



**GOOT**  
Products



Fujian Tenlead Advanced Material Co., Ltd.

- Phenolic & PU Foam Pre-insulated HVAC Ductwork
- Phenolic Foam Insulation Board
- Phenolic Foam Pipe Insulation
- Phenolic Foam Block

Fujian Tenlead Advanced Material Co., Ltd.  
Xiamen Goot Advanced Material Co., Ltd.  
No. 456 Hengtian Road, Jimei District, Xiamen City, Fujian Province, China  
Tel: 0086-592-6372250 Fax: 0086-592-6372290  
Email: [market@ten-lead.com](mailto:market@ten-lead.com)  
Web: [www.ten-lead.com](http://www.ten-lead.com)



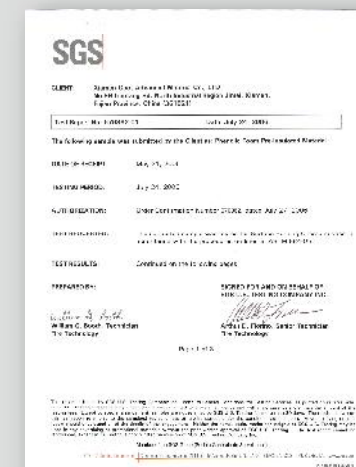


# BIRD VIEW OF FUJIAN TENLEAD FACTORY



## ABOUT US

Since the foundation in 1993, Fujian Tenlead Advanced Material Co., Ltd. (formerly known as "Xiamen Goot Advanced Material Co., Ltd.") has been focusing on the research and development of energy saving building materials. We manufacture a range of products designed for HVAC ductwork, pipeline insulation and building insulation. We are one of the fastest growing manufacturers of building insulation materials in China and we are intended to be a leading enterprise with high-technology and innovation in the field of phenolic foam all over the world.

