- Non-ferrous
- Electrical applications
- Thermal applications
- Chemical applications
- Pharmaceutical applications
- Aeronautical applications
- Automotive applications
- Naval applications
- Gasket applications
- Induction furnace applications
- Spin casting gaskets
- Domestic heating markets

technical data

		nefalit 7	nefalit 11	nefalit bio	bm1000	ad1200
COLOUR		Grey/Beige	Yellow	Blue	Yellow/Beige	White
DENSITY	Kg/M^3	850	1100	1100	950	1000
MAX SERVICE TEMP	°C	850	1100	1200	1000	1200
THERMAL @ 400°C CONDUCTIVITY	W/mK	0.10	0.12	0.12	0.15	0.12
HEAT @ 800°C TREATMENT LOSS	%	15	13	15	14	12
TENSILE STRENGTH						
Longitudinal Fibres	Kg/cm^2	40	40	50	40	40
Transversal Fibres	Kg/cm^2	40	30	40	30	30
SHRINKAGE @ 750°C	%	–	–	–	<2	–
@ 800°C	%	<2	–	–	–	–
@ 1000°C	%	–	<1	<1	–	–
@ 1150°C	%	–	–	–	–	<4

format

sheet	✔
gasket	✔
cut pieces	✔

dimensions

lengths	1000, 1500, 2000mm
width:	1000mm
thickness:	2, 12mm

Combat boron nitride coatings are entirely inorganic, composed of boron nitride powder and a high temperature bond phase.

Supplied in a liquid form suitable for brushing, combat boron nitride coatings can be diluted with water to spraying and dipping consistencies and applied to a variety of porous and non-porous materials including graphite, metals, ceramics and organics.

For coating recommendations for a specific application, the following information should be provided:

- Base material to which the coating will be applied
- Environmental conditions to which the coating will be subjected (temperature, atmosphere, contact with other materials, etc.)

General application and drying instructions for each composition are available on a separate sheet with every shipment. For many applications, specific procedures must be determined. All surfaces to which coatings are to be applied should be clean, dry and free from grease or oil. Metal or other smooth surfaces may require surface roughening to ensure best adherence. Roughened or porous surfaces normally do not require further preparation.

product link

all ceramic products
all refractories
all permatech products
monalite
carbon calsil

format

340g aerosol ✔
5kg tubs ✔

boron nitride coatings - combat®

typical applications

Combat Boron Nitride Coatings can be used up to 1372°C (2500°F) in a reducing/ inert atmosphere and 850°C (1562°F) in an oxidising atmosphere, and will retain many of the properties of Boron Nitride such as:

- Non-wetting by most molten metals, salts, fluxes and slags
- Resistant to molten metal corrosion and light
  metal drosses
- Excellent parting plane / very lubricous
- Helps in removal of solidified metals

features

Grade Specific Properties

Various compositions are formulated using a variety of inorganic binders. As a result, variations in physical properties such as hardness, adherence, useful temperature range, and ease of application are obtained.

Type A

The highest percentage concentration of boron nitride available at 39%. Extremely thick concentrate that should be diluted with water to obtain the required consistency.

Type Sf

A general purpose coating comprised of 23% BN is a thick concentrate that is best diluted with water to the desired consistency and sprayed or brushed onto the refractory or metal mold.

Type 10Sf

Same coating properties as Sf coating. Lower viscosity than Sf coating, a ready to use formula.

Type V

A high BN composition that dries to a harder surface used in special applications where a stronger binder is needed in applications such as coating moving parts in molten metal. Excellent for coating graphite.

boron nitride coatings - combat®

technical data

	Type A	Type Sf	Type 10Sf	Type V
Active Ingredient	BN	BN	BN	BN
Percent of BN	39%	23%	10%	31%
Percent of Solids[1]	55%	31%	16%	33%
Percent Liquids Phase[2]	45%	69%	84%	67%
Carrier Liquid	Water	Water	Water	Water
Binder Phase	Aluminium Phosphate	A^2O^3	Al^2O^3	Magnesium Silicate
pH	1.0 - 3.0	6.0 - 8.0	6.0 - 8.0	>7.5
Viscosity (cps)	50,000-200,0005	15,000- 60,0003	500 – 6,0003	3,000 – 12,0004
Specific Gravity (g/cc)	1.24	1.21	1.10	1.20
Colour	White	White	White	White
Coverage[6]	100- 400 ft^2 / gal	100- 400 ft^2 / gal	100- 400 ft^2 / gal	100- 400 ft^2 / gal
Shelf Life at R.T.	12+ months	12+ months	12+ months	12+ months
Composition of Coatings				
BN	72%	73%	63%	94%
Binder Phase	28%	27%	37%	6%
Use- Temperature				
Reducing/ Inert	1370°C	1370°C	1370 °C	1370 °C
Oxidising	850°C	850 °C	850 °C	850 °C

1. BN powder and binders.
2. Percentage of water.
3. Brookfield viscometer with helipath stand, spindle T-C speed 10 rpm.
4. Brookfield viscometer with helipath stand, spindle T-A at speed 10 rpm.
5. Brookfield viscometer with helipath stand, spindle T-E at speed 10 rpm.
6. Depending on coating thickness and surface finish and porosity of substrates.
7. Composition after the coating is completely dried.

typical applications

Combat Boron Nitride aerosol may be used as a coating for:

- High temperature release (crucibles, molds, transition plates)
- High temperature lubrication
- Corrosion resistance to molten metals, molten glasses and slags
- Anti-oxidation barriers
- Anti-stick barriers during hot pressing operations

features

Combat Boron Nitride aerosol is a very lubricious drying spray which deposits a thin film (.0005”-. boron nitride powder on sprayed surfaces. This powder film is very lubricious, produces an excellent anti- stick surface and will also act as an oxidation up to 850ºC. It is chemically inert to most organic and corrosive agents, and is not wet by molten glasses or slags.

Combat Boron Nitride aerosol spray consists of boron nitride powder dispersed in an acetone carrier and carefully compounded with a small amount of binder to facilitate adherence.

A propellant that is ozone-friendly and non-carcinogenic drives the spray. However, this propellant is flammable and should be kept from open flame, sparks, heat or other ignition sources.

product link

all ceramic products
all refractories
all permatech products
monalite
carbon calsil

format

340g aerosol ✔
5kg tubs ✔

Zircon Patch is a specially blended product consisting mainly of zircon grades with plasticizers and a chemical bond.

Zircon Patch is supplied ready-for-use, in a putty consistency for direct application by hand or suitable implement.

