

HVAC





“...the choice of industry experts for over 35 years...”

SIG Technical Insulation is an Industrial, HVAC, Fire Protection and High Temperature distribution company with a long pedigree.

Part of SIG PLC, Europe's largest insulation distribution group, SIG Technical Insulation have subsidiary roots reaching back to the beginning of the 20th century. Our parent company was formed back in 1957 as a small independent insulation distributor, but we have grown through acquisition and expansion into the market leading company we see today.

This rapid growth is partly due to the exceptional service levels we can offer and also to our “one stop shop” philosophy, which has, for many years, made us the distributor of choice for the leading names in the HVAC industry.

SIG Business Support

SIG has teamed up with a number of carefully selected third parties to offer our customers a combined, unique and market leading package of financial services. SIG customers can exclusively benefit from discounted rates and in some cases privileged access to business enhancing products not freely available elsewhere to help secure additional finance, increased cash flow and enhanced internal risk processes.

Visit us today at: www.sigfinancetools.co.uk to find out how you can achieve competitive advantage and ensure your business is protected and financed for future growth.

Frost Protection

There is a popular misconception that it is possible to completely prevent freezing in pipes situated outdoors or in unheated areas during prolonged spells of cold weather by the use of insulation alone. The reality is that insulation merely slows down the rate of cooling, although this is often enough to prevent any serious problems.

A few of the issues surrounding frost protection are:

- Even before insulation is applied, normal cold water supply in winter is at a low temperature - typically below 5°C, and often only at 2-3°C - barely above freezing. Seen in this context, protection is obviously very difficult to achieve when ambient temperatures drop to minus 10°C or below
- Small bodies of water (i.e. small diameter pipes) freeze much more readily than large diameter pipes
- Theoretical thicknesses required to completely prevent even partial freezing on small diameter pipes under protracted low temperatures are usually impractical due to space requirements. To be absolutely certain that freezing will not take place on smaller pipes, trace heating as well as insulation may need to be applied
- Keeping the system running can help to delay or prevent freezing
- In permanently heated buildings, even in loft areas, cold water pipes rarely freeze

Some guidelines to follow:

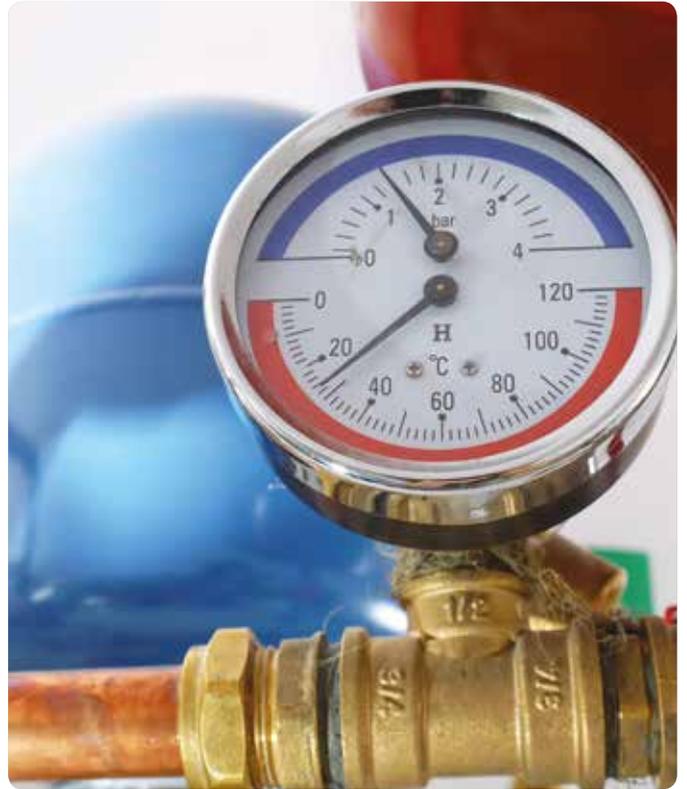
- Use manufacturers' thickness recommendations as a minimum standard
- As manufacturers' thickness charts tend to be a compromise on pipes in the range of 15-34mm OD, it is advisable to use the greatest thickness feasible
- Traditional means of protecting cold water pipes such as "hair felt" are of little benefit, and should therefore be replaced
- The same level of attention should be given to lagging valves and pipe fittings as is given to lagging the pipes
- Wet insulation is very inefficient and frost can damage the surface of many closed-cell insulants, so on all outdoor installations careful consideration should be given to the choice of a tough, waterproof insulation covering
- Flexible, closed-cell insulants such as Climaflex or Armaflex are often the best and easiest choice of product



Domestic Hot Water & Heating

For many years, Mineral Wool (Stone & Glass) pipe sections have been the preferred choice in this temperature range, however, in recent times Rigid Foams have become more prominent up to a limiting temperature of 110°C.