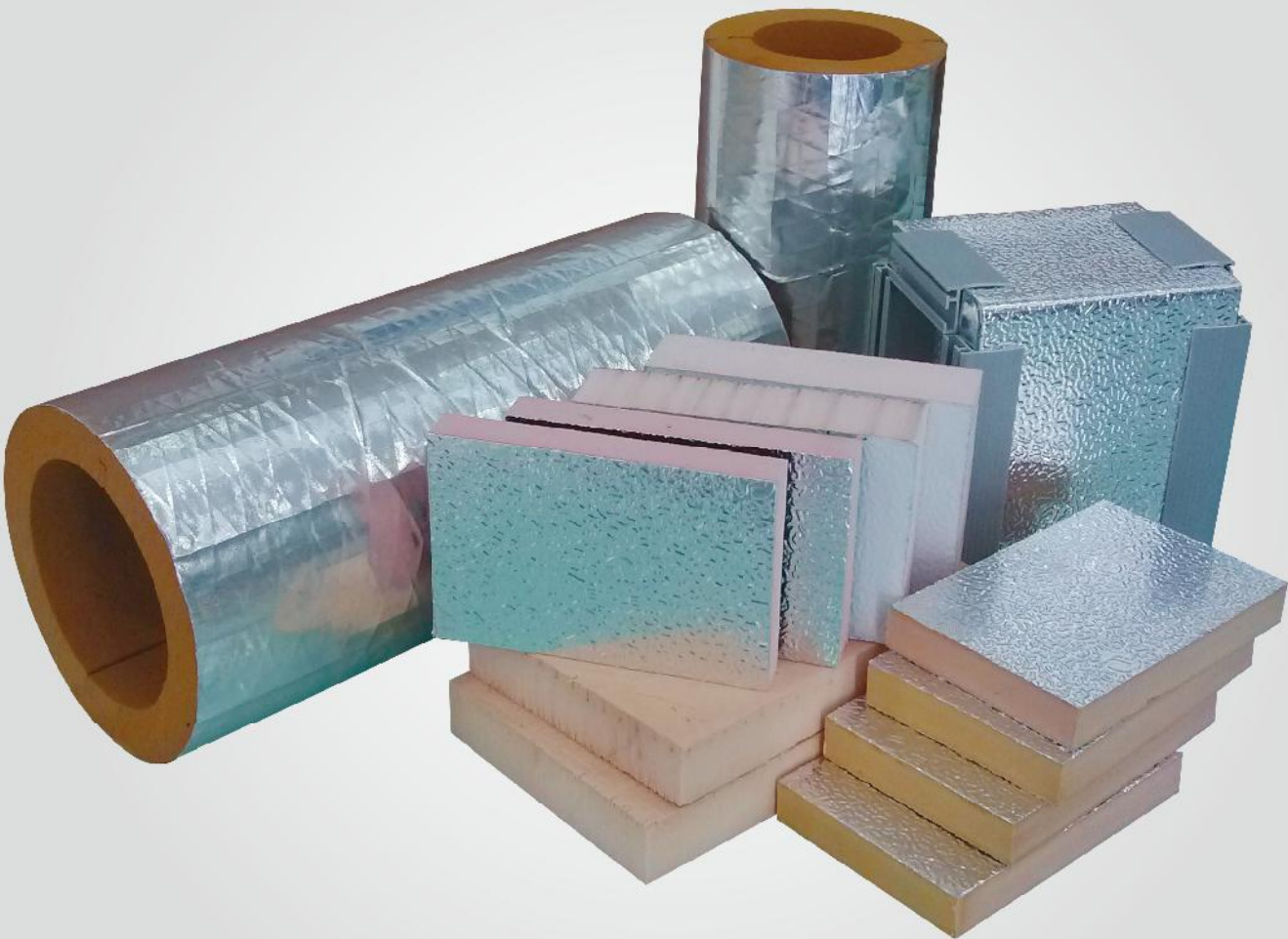




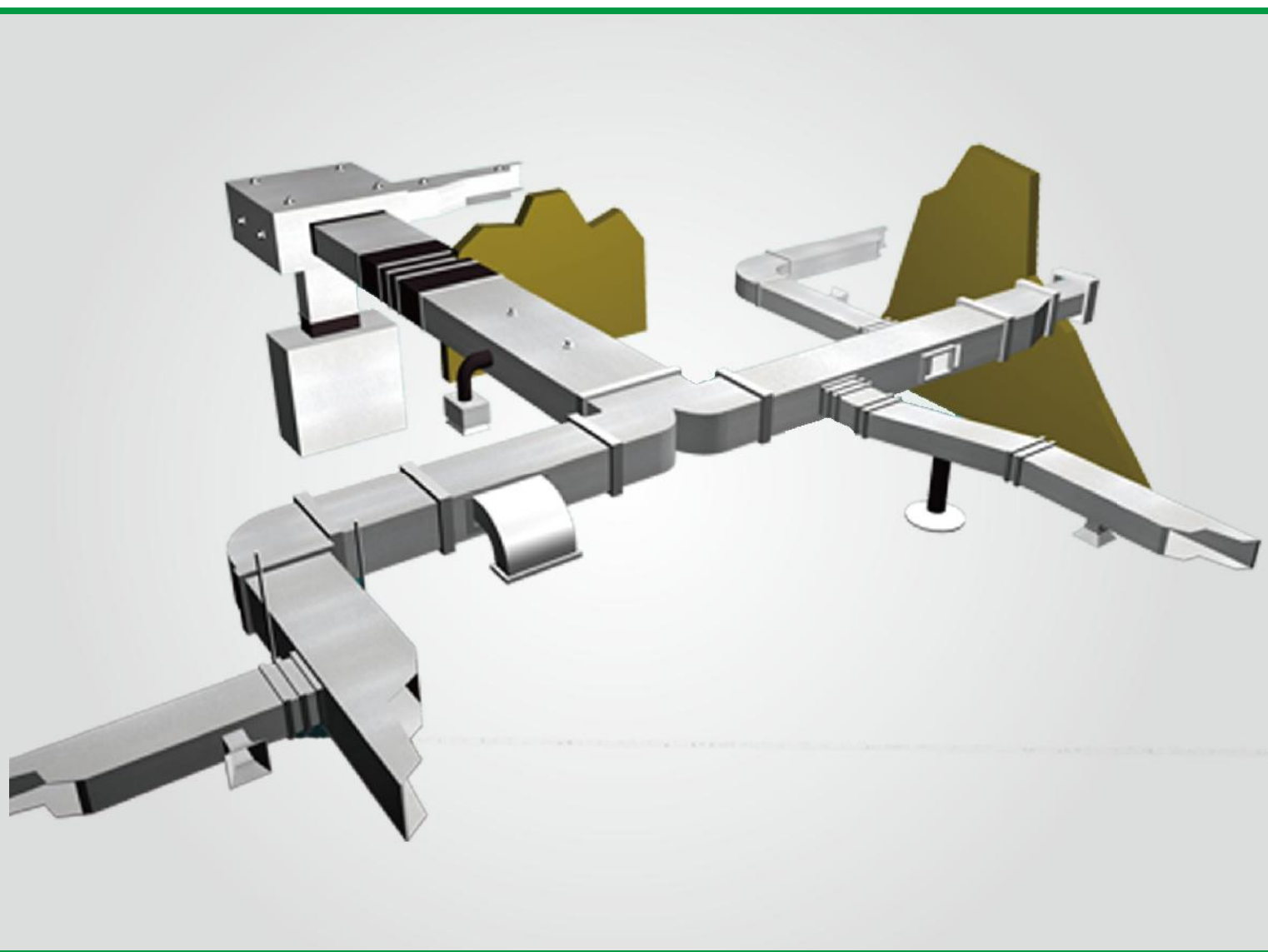
# Contents

Introduction of Phenolic Foam	01
GOOT® Phenolic Foam Pre-insulated Ductwork	02
GOOT® Polyurethane Foam Pre-insulated Ductwork	06
Project Cases of Air Duct	09
LOVEHOT® Phenolic Foam Pre-insulated Ductwork	12
Tools and Accessories for Fabrication of Pre-insulated Duct	16
Phenolic Foam Insulation Board	18
Phenolic Foam Block	20
Phenolic Foam Pipe Insulation	22

The exceptionally high level of closed cells and the fine cell structure gives phenolic foam excellent thermal properties. Closed cell phenolic foams are the most thermally efficient insulation materials commonly available. The product is manufactured in a number of forms including blocks, continuously produced flexible faced laminate, rigid faced laminates and composite panels in addition to highly specialized applications such as fire doors and molded products. Being based on a phenolic resin it has outstanding fire characteristics and extremely low smoke emission when exposed to a flame source. Phenolic foam is used extensively in industrial heating and ventilation applications such as pipe and duct insulation. It is also used in building applications such as roofing, flooring, cavity walls, sarking and in the food processing industry for steel faced panel. (quoting from European Phenolic Foam Association [www.epfa.uk.org](http://www.epfa.uk.org))