Zircon Patch can also be supplied in powder form which can be mixed with Zircon Bonding solution to give consistencies suitable for tamping, trowelling or pouring.

Zircon Patch will give good strength on drying at ambient temperature but is best heated to 200/300°C, for optimum strength and service performance.

Zircon Patch is a high strength patching material for hot and cold repairs in glass tank furnaces. It is suitable for repairs to Zircon, Silica, Mullite, Alumina and in fact, any non-basic refractories.

Zircon Patch Standard

typical applications

- Repairs to crowns and superstructures in glass furnaces
- Filling at expansion joint gaps where the material must be forced into the void to obtain a complete seal
- Repairs to metal melting furnaces and ladles
- Zircon Patch is best used in conjunction with a coating of Zircon Paint, applied after drying, in all applications where this is possible. Zircon Paint can be applied by brush or spray gun

chemical analysis (calcined basis)

ZrO^2	-	58%
SiO^2	-	35%
$Al2O^3$	-	4%
Moisture content	-	8/9%

technical data

Bulk density (wet putty)	-	3250 kg/m^3
Service temperature	-	up to 1650°C
Permanent Linear Change (1400°C – 5 hours)	-	+ 0.3%
QUALITY OF BONDING SOLUTION REQUIRED FOR ZIRCON PATCH POWDER		
For ramming	-	4/5%
For putty	-	8/9%
For trowelling	-	10/11%

packaging

Zircon Patch (putty) is supplied in a tightly sealed polythene bag in a bucket of 25kg ✔

Powder is supplied in a 25 kg bucket ✔

Zircon Bonding solution is supplied in 5 litre containers ✔

Zircon Patch Z/S Super 150 (Wet)

typical applications

- Repairs to crowns and superstructures in glass furnaces
- Filling at expansion joint gaps to give maximum sealing
- Patching and filling regenerate crowns, breast front and back walls and port areas

chemical analysis (calcined basis)

$ZrO^2 + HfO^2$	-	63.5
SiO^2	-	32.5
$Al2O^3$	-	0.6
$Fe2O^3$	-	0.2
$P2O^5$	-	2.5

technical data

Supplied	-	ready for use
Type of bonding	-	chemical
Bulk density (as placed)	-	3300kg/m^3
Service temperature	-	300°C to 1650°C

Zircon Patch Z/S – Super 150 is a high purity chemically bonded zircon supplied in a plastic putty consistency ideal for direct application.

Zircon Patch Z/S – Super 150 can be applied by hand or trowel and if required a small amount of water can be added to 'wet down' the putty to give a softer consistency.

Zircon Patch Z/S – Super 150 will develop limited strength at ambient temperature but is best heated to 200/300°C, after a cold repair, for optimum strength and service performance.

Zircon Patch Z/S – Super 150 is a high strength material for hot and cold repairs to Zircon, Silica, Mullite, Alumina and Fusion Cast Refractories.

packaging

Zircon Patch Z/S – Super 150 is supplied in a tightly sealed 25 kg bucket ✔

RSL - 90 Paint has been specially formulated to give tenacious adhesion onto refractory materials both dense and insulating operating at extreme temperatures.

It also has good adhesion and stability on metal surfaces up to 600°C. This makes RSL - 90 ideal for coating iron and steel launders and ladles.

packaging

- 5 kg buckets ✔
- 20 kg buckets ✔
- 200 litre drums on request ✔

RSL - 90 paint

RSL - 90 Paint

is manufactured to be ready for use in a smooth gelled consistency. If on storage a small layer of liquid has separated it will be very easy to stir and return to its original consistency.

Surfaces should be sound and clean as possible before applying the paint.

It can be applied by towelling or applied by firmly brushing or spraying onto the surface to give maximum penetration and adhesion. Spraying or gunning gives an excellent smooth finish but it may be necessary to dilute the paint for satisfactory application. (See below).

RSL - 90 is best applied in a thin layer, which can be built up on successive coatings if required.

coverage

20 kg will coat approximately 20m^2 at 0.5mm thickness

dilution

maximum 1 part water to 5 parts paint by volume

health & safety

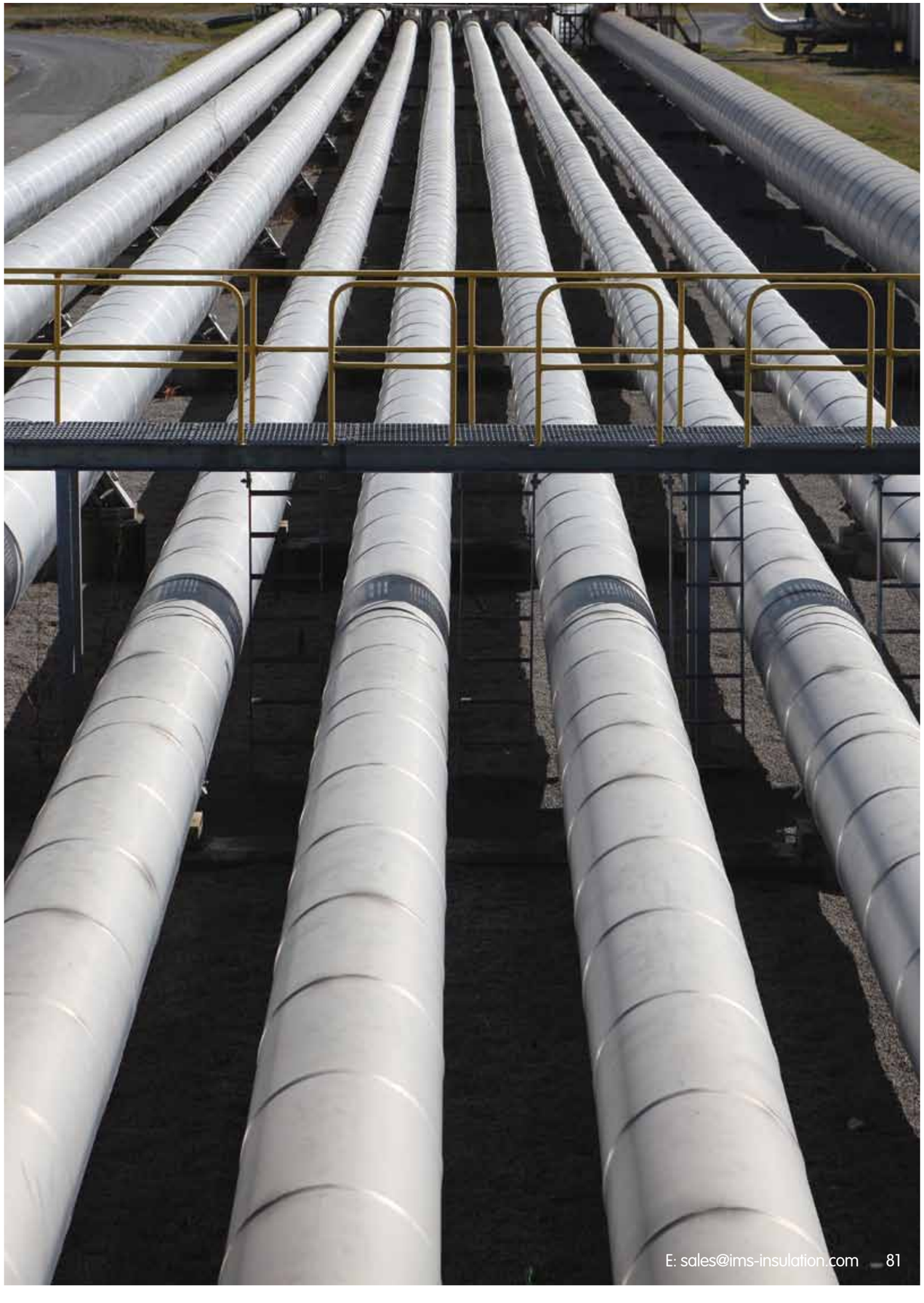
full details available on material safety data sheet