Both types of product are highly economical and the fibrous products are very easy to use whilst the phenolic can offer substantial thickness/space savings.



Condensation Protection in Chilled and Cold Water Pipes

Cold water pipes tend to become wet when in a moist atmosphere due to condensation. This occurs when moist air is cooled to its "Dew Point," the point at which the water vapour in the atmosphere turns to liquid water. As the cold water pipes are normally at a lower temperature than their surroundings, this water tends to condense onto the pipe.

The actual "Dew Point" in any situation varies according to a number of factors including the relative humidity (RH) of the air, atmospheric pressure and ambient temperature. Normally condensation is just a nuisance, leading to wet floors etc, but obviously it can be more of a problem if dripping water leads to damaged electrical equipment, books, ceiling tiles etc. Also, if the pipe is lagged with open cell insulation, the insulation can eventually become totally saturated, thereby losing almost all of its insulating properties and creating ideal conditions for corrosion to occur.

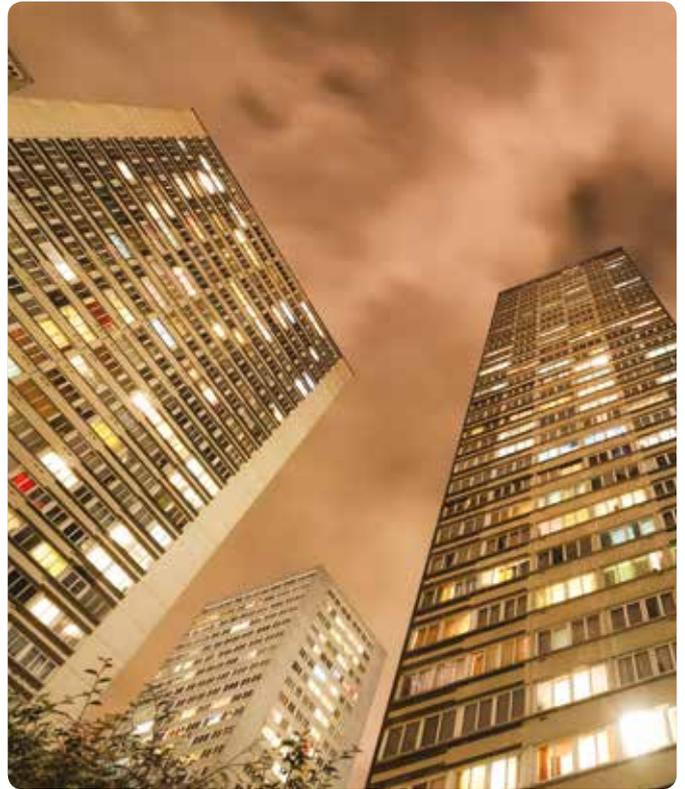
This phenomenon can be prevented by the use of vapour barriers. For these to work efficiently, they must be maintained continuously over the entire pipeline, including pipe supports.

Some rigid H&V products come with their own reinforced aluminium foil vapour barriers already attached, while other flexible products such as Polyethylene or Nitrile Rubber Foams do not require the use of additional vapour barriers due to their inherent closed cell construction and external 'skin'.