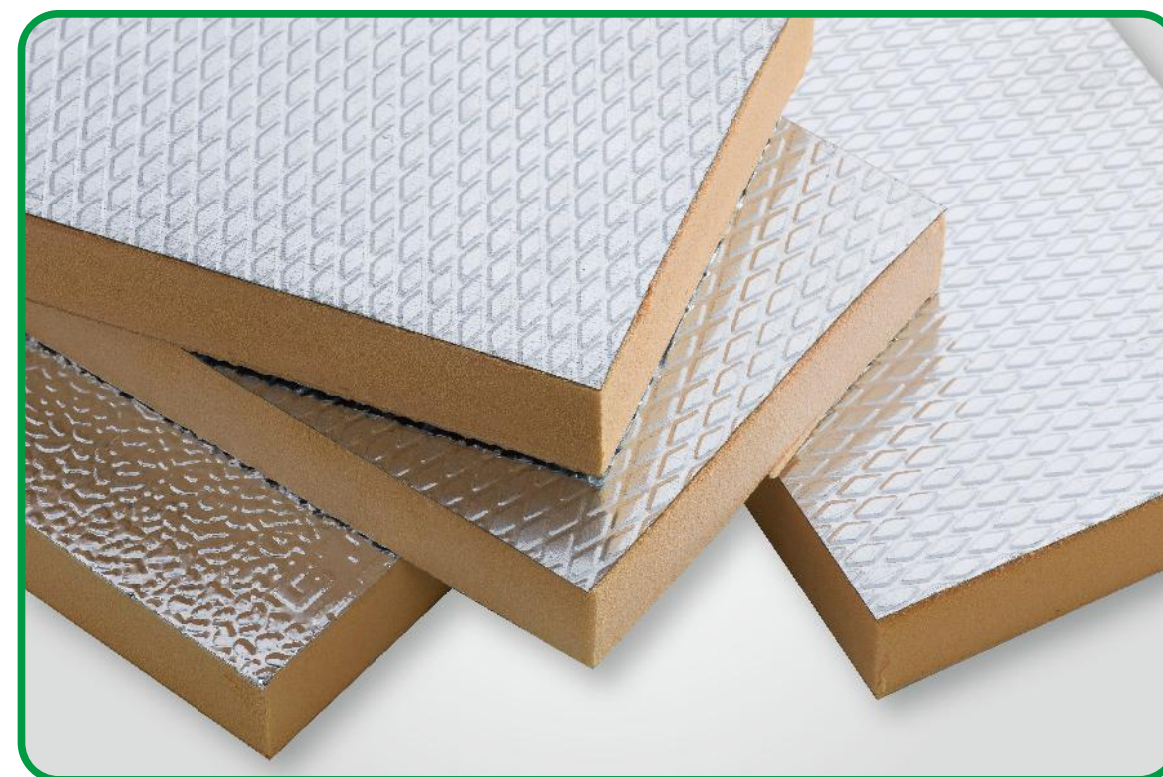




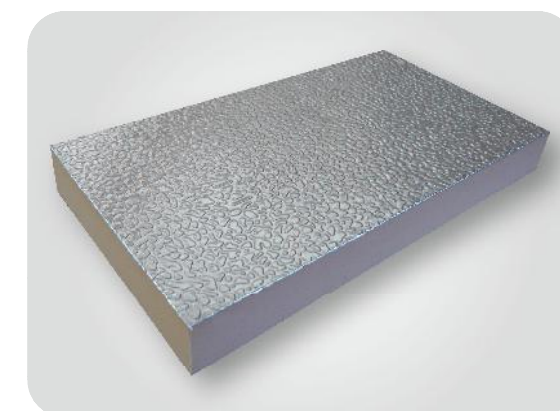


The GOOT® Phenolic Foam Pre-insulated Ductwork System is like no other insulated ductwork system. It is the most advanced and innovative energy saving system of air-distribution ductwork available worldwide. Ductwork is fabricated using rigid insulation panels in sections up to 4m and can provide the optimum energy saving and environmental solution in comparison with other types of ductwork. The system consists of Phenolic Pre-insulated Duct Panels, fabrication methods, jointing systems and a complete line of accessories to produce a system where air leakage can be reduced to a fraction of that typical of sheet metal ductwork.

The GOOT® Phenolic Foam Pre-insulated Duct System is the clear leader in new generation pre-insulated ductwork. It offers the triple benefits of cutting energy, cutting carbon and cutting cost whilst already having proved itself in its highly competitive marketplace. Being based on a phenolic resin it has outstanding fire characteristics and extremely low smoke emission when exposed to a flame source.

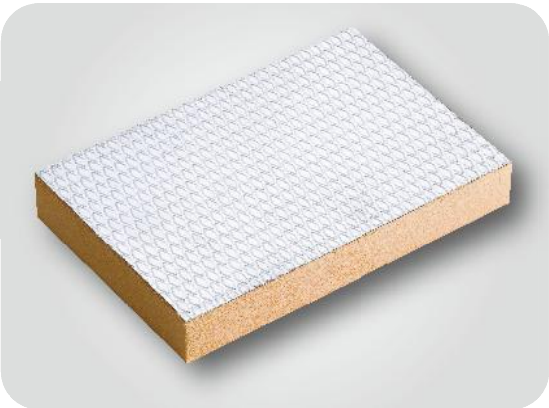


Internal Use:  
Panel Structure: Alu. Foil/ Phenolic Foam / Alu. Foil  
Foam Density: 60kg/m<sup>3</sup>  
Panel Dimension: 3950mm\*1200mm\*20mm  
Alu. Foil: 80 Micron  
Alu. Finish: Embossed  
Fire And Smoke Classification:  
Class 0 (BS476: Part 6&7 )  
Class A (ASTM E84)





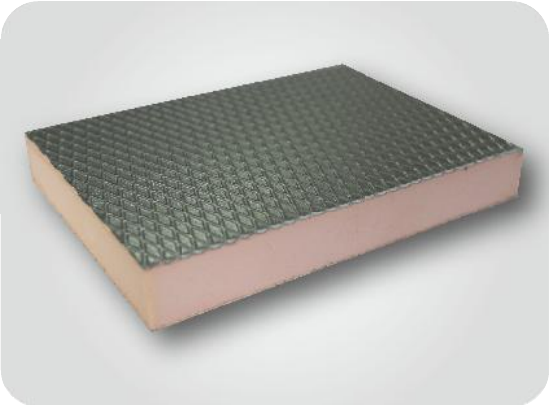
External /Internal Use:  
Panel Structure: Alu. Foil/ Phenolic Foam / Alu. Sheet  
Foam Density: 60kg/m³  
Panel Dimension: 3950mm\*1200mm\*20mm  
Alu. Foil: 80 Micron  
Alu. Finish: Embossed  
Alu. Sheet : 180 Micron (Smooth or Embossed)  
Fire And Smoke Classification:  
Class 0 (BS476: Part 6&7 )  
Class A (ASTM E84)