Chemical Analysis (calcined basis)

Al_2O_3	-	85% min
SiO_2	-	12% max
Fe_2O_3	-	0.3% max
Alkalis	-	2.8% max

Typical Properties

Grading:	Bulk Density:	Maximum Service Temperature	Refractoriness
Virtually all passing 48 mesh (BSS). Micronised particles aid penetration, sintering and sealing	1800 kg/m^3	1800°C	1850°C



Microporous Insulation uses nanoporous insulation where the pore size is smaller than air molecules.

This gives the best insulation possible, which means microporous insulation allows the greatest temperature drop with the lowest mass of materials,

The material is available in different forms. Rigid forms include panel and boards, while flexible forms are Slatted, quilted and blanket. All have very similar thermal conductivity, the method of installation and shape of the unit to be insulated usually determines which form of microporous insulation usually determines which form is used

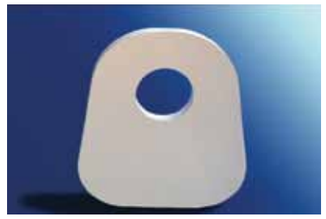
Panel has a glass cloth covering

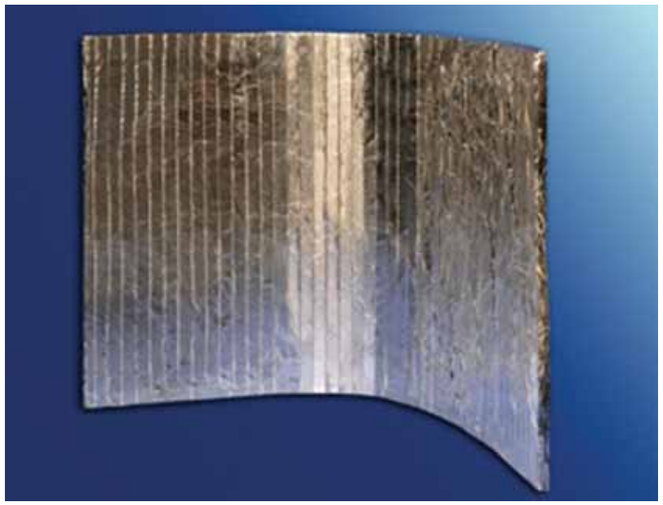
Board can be supplied, uncovered , shrink wrapped or covered in aluminium foil

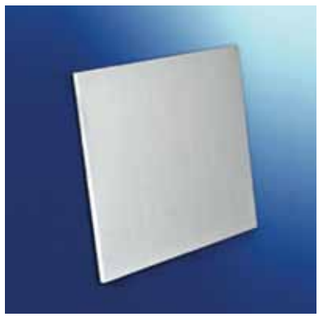
Slatted can be covered in a glass cloth or aluminium foil

Quilt is covered in a glass cloth

microporous rigid and flexible







technical data

			Blanket / areogel
Temperature rating°C	950°C		650°C
Density	200-360 kg/cuM		180
Thermal Conductivity w/mk			
Mean temp	200°C	0.023	0.028
	400°C	0.026	0.046
	600°C	0.030	0.089
	800°C	0.037	-

aspen aerogel Pyrogel® xt, xtf

Pyrogel®XT

Service Temperature Range
-40°F (-40°C) to 1200°F (650°C)

Thermal Performance
Pyrogel®XT is on of the most efficient industrial insulations in the world. Its required thicknesses are 50% - 80% less than other insulation materials.

Moisture Resistance
Moisture is a problem in insulation at temperatures up to 200 °C. It can form within the insulation and cause corrosion under insulation (CUI). Pyrogel®XT is hydrophobic (resistant to liquid water) through the entire matrix of the material (not just on the surface) and provides excellent resistance to moisture. Other insulations tend to absorb moisture over time, potentially coroding the substrate. Pyrogel®XT also meets all specifications for stress crack corrosion of stainless steel.

Logistics
From procurement through installation, Pyrogel®XT simplifies logostics because of it's decreased volume requirements. These advantages include freight savings, storage space, simplified inventory, and the fact that it doesn't break in transit.

Installation
Pyrogel®XT is quickly and easily installed by wrapping it onto piping and equipment. In contrast, rigid insulation materials are installed piece by piece in sections, which is very labour intensive. Pyrogel®XT aslo is applied in longer lengths at a faster rate than other insulation materials, which shortens the project schedule.

Pyrogel®XF

Advantages

Superior Thermal Performance
Up to five times better thermal performance than competting insulation products

Reduced Thickness and Profile
Equal thermal resistance at a fraction of the thickness.

Less time and Labout to Install
Easily cut and conformed to complex shapes, tight curvatures, and spaces with restricted access.

Physically Robust
Soft and flexible but with excellent springback, Pyrogel®XTF recovers its thermal performance even after compression events as high as 100 psi

Shipping and Warehousing Savings
Reduced material volume, high packing density, and low scrap rates can reduce logistics costs by a factor of five or more compared to rigid, pre-formed insulations.

Simplified Inventory
Unlike rigid Pre-forms such as pipe cover or board, the same Pyrogel®XTF blanket can be kitted to fit any shape or design.

Hydrophobic Yet Breatable
Pyrogel®XTF repels liquid water but allows vapour to pass through, helping to prevent corrosion under insulation.