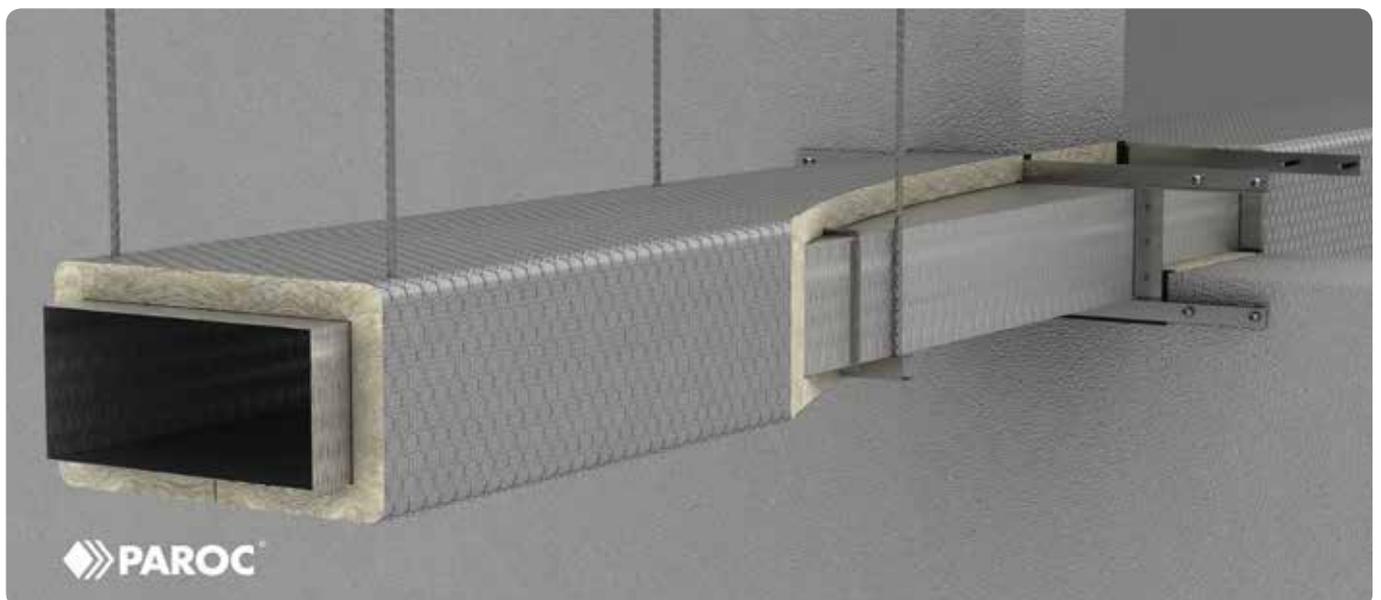
Sound Insulation

Though perhaps more important in industrial applications, sound insulation is often of benefit in domestic applications. As well as being able to supply sound attenuation products from all major manufacturers, the SIG Group also have in-house specialist companies with the ability to manufacture standard and bespoke products for this market sector.



Fire Protection

Ducts require fire protection for a number of reasons, notably to prevent the spread of fire between the different building elements they connect, or for smoke extract purposes. The main job for fire protection systems is to provide stability and integrity to steel ductwork in the event of a fire, for a period of 30-120 minutes depending upon the system design. Additionally, fire protection products give thermal and acoustic benefits.



Air Conditioning Ducts

As air conditioning ductwork predominantly runs below ambient, it could, if un-insulated, become a source of condensation. Nowadays, for that reason, specifiers tend to recommend closed cell products such as rigid foam, or nitrile rubber as an insulant for this service due to an inherent resistance to water vapour pressure.

As with pipework, it is vitally important that the insulated surface and therefore the vapour barrier is kept continuous over the entire installation to prevent water vapour ingress.

Nitrile rubber products are normally fixed to the ducts using special adhesives, but rigid foam boards/sheets are usually fixed using metal 'stick pins' or banding with corner pieces. Particular care should be taken to reinstate the foil vapour barrier when piercing it with metal pins.



Heating Ductwork

Heating ductwork can be insulated with a wide range of materials including Mineral Wool (Stone & Glass) or Ductwrap, Phenolic Slabs, or Nitrile Rubber. As with other forms of ductwork, great care should be taken by the installer to ensure that ducts are sealed as additional pressure from within is sufficient to break the seal created by the matching ductwork tape, thus making the installation inefficient and very untidy.