Internal Use:  
Panel Structure: Alu. Foil/ Phenolic Foam / Painted  
Steel Sheet  
Foam Density: 60kg/m³  
Panel Dimension: 3950mm\*1200mm\*20mm  
Alu. Foil: 80 Micron  
Alu. Finish: Embossed  
Painted Steel Sheet : 180 Micron (Smooth or  
Embossed)  
Fire And Smoke Classification:  
Class 0 (BS476: Part 6&7 )  
Class A (ASTM E84)



Internal Use:  
Panel Structure: Alu. Foil/ Phenolic Foam / G.I. Sheet  
Foam Density: 60kg/m³  
Panel Dimension: 3950mm\*1200mm\*20mm  
Alu. Foil: 80 Micron  
Alu. Finish: Embossed  
G.I. Sheet: 180 Micron (Smooth or embossed)  
Fire And Smoke Classification:  
Class 0 (BS476: Part 6&7 )  
Class A (ASTM E84)

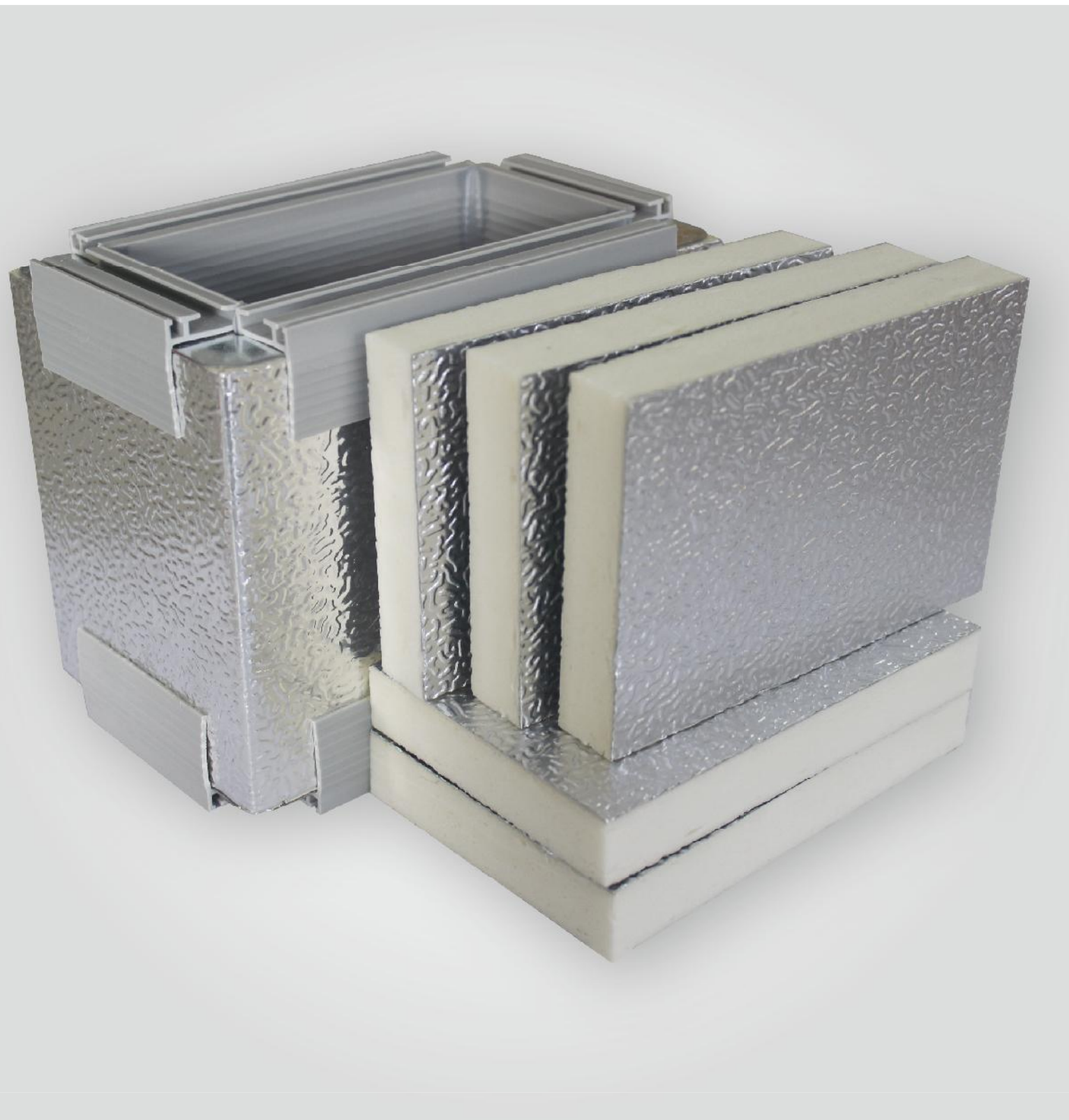


**Advantages Compared to Traditional Insulated Sheet Metal Ductwork:**  
Do it in one time, no lag insulation required, save the labor and cost.  
Save the building space  
Very light, decrease the total weight of building  
Little air leakage by flange joint connecting  
Low thermal conductivity, no condensation and energy saving  
Closed cell foam, good acoustic insulation  
Fire proof, no smoke when exposing to fire  
Faced with aluminum foil, it's water proof and anti-microbial  
CFC and HCFC free, environment friendly

Specification of GOOT® Phenolic Foam Pre-insulated Duct Panel

Item	Unit	Specification
Panel Structure		Alu./Foam/Alu.
Standard Panel Size	mm	3950*1200*20
Alu. Foil Thickness	micron	80
Alu. Sheet Thickness	micron	180
Foam Density	kg/m³	60
Thermal Conductivity	W/m.K	0.02
Compressing Strength	Mpa	0.25
Bending Strength	Mpa	1.0
Combustibility Property		Class 0 (BS476 Part 6 & 7) Class A (ASTM E84)
Water Absorption (Volume)	%	1.9
Max Smoke Density	%	2
Dimension Change	%	0.3
Working Temperature	°C	-250- +150