Environmentally Safe
Landfill disposable, shot-free, with no respirable fiber content.

physical properties

Thickness*	0.40 in (10mm)
Material Form*	60 in (1,500mm) wide x 155 ft (47m) long rolls
Max. Use Temp.	1200°F (650°C)
Colour	Grey
Density*	11lb/ft^3 (0.18 g/cc)
Hydrophobic	Yes

Pyrogel® XT is the most effective high-temperature insulation material in the industrial market, typically 2-5 times thinner than competing products.

It is efficient, durable and more productive to install, its water resistance offersa level of protection against corrosion under insulation (CUI). It is also available in a fire-protection grade (Pyrogel®XTF) that is specially formulated to provide exceptional performance against the UL 1709 standard.

Pyrogel® XTF is a high temperature insulation blanket formed of silica areogel and reinforced with non-woven, high temperature batting.

Similar to Pyrogel® XT in composition, Pyrogel® XTF has been specially formulated to provide exceptional protection against fire.

Silica aerogels posses the lowest thermal conductivity of any known solid. Pyrogel® XTF achieves this industry-leading thermal performance in a flexible, environmentally safe, and easy-to-use product. Ideal for insulating piping, vessels, tanks and equipment, Pyrogel® XTF is an essential material for those seeking the ultimate in thermal efficiency.

vermiculite board & bricks

Vermiculite is supplied in boards, bricks and granules. Vermiculite products exhibit good insulation properties, high mechanical strength and excellent temperature resistance.

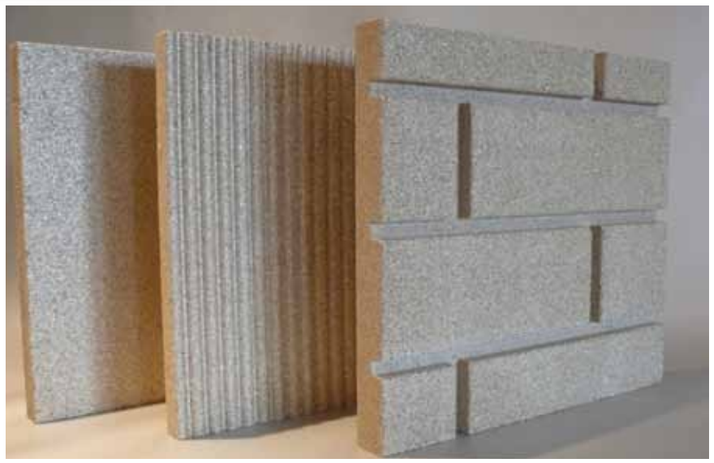
Vermiculite boards and bricks are moulded to extremely close dimensional tolerances. The material is free of asbestos and organic substances. Vermiculite is an aluminium-magnesium layer silicate, which bloats to ultra lightweight granules through heating. and is processed to boards, bricks and shaped parts through a compression mould procedure.

typical applications

- Hearths
- Boilers
- Vessels and tanks
- Night storage heaters

features

- 1100 max temp
- Moldable
- Easily machined



technical data

	Standard Vermiculite	Vermiculite HD
TEMPERATURE	1100°C	1100°C
BULK DENSITY	700 kg/m^3	1200 kg/m^3
THERMAL CONDUCTIVITY @ 400°C	0.20 W/mK	0.27 W/mK
@ 800°C	0.22 W/mK	0.30 W/mK

product link

all ceramic products
all refractories
bricks

format

sheet	✔
machinable	✔
granules	✔

dimensions

lengths: 1000mm, 1200mm
width: 610mm
thickness: 20, 25, 30, 40, 50, 75mm

Bricks can be supplied in any size or shape from the above board.