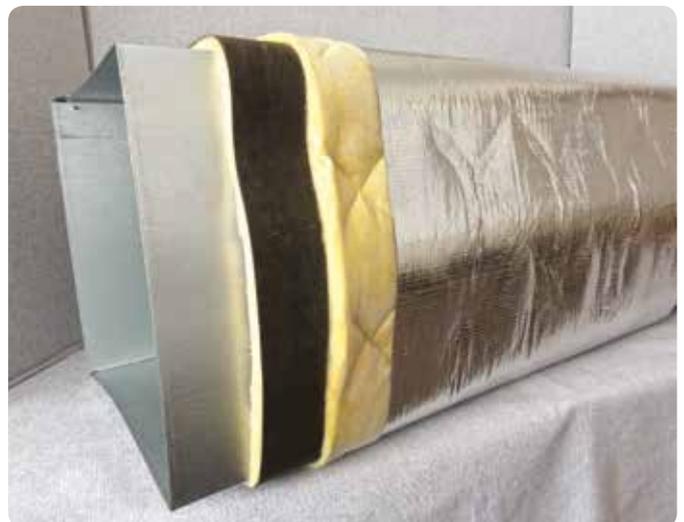
Flexible duct insulation is far and away the cheapest method of insulating heating ducts, and the fact that it comes in roll form also reduces installation times. Heating ducts can be insulated using the same methods employed on air conditioning ducts. However, where flexible duct insulation is applied an additional fixing of wire netting will help secure the insulation to the duct. There is a wide disparity in densities between the lowest and the highest density flexible insulation, and this may be a factor that needs taking into account by the installer.



Sound

Many insulation materials, particularly fibrous insulants, have inherent sound absorption properties, so when ducts are insulated for thermal use there is usually some gain in thermal performance.

However, a range of different purpose built sound absorption products is also available including Muftilag/Superlag, Techwrap and Armasound. These products all work on the principle of a sound attenuating insulation material used in conjunction with a sound barrier. SIG is also able to supply 'Climaver', a new system in which the ductwork system itself is made from insulation board. This system is very acoustically quiet, and even has a special acoustic version, Neto. Climaver is highly suitable for quiet areas such as cinemas, libraries, and music rooms.



Plant Rooms

Plant rooms can be insulated using many of the products used for HVAC applications, but different approaches are sometimes required. Because of the maintenance of foot traffic, the insulation is sometimes subject to abuse that would not normally be encountered in service ducts and ceiling voids and for this reason the insulation is often protected by metal casings. Larger vessels and equipment such as calorifiers may require insulating with Mineral Wool (Stone & Glass) products similar to those used in industrial installations, such as crimp wrap, wired mat, or pipe section mat.



Finishes & Coverings

Internal

- Glass reinforced aluminium foil - a finish supplied pre-applied to many HVAC insulation products that acts not only as a vapour barrier, but also provides a clean, decorative finish.
- PVC cladding - Isogenopak/Danmat - this resilient product is very simple to install and has a clean, easy to maintain finish.
- PET sheeting - such as Ventureclad - offers a smart durable finish, and is particularly suitable for areas that are regularly cleaned or wiped.

External

In recent years PET sheeting has become the product of choice for the outdoor protection of pipe and ductwork insulation. This is due to its durability, ease of application and performance in wet conditions. PET has an advantage over metal casing when correctly applied, as it is easier to make efficient and weatherproof seals and it is more resistant to damage and distortions caused by mechanical impacts. Other materials such as PIB (polyisobutylene) sheeting and butyl-backed foil are also available.



Please contact your local SIG Technical Insulation branch for solutions to all of your domestic and commercial insulation problems.