product link

all ceramic products
all refractories
bricks

format

sheet	✔
machinable	✔
granules	✔

a-z of products

index a - z

a-z of products

ims

ims catalogue conditions of sale

1. INTERPRETATION
1.1 Definitions. In these Conditions, the following definitions apply:
Business Day: a day (other than a Saturday, Sunday or a public holiday) when banks in London are open for business.
Buyer: the person, firm, or company who purchases the Goods from the Seller. Conditions: these terms and conditions as amended from time to time in accordance with clause 14.7.
Contract: the contract between the Seller and the Buyer for the supply of Goods and services (where applicable) in accordance with these Conditions.
Contract Price: the price of the Goods invoiced by the Seller to the Buyer in accordance with clause 9.3.
Force Majeure Event: has the meaning given to it in clause 14.1.
Goods: the goods (or any part of them) set out in the Order.
Intellectual Property Rights: all patents, rights to inventions, utility models, copyright and related rights, trade marks, service marks, trade, business and domain names, rights in trade dress or get-up, rights in goodwill or to sue for passing off, unfair competition rights, rights in designs, rights in computer software, database right, topography rights, moral rights, rights in confidential information (including know-how and trade secrets) and any other intellectual property rights, in each case whether registered or unregistered and including all applications for and renewals or extensions of such rights, and all similar or equivalent rights or forms of protection in any part of the world.
Order: the Buyer's order for the supply of Goods, as set out in the Buyer's purchase order form, or the Buyer's written acceptance of the Seller's quotation, or as the case may be.
Seller: SIG Trading Limited, its successors or assigns.
2. BASIS OF CONTRACT
2.1 The Order constitutes an offer by the Buyer to purchase Goods in accordance with these Conditions.
2.2 The Order shall only be deemed to be accepted when the Seller issues written acceptance of the Order at which point and on which date the Contract shall come into existence.
2.3 The Contract constitutes the entire agreement between the parties. The Buyer acknowledges that it has not relied on any statement, promise or representation made or given by or on behalf of the Seller which is not set out in the Contract.
2.4 Any samples, drawings, descriptive matter or advertising issued by the Seller and any descriptions of the Goods contained in the Seller's catalogues or brochures are issued or published for the sole purpose of giving an approximate idea of the Goods described in them. They shall not form part of the Contract or have any contractual force.
2.5 These Conditions apply to the Contract to the exclusion of any other terms that the Buyer seeks to impose or incorporate, or which are implied by trade, custom, practice or course of dealing.
2.6 Any quotation given by the Seller shall not constitute an offer, and shall be for the current price and strictly limited to the type and quantity of Goods as stated in the quotation.
3. GOODS
3.1 The Goods are described in the Seller's catalogue as modified by any applicable specification.
3.2 To the extent that the Goods are to be manufactured in accordance with a specification supplied by the Buyer, the Buyer shall indemnify the Seller against all liabilities, costs, expenses, damages and losses (including any direct, indirect or consequential losses, loss of profit, loss of reputation and all interest, penalties and legal and other reasonable professional costs and expenses) suffered or incurred by the Seller in connection with any claim made against the Seller for actual or alleged infringement of a third party's intellectual property rights arising out of or in connection with the Seller's use of the specification. This clause 3.2 shall survive termination of the Contract.
3.3 The Seller's employees or agents are not authorised to make any representations concerning the Goods unless confirmed by the Seller in writing. The Buyer acknowledges that it does not rely on, and waives any claim for breach of any such representations which are not so confirmed.
3.4 The Seller is unable to advise the Buyer on the fitness of the Goods for any particular purpose, their storage or application. Unless the Seller gives written advice or a written recommendation, the Buyer is entirely responsible for satisfying itself that the Goods are fit for the intended use either by relying on their own expertise or by obtaining professional advice.
3.5 The Seller reserves the right to amend the specification if required by any applicable statutory or regulatory requirements. Dimensions and other physical properties of the Goods are subject to reasonable manufacturing tolerances.
4. DELIVERY OF GOODS
4.1 The Seller shall ensure that: (a) each delivery of the Goods is accompanied by a delivery note; and (b) if the Seller requires the Buyer to return any packaging material to the Seller, that fact is clearly stated on the delivery note. The Buyer shall make any such packaging materials available for collection at such times as the Seller shall reasonably request. Returns of packaging materials shall be at the Seller's expense.
4.2 The Seller shall deliver the Goods to the location set out in the Order or such other location as the parties may agree ("Delivery Location") at any time after the Seller notifies the Buyer that the Goods are ready. Delivery shall be as near as possible to the Delivery Location, where the Seller believes that such place is suitable for unloading during the normal working hours of the Seller on a Business Day.
4.3 Where the Goods are delivered by the Seller, delivery of the Goods shall be completed on the Goods' arrival at the Delivery Location. The Buyer shall be solely responsible for the unloading of the Goods and the Seller shall not be liable for any damage that occurs during such unloading. In the event that the same exceeds a period of one hour then demurrage may be charged by the Seller to the Buyer.
4.4 Where the Goods are collected by the Buyer then delivery of the Goods shall be completed upon completion of the loading of the Goods. The Seller shall not be liable for any damage that occurs during the loading or unloading of the Goods.
4.5 Any claims by the Buyer in respect of alleged shortage or damage or loss in transit must be notified to the Seller within 24 hours of delivery and confirmed in writing within three days of delivery taking place. Any evident damage to external packaging must be the subject of an endorsement on the Seller's delivery note at the time of delivery. No claim can be made by the Buyer under this clause if an acceptance note relating to the Goods
has been signed by the Buyer or his agent or employee without reference to the alleged
damage, shortage or loss in transit.
4.6 Any dates quoted for delivery of the Goods are approximate only, and the time of delivery
is not of the essence. The Seller shall not be liable for any delay in delivery of the Goods that is caused by a Force Majeure Event or the Buyer's failure to provide the Seller with adequate delivery instructions or any other instructions that are relevant to the supply of the Goods.
4.7 If the Seller fails to deliver the Goods, its liability shall be limited to the costs and expenses incurred by the Buyer in obtaining replacement goods of similar description and quality in the cheapest market available, less the price of the Goods. The Seller shall have no liability for any failure to deliver the Goods to the extent that such failure is caused by a Force Majeure Event, the Buyer's failure to provide the Seller with adequate delivery instructions for the Goods or any relevant instruction related to the supply of the Goods.
4.8 If the Buyer fails to accept or take delivery of the Goods within seven Business Days of the Seller notifying the Buyer that the Goods are ready, then except where such failure or delay is caused by a Force Majeure Event or by the Seller's failure to comply with its obligations under the Contract in respect of the Goods: (a) delivery of the Goods shall be deemed to have been completed at 9.00 am on the Business Day following the day on which the Seller notified the Buyer that the Goods were ready; and (b) the Seller shall store the Goods until delivery takes place, and charge the Buyer on an indemnity basis for all related costs and expenses (including insurance).
4.9 If 28 days after the Seller notified the Buyer that the Goods were ready for delivery the Buyer has not accepted or taken delivery of them, the Seller may resell or otherwise dispose of part or all of the Goods and, after deducting reasonable storage and selling costs, account to the Buyer for any excess over the price of the Goods or charge the Buyer for any shortfall below the price of the Goods.
4.10 The Seller may deliver the Goods by instalments, which shall be invoiced and paid for separately. Each instalment shall constitute a separate contract. Any delay in delivery or defect in an instalment shall not entitle the Buyer to cancel any other instalment.
4.11 The Seller shall be under no obligation to make any delivery of Goods to the Buyer if the Buyer is in breach of any of these Conditions.
5. QUALITY OF GOODS
5.1 The Seller warrants that on delivery, and for a period of 12 months from the date of delivery ("Warranty Period"), the Goods shall: (a) be as described in the Seller's catalogue or in any specification as appropriate; (b) be free from material defects in design, material and workmanship; and (c) be of satisfactory quality (within the meaning of the Sale of Goods Act 1979).
5.2 Subject to clause 5.3 if: (a) the Buyer gives notice in writing during the Warranty Period within a reasonable time of discovery that some or all of the Goods do not comply with the warranty set out in clause 5.1; (b) the Seller is given a reasonable opportunity of examining such Goods; and (c) the Buyer (if asked to do so by the Seller) returns such Goods to the Seller's place of business at the Buyer's cost,
then the Seller shall, at its option, repair or replace the defective Goods, or refund the price
of the defective Goods in full.
5.3 The Seller shall not be liable for the Goods' failure to comply with the warranty in clause
5.1 if: (a) the Buyer makes any further use of such Goods after giving a notice in accordance with clause 5.2; (b) the defect arises because the Buyer failed to follow the manufacturer's oral or written instructions as to the storage, installation, commissioning, use or maintenance of the Goods or (if there are none) good trade practice; (c) the defect arises as a result of the Seller following any drawing, design or specification supplied by the Buyer; (d) the Buyer alters or repairs such Goods without the written consent of the Seller; (e) the defect arises as a result of fair wear and tear, wilful damage, negligence, or abnormal working conditions; or (f) the Goods differ from the specification as a result of changes made to ensure they comply with applicable statutory or regulatory standards; or (g) the Buyer has not paid in full for the Goods.
5.4 Except as provided in this clause 5.4, the Seller shall have no liability to the Buyer in respect of the Goods' failure to comply with the warranty set out in clause 5.1.
5.5 The terms of these Conditions shall apply to any repaired or replacement Goods supplied by the Seller under clause 5.2.
6. RETURNS
6.1 Goods returned at the Buyer's request not on the Seller's own vehicle shall be at the Buyer's risk regarding insurance for a value not less than the full invoice price.
6.2 Subject to clause 5 specifically ordered or non stock items are not returnable.
6.3 Costs of collection and re-delivery of replacement items will be met by the Buyer unless attributable to the negligence of the Seller. Only Goods returned in saleable condition can be accepted for credit. The Seller reserves the right to levy a re-stocking and handling
charge. All returns must be sanctioned by the Seller prior to Goods being brought back.
7. TITLE AND RISK
7.1 The risk in the Goods shall pass to the Buyer on completion of delivery where the Goods are delivered by the Seller. Where the Goods are collected by the Buyer, the risk in the Goods shall pass to the Buyer when the employees or agents of the Seller have completed lading to the satisfaction of the vehicle's driver.
7.2 Title to the Goods shall not pass to the Buyer until the Seller has received payment in full (in cash or cleared funds) for: (a) the Goods; and (b) any other goods that the Seller has supplied to the Buyer.
7.3 Until title to the Goods has passed to the Buyer, the Buyer shall: (a) hold the Goods on a fiduciary basis as the Seller's bailee; (b) store the Goods separately from all other goods held by the Buyer so that they remain readily identifiable as the Seller's property; (c) not remove, deface or obscure any identifying mark or packaging on or relating to the Goods; (d) maintain the Goods in satisfactory condition and keep them insured against all risks for their full price on the Seller's behalf from the date of delivery; (e) notify the Seller immediately if it becomes subject to any of the events listed in clause 12.1; and (f) give the Seller such information relating to the Goods as the Seller may require from time to time, but the Buyer may resell or use the Goods in the ordinary course of its business provided that any such sale of the Goods shall take place as the Seller's bailee and that the entire proceeds of sale are held in trust for the Seller and shall not be mingled with other monies or paid into any overdrawn bank account.
7.4 If before title to the Goods passes to the Buyer the Buyer becomes subject to any of the events listed in clause
12.1, or the Seller reasonably believes that any such event is about to happen and notifies the Buyer accordingly, then, provided the Goods have not been resold, or irrevocably incorporated into another product, and without limiting any other right or
TERMS AND CONDITIONS OF SALE
remedy the Seller may have, the Seller may at any time require the Buyer to deliver up the Goods and, if the Buyer fails to do so promptly, enter any premises of the Buyer or of any third party where the Goods are stored in order to recover them.
8. BUYER'S OBLIGATIONS
8.1 The Buyer shall: (a) ensure that the terms of the Order and any specification are complete and accurate; and (b) in the event that the Goods do not accord with the Order, the Buyer must notify the Seller within 24 hours from the date of delivery and be confirmed in writing to the Seller within three days, failing which the Buyer will be deemed to have accepted the Goods.
9. CHARGES AND PAYMENT
9.1 The price for Goods shall be the price set out in the Order or, if no price is quoted, the price set out in the Seller's published price list as at the date of delivery. The price of the Goods is exclusive of all costs and charges of packaging, insurance, transport of the Goods which shall be paid by the Buyer when it pays for the Goods.
9.2 The Seller reserves the right to increase the price of the Goods by giving notice to the Buyer at any time before delivery, to reflect any increase in the cost of the Goods to the Seller that is due to: (a) any factor beyond the control of the Seller (including foreign exchange fluctuations, increases in taxes and duties, and increases in labour, materials and other manufacturing costs); (b) any request by the Buyer to change the delivery date(s), the number of deliveries, quantities or types of Goods ordered, or any specification; or (c) any delay caused by any instructions of the Buyer in respect of the Goods or failure of the Buyer to give the Seller adequate or accurate information or instructions in respect of the Goods.
9.3 The Seller shall invoice the Buyer on or at any time after completion of delivery of the Goods.
9.4 The Seller shall have the right to invoice the Buyer by e-mail where the Buyer has consented to invoices being submitted in this manner. Where invoices are sent out using electronic mail they will be deemed to have been received by the Buyer on the date when they are sent provided that the electronic mail is transmitted between the hours of 9.00am and 5.00pm on a Business Day. If the invoice is sent by e-mail from the Seller to the Buyer outside of the above times then the Buyer will be deemed to have received the invoice on the next Business Day.
9.5 The Buyer shall pay each invoice submitted by the Seller: (a) by the end of the month following the month of issue of the invoice; and (b) in full and in cleared funds to a bank account nominated in writing by the Seller,
and time for payment shall be of the essence of the Contract.
9.6 All amounts payable by the Buyer under the Contract are exclusive of amounts in respect of value added tax chargeable from time to time ("VAT"). Where any taxable supply for VAT purposes is made under the Contract by the Seller to the Buyer, the Buyer shall, on receipt of a valid VAT invoice from the Seller, pay to the Seller such additional amounts in respect of VAT as are chargeable on the supply of the Goods at the same time as payment is due for the supply of the Goods.
9.7 Without limiting any other right or remedy of the Seller, if the Buyer fails to make any payment due to the Seller under the Contract by the due date for payment ("Due Date"), the Seller shall have the right to charge interest on the overdue amount at the rate of 2% per month of the Contract Price from the Due Date until the date of actual payment of the overdue amount, whether before or after judgment.
9.8 The Buyer shall pay all amounts due under the Contract in full without any deduction or withholding except as required by law and the Buyer shall not be entitled to assert any credit, set-off or counterclaim against the Seller in order to justify withholding payment of any such amount in whole or in part. The Seller may, without limiting its other rights or remedies, set off any amount owing to it by the Buyer against any amount payable by the Seller to the Buyer.
9.9 Non-payment by the Buyer by the Due Date shall entitle the Seller to demand payment of all outstanding balances under the Contract or any other contract or agreement between the parties whether due or not and to cancel forthwith any outstanding orders and credit facilities without prejudice to all other rights the Seller may have.
9.10 The Buyer must pay to the Seller all and any reasonable expenses and legal costs incurred by the Seller in taking any steps, including Court action, to enforce the Buyer's obligations under the Contract for the payment of any monies owed by the Buyer to the Seller.
10. CONFIDENTIAL INFORMATION