DOMESTIC



COMMERCIAL



A variety of core insulants are used in the HVAC market

Polyethylene insulation

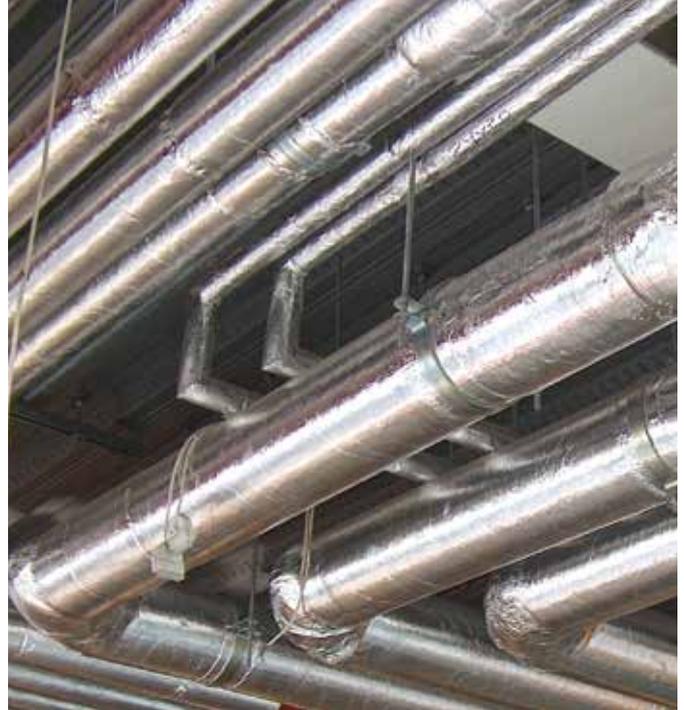


Polyethylene Insulation is an economically priced insulant with self extinguishing fire characteristics, which is used for many plumbing and domestic installations. The key benefits of this type of insulant include a closed cell structure, low weight, a clean finish, ease of installation, flexibility, resilience, and a relatively low cost.

Application

Most commonly found on cold and chilled water services, Polyethylene can also be used in frost protection situations and on low temperature heating pipes.

Mineral Wool (Stone & Glass)

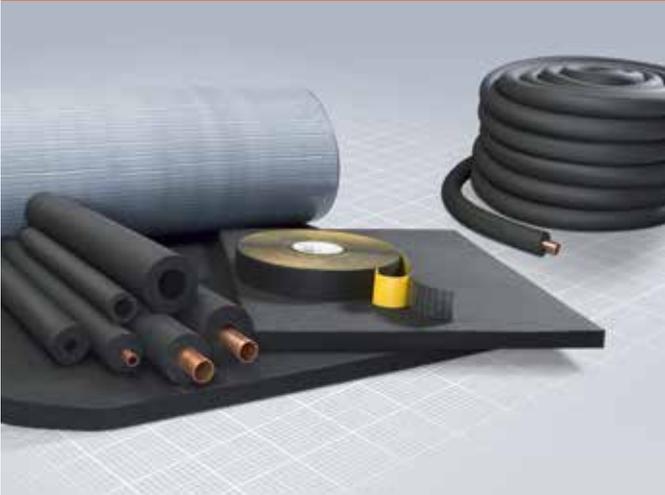


Mineral Wool (Stone & Glass) products have been the mainstay for warm and hot services in HVAC installations for many years. This tried and tested type of insulant offers additional performance characteristics such as fire resistance and acoustic absorption and is often the first choice in value engineered solutions. The different forms are easy to cut, fit and maintain, making them one of the first choices for insulation contractors.

Application

Easy to apply, a wide range of the products are readily available from all SIG Technical Insulation sites, including pipe sections, rolls and slabs.

Class O Nitrile



These closed cell products have many of the benefits of Polyethylene Insulation but come with a much improved fire rating and a higher limiting temperature.

Application

They have found wide acceptance in commercial and domestic anti-condensation and frost protection applications, but can also be used on residential and commercial hot water pipes and air handling systems.

Phenolic Foams



Phenolic Foams are widely used in commercial and domestic buildings due to their excellent thermal performance and inherent low smoke propagation in the event of a fire. Where controlling smoke generation is less of a priority, for example on outdoor ducts and pipework, PIR/PUR Foams can also be used.

Phenolic Foam is significantly more efficient than Mineral Wool or flexible foam products, so greatly reduced thicknesses can be used to achieve the same results. This enables pipes to be located closer together, tighter to walls/ceilings, offering substantial space-saving opportunities.

Application

Their high closed cell content means Phenolic Foams are highly suitable for areas where condensation is a potential problem, such as kitchens, swimming pools and air conditioning plants, particularly when used in conjunction with matching pipe supports. Similarly, Phenolic Foam slabs and laminates are a popular choice for air conditioning ductwork. These products are available in a range of higher densities where higher compressive strength is required.

Polyethylene Insulation



Typical Features and Benefits

- ODP of zero
- Thermal conductivity of 0.034 W/mK at 0°C allows for the use of thinner wall thicknesses
- A large range of sizes compliant with Part L of the April 2010 building regulations
- Meets the “W35” category for water regulations
- Full range of accessories available

Range

- Available in a range of sizes and thicknesses, standard lengths 2m
- Bore sizes range from 9mm - 76mm
- Wall thicknesses range from 15mm - 32mm
- Fully slit sizes: 19mm & 25mm thicknesses

Typical Product Range (Climaflex)

Material	Closed-cell polyethylene foam
Thermal conductivity	$\lambda = 0.034$ W/mK at 0°C (DIN52613) $\lambda = 0.036$ W/mK at 20°C (DIN52613) $\lambda = 0.038$ W/mK at 40°C (DIN52613)
Ignition resistance	BS 476, Part 12 : 1991 No ignition source A & B
Water vapour permeability	$\mu \geq 16.000$ (DIN 52615)
Water absorption	0.5 % vol. after 40 days (DIN 53495)
Temperature range	-45°C to +105°C
Normal density	30 kg/m ³
Physiologically neutral	Does not rot

Figures courtesy of NMC (UK) Ltd (December 2013).