Neither party shall during and after termination of this Contract, without the prior written consent of the other party use or disclose to any other party any information of the other party which is identified as confidential or which is confidential by its nature. This clause 10 shall survive termination of the Contract.
11. LIMITATION OF LIABILITY: THE BUYER'S ATTENTION IS PARTICULARLY DRAWN TO THIS CLAUSE
11.1 Nothing in these Conditions shall limit or exclude the Seller's liability for: (a) death or personal injury caused by its negligence, or the negligence of its employees, agents or subcontractors; (b) fraud or fraudulent misrepresentation; (c) breach of the terms implied by section 2 of the Supply of Goods and Services Act 1982 (title and quiet possession); (d) breach of the terms implied by section 12 of the Sale of Goods Act 1979 (title and quiet possession); or (e) defective products under the Consumer Protection Act 1987.
11.2 Subject to clause 11.1: (a) the Seller shall under no circumstances whatever be liable to the Buyer, whether in contract, tort (including negligence), breach of statutory duty, or otherwise, for any loss of profit, or any indirect or consequential loss arising under or in connection with the Contract; and (b) the Seller's total liability to the Buyer in respect of all other losses arising under or in connection with the Contract, whether in contract, tort (including negligence), breach of statutory duty, or otherwise, shall in no circumstances exceed the Contract Price.
11.3 Except as set out in these Conditions, all warranties, conditions and other terms implied by statute or common law are, to the fullest extent permitted by law, excluded from the Contract.
11.4 This clause 11 shall survive termination of the Contract.
12. TERMINATION
12.1 Without limiting its other rights or remedies, the Seller may terminate the Contract with immediate effect by giving written notice to the other party if: (a) the Buyer defaults in any of its payment obligations; (b) the Buyer commits a material breach of its obligations under this Contract and (if such breach is remediable) fails to remedy that breach within 10 days after receipt of notice in writing of the breach; (c) any distress or execution is levied upon any assets of the Buyer; (d) a winding up petition is filed in relation to the Buyer, or where the Buyer is an individual, they become subject to a bankruptcy petition or order; (e) the Buyer makes a resolution for its winding up, makes an arrangement or composition with its creditors or makes an application to a Court of competent
jurisdiction for protection from its creditors or an administration or winding up order is made or an administrator or receiver is appointed in relation to the Buyer; (f) the financial position of the Buyer deteriorates to such an extent that in the opinion of the Seller the capability of the Buyer adequately to fulfil its obligations in accordance with the Contract has been placed in jeopardy; or (g) the Buyer suspends, or threatens to suspend, payment of its debts and/or threatens to suspend, ceases or threatens to cease to carry on all or substantially the whole of its business.
12.2 Without limiting its other rights or remedies, the Seller may terminate the Contract: (a) by giving the Buyer 14 days' written notice; or (b) with immediate effect by giving written notice to the Buyer if the Buyer fails to pay any amount due under this Contract on the due date for payment.
12.3 Without limiting its other rights or remedies, the Seller shall have the right to suspend all further deliveries of Goods under the Contract or any other contract between the Buyer and the Seller if: (a) the Buyer fails to pay any amount due under this Contract on the due date for payment; or (b) the Buyer becomes subject to any of the events listed in clause 12.1, or the Seller reasonably believes that the Buyer is about to become subject to any of them.
13. CONSEQUENCES OF TERMINATION
On termination of the Contract for any reason: (a) the Buyer shall immediately pay to the Seller all of the Seller's outstanding unpaid invoices and interest; (b) the accrued rights and remedies of the Seller as at termination shall not be affected, including the right to claim damages in respect of any breach of the Contract which existed at or before the date of termination or expiry; and (c) clauses which expressly or by implication have effect after termination shall continue in full force and effect.
14. GENERAL
14.1 Force majeure:
(a) For the purposes of this Contract, "Force Majeure Event" means an event beyond the reasonable control of the Seller including but not limited to strikes, lock-outs or other industrial disputes (whether involving the workforce of the party or any other party), failure of a utility service or transport network, act of God, war, riot, civil commotion, malicious damage, compliance with any law or governmental order, rule, regulation or direction, accident, breakdown of plant or machinery, fire, flood, storm or by any failure of the Seller's subcontractors to supply the Seller.
(b) The Seller shall not be liable to the Buyer as a result of any delay or failure to perform its obligations under this Contract as a result of a Force Majeure Event.
(c) If the Force Majeure Event prevents the Seller from providing any of the Goods for more than 14 days, the Seller shall, without limiting its other rights or remedies, have the right to terminate this Contract immediately by giving written notice to the Buyer.
14.2 Assignment and subcontracting:
(a) The Seller may at any time assign, transfer, charge, subcontract or deal in any other manner with all or any of its rights under the Contract and may subcontract or delegate in any manner any or all of its obligations under the Contract to any third party.
(b) The Buyer shall not, without the prior written consent of the Seller, assign, transfer, charge, subcontract or deal in any other manner with all or any of its rights or obligations under the Contract.
14.3 Data and Data Protection:
(a) The Seller may use any information that the Buyer has provided to the Seller to enable a search to be made with credit reference agencies to assess the creditworthiness of the Buyer and to search against any personal credit records of all directors and/or proprietors of the Buyer (in respect of which the Buyer confirms that all necessary consents from the individuals have been obtained) where the Buyer has sought or has entered into credit terms with the Seller. Such searches may include a search against current or previous addresses in the last three years
(b) For the purposes of credit referencing, fraud prevention and any money laundering regulations that may apply, the Seller may share the account information and trade history with other lenders and credit reference agencies. The Seller may from time to time review the account of the Buyer, and further searches of credit reference agencies and/or personal credit record searches may be undertaken by the Seller.
(c) Under the Data Protection Act 1998 those individuals referred to at clause 14.3(a) above have the right to apply for a copy of the information about them held by the Seller, for which the Seller may charge a small fee, and have the right to correct any inaccuracies in any such information held.
14.4 Waiver and cumulative remedies:
(a) A waiver of any right under the Contract is only effective if it is in writing and shall not be deemed to be a waiver of any subsequent breach or default. No failure or delay by the Seller in exercising any right or remedy under the Contract or by law shall constitute a waiver of that or any other right or remedy, nor preclude or restrict its further exercise. No single or partial exercise of such right or remedy shall preclude or restrict the further exercise of that or any other right or remedy.
(b) Unless specifically provided otherwise, rights arising under the Contract are cumulative and do not exclude rights provided by law.
14.5 Severance:
(a) If a court or any other competent authority finds that any provision of the Contract (or part of any provision) is invalid, illegal or unenforceable, that provision or part-provision shall, to the extent required, be deemed deleted, and the validity and enforceability of the other provisions of the Contract shall not be affected.
(b) If any invalid, unenforceable or illegal provision of the Contract would be valid, enforceable and legal if some part of it were deleted, the provision shall apply with the minimum modification necessary to make it legal, valid and enforceable.
14.6 No partnership: Nothing in the Contract is intended to, or shall be deemed to, constitute a partnership or joint venture of any kind between any of the parties, nor constitute any party the agent of another party for any purpose. No party shall have authority to act as agent for, or to bind, the other party in any way.
14.7 Third parties: A person who is not a party to the Contract shall not have any rights under or in connection with it.
14.8 Variation: Except as set out in these Conditions, any variation, including the introduction of any additional terms and conditions, to the Contract shall only be binding when agreed in writing and signed by the Seller.
14.9 Governing law and jurisdiction: This Contract, and any dispute or claim arising out of or in connection with it or its subject matter or formation (including non-contractual disputes or claims), shall be governed by, and construed in accordance with, English law, and the parties irrevocably submit to the exclusive jurisdiction of the courts of England and Wales.

METHODS OF PAYMENT

1. credit account - if you do not have an account with us, please phone for details
2. credit cards - we accept Visa, Mastercard and Switch/Delta
3. cash or cheque payment
- please allow clearance time

Conversion table

from	to	multiply by
LINEAR		
inches	milimetres	25.4
milimetres	inches	0.0394
inches	centimetres	25.4
centimetres	inches	0.3937
feet	metres	0.3048
metres	feet	3.281
SQUARE		
sq inches	sq centimetres	6.452
sq centimetres	sq inches	0.155
sq metres	sq feet	10.76
sq feet	sq metres	0.0929
CUBIC		
cubic inches	cubic centimetres	16.39
cubic centimetres	cubic inches	0.06102
cubic feet	cubic metres	0.02832
cubic metres	cubic feet	35.315
CAPACITY		
litres	cubic feet	0.03531
litres	UK gallons	0.22
litres	US gallons	0.2642
litres	pints	1.76
centilitres	fluid ounce	0.35
cubic feet	litres	28.32
UK gallons	litres	4.546
US gallons	litres	3.785
pints	litres	0.5682
fluid ounce	centilitres	2.857
WEIGHT		
metric tons	gross tons	0.9842
metric tons	short tons	1.102
kilograms	hundred weights	0.01968
kilograms	pounds	2.205
grams	ounces	0.03527
gross tons	metric tons	1.0161
short tons	metric tons	0.9074
hundred weights	kilograms	50.813
pounds	kilograms	0.45359
ounces	grams	28.329
DENSITY		
kg/m³	lbs./cu.ft	0.06242
lbs./cu.ft	kg/m³	16.02
PRESSURE		
kp/cm³	lbs./sq.in	25.4
kp/cm³	MPa	0.0394
MPa	lbs./sq.in	25.4
lbs./sq.in	kp/cm³	0.3937
MPa	kp/cm³	0.3048
lbs./sq.in	MPa	3.281

from	to	multiply by
VELOCITY		
metres/second	feet/second	3.279
feet/second	metres/second	0.305
ENERGY		
kilocalories	kilojoules	4.184
kilocalories	British thermal units	3.9683
kilojoules	British thermal units	0.9484
watts	BTU/h	3.4128
kcal/h	BTU/h	3.9683
kilojoules	kilocalories	0.2389
British thermal units	kilocalories	0.2520
British thermal units	kilojoules	1.0544
BTU/h	watts	0.2930
BTU/h	kcal/hs	0.2520
HEAT		
kcal/m³	BTU/cubic feet	0.11236
kj/m³	BTU/cubic feet	0.0268
kcal/m³	kj/m³	4.184
kcal/h	cubic centimetres	3.968
kcal/h	Wh/h	1.1622
Wh/h	cubic metres	3.4128
kcal/(kg°C)	cubic feet	1.0
kcal/(kg°C)	kj/(kg K)	4.184
kj/(kg K)	BTU/(lb F)	0.2389
kcal/(m²h)	BTU/(sq.ft h)	03686
kcal/(m²h)	Wh/(m²h)	1.1622
Wh/(m²h)	BTU/(sq.ft h)	0.3171
kcal/(m h °C)	BTU/(sq.ft h °F/in)	8.0645
kcal/(m h °C)	W/(m K)	1.1628
W/(m K)	BTU/(sq.ft h °F/in)	6.9347
W/(m K)	BTU/(ft h °F)	0.5779
W/(m² K)	BTU/(sq.ft h °F/in)	0.1761
BTU/cubic feet	kcal/m³	8.90
BTU/cubic feet	kj/m³	37.313
kj/m³	kcal/m³	0.2390
BTU/h	kcal/h	0.252
Wh/h	kcal/h	0.8604
BTU/h	Wh/h	0.2930
BTU/(lb F)	kcal/(kg°C)	1.0
kj/(kg K)	kcal/(kg°C)	0.239
BTU/(lb F)	kj/(kg K)	4.1860
BTU/(sq.ft h	kcal/(m²h)	2.713
W/(m² K)	kcal/(m²h)	0.8604
BTU/(sq.ft h)	Wh/(m²h)	3.154
BTU/(sq.ft h °F/in)	kcal/(m h °C)	0.124
W/(m K)	kcal/(m h °C)	0.860
BTU/(sq.ft h °F/in)	W/(m K)	0.1442
BTU/(ft h °F)	W/(m K)	1.7304
BTU/(sq.ft °F)	W/(m² K)	5.677

TEMPERATURE CONVERSION

°F to °C first deduct 32, multiply by 5 then divide by 9

°C to °F multiply by 9, divide by 5, add 32

ims

ims UK

IMS Head Office
Unit 15
Slaidburn Industrial Estate
Slaidburn Crescent
Southport PR9 9YF
T: +44 (0) 1704 226878
F: +44 (0)1704 225857

IMS Bromborough
Dock Road South
Bromborough
Wirral
CH62 4SP
T: +44 (0) 151 645 9000
F: +44 (0) 151 645 6987

IMS Midlands
Building 62
Third Avenue
Pensnett Trading Estate
Kingswinford
West Midlands DY6 7XT
T: +44 (0) 1384 270761
F: +44 (0) 1384 270768

IMS Chesterfield
Unit 1
Sheepbridge Centre
Sheepbridge Lane
Chesterfield
Derbyshire S41 9RX
T: +44 (0)1246 572589
F: +44 (0)1246 572594

IMS Central
Refractories
10 Meadow Street
Falkirk
Stirlingshire
FK1 1RP
T: +44 (0)1324 624412
F: +44 (0)1324 626923

An SIG insulations company

email: sales@ims-insulation.com • web: www.ims-insulation.com