Polyethylene Insulation is manufactured by a number of suppliers, including NMC (UK) Ltd (Climaflex) and Armacell UK Limited (Tubolit).



Mineral Wool (Stone & Glass)

A wide range of these products are readily available from all SIG Technical Insulation sites, including pipe sections, rolls and slabs. Pipe sections come in a variety of outside diameters and thicknesses, starting at 15mm and thicknesses from 20mm upwards.

Duct rolls come in 25mm, 40mm and 50mm thicknesses, duct slabs 40mm and 50mm thickness, and slabs are also available in a variety of densities from 45kg/m³ upwards.

Snap on pipe sections are either 1.0 (Stone) or 1.2 (Glass) metres long, are strong and lightweight (120kg/m³ Stone / 75kg/m³ Glass nominal) and come supplied with a reinforced aluminium foil facing and a self-adhesive overlap providing an inherent vapour barrier and fast neat installation.

Typical Product Range (Stone)

Nominal insulation thickness (mm)	Nominal pipe OD (mm)																					
	17	21	27	34	42	48	54	60	67	76	80	89	108	114	140	169	194	219	230	245	273	
20	X	X	X	X	X	X	X	X														
25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	+	+	+	+	+	+	+	+
30	X	X	X	X	X	X	X	X	X	X	X	X	X	+	+	+	+	+	+	+	+	+
35	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-
40	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-
45		X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
50		X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
60			X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Packaging of different sizes of pipe section:

X = 1m lengths packed in cartons 102 x 40 x 40cm (number of pieces per pack dependent on size of section)

- = 1 x 1m lengths, shrink wrapped in polyethylene film

+ = 1 x 1m lengths, (unsplit), shrink wrapped

Typical Thermal Conductivity

°C	0	50	100	150	200
Thermal conductivity (W/mK)	0.032	0.037	0.044	0.052	0.061

Figures courtesy of Rockwool (December 2013).

Typical Product Range (Glass)

Nominal insulation thickness (mm)	Outer diameter of pipe section																	
	Inner diameter (mm)																	
	15	22	28	35	42	48	54	60	70	76	83	89	108	114	140	168	219	273
20	✓	✓	✓	✓	✓	✓	✓	✓										
25	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
30	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
40	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
50	✓		✓	✓	✓	✓		✓		✓		✓		✓	✓	✓	✓	✓
60							✓		✓		✓		✓		✓			

Typical Thermal Conductivity

°C	10	50	100	200
Thermal conductivity (W/mK)	0.033	0.036	0.043	0.063

Figures courtesy of Isover (December 2013).

Mineral Wool (Stone & Glass) is manufactured by a number of suppliers, including Rockwool (Rocklap) and Isover (CLIMPIPE Section Alu2).

Class 0 Nitrile



These foams are highly resilient and are suitable for use with a variety of finishing solutions, including pre-applied surface protection. They can also be used with proprietary sound barrier sheets and in conjunction with open cell acoustic foams to produce an integrated thermal and acoustic insulation.

Sister products include non-halogen and EPDM options that offer a higher temperature range (up to 150°C) and better ultra violet protection, making it an ideal product for use outdoors.

Class 0 fire performance (BS 476 parts 6/7)

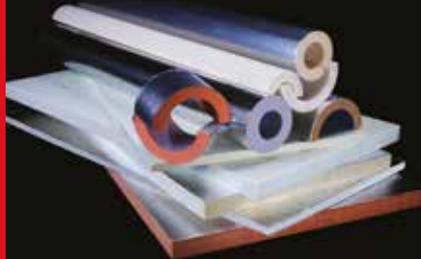
- Thermal conductivity at 0°C is 0.033 W/mK
- Highly water vapour diffusion resistant
- Factory mutual approved

Typical Properties (Class 0)

Material	Typical values	Remarks
Material	Foamed nitrile rubber	
Max. surface temperature	+110°C	
Max temperature for flat surface	+85°C	
Min surface temperature	-50°C	
Thermal conductivity at 0°C	0.033 W/mK [33 + 0,1 · ϑ m + 0,0008 · ϑ m ²]/1000	Declared acc. to EN ISO 13787 Tested acc. to EN 12667 EN ISO 8497
Water vapour permeability	Moisture resistance factor μ 10,000 (Tubes 6-19 mm, sheets 6-32mm)	
Surface spread of flames	Class 1	Surface spread of flame acc. BS 476 Part 7: 1997
Fire propagation	Total index performance (1) ≤ 12 Sub index (1) ≤ 6	Fire protection acc. BS 476 Part 6: 1989
Fire performance acc. to building regulation	Class 0	Test results for surface spread of flames and fire propagation meets: <ul style="list-style-type: none"> • Building regulation 2000 (England and Wales) • Building standard (Scotland) regulation 1990 • Building regulations 2000 (Northern Ireland) • Building regulations 1997 (Republic of Ireland) for the Class 0 fire category
Euroclass fire rating	Tubes B ₁ -s3, do Sheets & tapes B-s3, do	Classified acc. to EN 13501-1 Tested acc. to EN 13823 EN ISO 11925-2
Reaction to fire	Self-extinguishing, does not drip	
Resistance to	Building materials – very good Chemicals – consult product test list Ozone – very good	
Environmental aspects	ODP zero, GWP zero	
Health aspects	Dust & fibre free	

Figures Courtesy of Armacell UK Limited (December 2013).

Class “0” and Non-Halogen Flexible Elastomeric Foam are manufactured by a number of suppliers, including Armacell UK Limited, NMC Industries (INSUL-TUBE®) and Kaimann (Kaliflex).



Phenolic Foam

In recent years, Phenolic Foams have risen to prominence due to their usefulness in building service applications and within lines where a low chloride content is important. They have now gained prominence as a major product for the insulation of pipes, ducts, plant rooms and public buildings, as well as offices and domestic premises, due to their efficiency, fire safety and comparatively low cost.

Additionally, Phenolic Foams are an excellent solution for wet processes such as breweries because of the comparatively low level of leachable chlorides. Phenolic Foam can be supplied with a variety of covering materials, in particular the reinforced aluminium foil commonly applied to HVAC products.

Standard pipe section is typically manufactured from 37-40kg/m³ Phenolic, but high density Phenolic Foams of 80kg/m³ and 120kg/m³ are also available and used predominantly in the fabrication of pipe supports, duct supports, crocodile strips and slabs.

Typical Properties

Properties	Standard	Units
Nominal density	EN1602	40 kg/m ³ +/- 2
Thermal conductivity	EN 12667	0.021 W/mK +/- 0.002
Temperature limits		-180°C to +120°C
Specific heat		1.88 kJ/kg. C
Compressive strength - Parallel to rise - Perpendicular to rise	EN 826	180 kPA +/- 40 140 kPA +/- 40
Tensile strength - Parallel to rise - Perpendicular to rise	EN 1607	200 kPA +/- 40 180 kPA +/- 40
Closed cell content	EN ISO 4590	Minimum 95%

Fire Test Classifications:

- EN 13501-1 : 2007+A1 : 2009, EuroClass SBI B₁, s1-d0
- BS476 Part 6 and Part 7 – results conform to Class 0 of the UK Building Regulations
- Epiradiateur – M1
- ASTM E84 25/50 flame and smoke up to 3 inches thick
- NEN 6065/6066 – Klasse 1/2
- DIN 4102 – B1

Other Information

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of GRM Insulation Solutions. The data on this sheet relates only to the specific material designated to herein. GRM Insulation Solutions assumes no legal responsibility for use or reliance upon this data. For information regarding specific applications of the product, please contact GRM Insulation Solutions.

Phenolic Foam is manufactured by a number of suppliers, including GRM Insulation Solutions (BetaPlus) and Kingspan Tarec (Kooltherm/Tarecphen).

For full technical advice, thermal calculations and support, please contact your local SIG Technical Insulation branch



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SIG is committed to the health, safety and wellbeing of our employees, customers and the general public. We operate a zero harm policy and have gained accreditation to FORS at all of our operating sites.



Email fireprotection@sigplc.com to speak to your local fire protection specialist.



For more information please visit: www.sigassured.co.uk