Maximum Allowable Wind Velocity	m/s	≤12
Continuous Running Maximum Temperature	°C	≤120





The GOOT® Polyurethane (PU) Foam Pre-insulated air duct panel is widely used for the air distribution of central air duct system, which is one of the most advanced and energy-saving air duct systems. The system is composed of CFC & HCFC free Polyurethane Foam Pre-insulated air duct panel and professional supporting accessories & tools. By taking the rigid insulation foam as the core material and covered with embossed/smooth Aluminum foil on both sides, PU Foam Pre-insulated air duct panel obtains excellent performances of low vapor permeability, thermal resistance and good toughness property, which is also environment Friendly.

Specification of GOOT® Polyurethane (PU) Foam Pre-insulated Duct Panel

Item	Unit	Specification
Panel Structure		Alu./Foam/Alu.
Standard Panel Size	mm	3950*1200*20
Alu. Foil Thickness	micron	80
Alu. Sheet Thickness	micron	180
Foam Density	kg/m³	50
Thermal Conductivity	W/m.K	0.02
Compressing Strength	Mpa	0.3
Bending Strength	Mpa	2
Water Absorption (Volume)	%	≤0.1
Dimension Change	%	0.3
Working Temperature	°C	-100 to +80
Maximum Allowable Wind Velocity	m/s	≤12
Continuous Running Maximum Temperature	°C	≤70



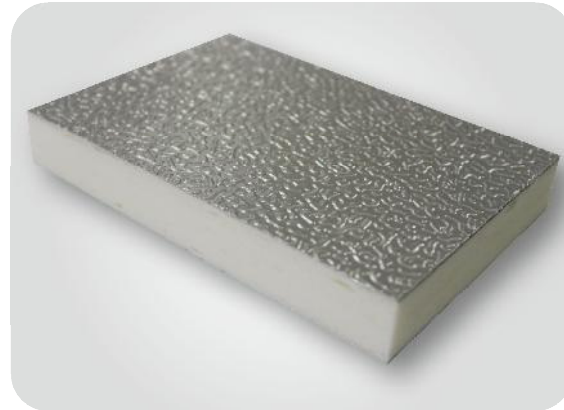


#### Advantages of GOOT® Polyurethane(PU) Pre-insulated HVAC Ductwork:

- Lower heat conductivity, higher thermal efficiency
- Low density, light weight
- Foamed with CFC free materials, environment protective
- Hermetic seal ensures little air leakage
- With aluminum foil reinforced on both sides, it's corrosion protective, Hygeian, and has a beautiful appearance
- Foamed with closed-cell structure, its water-proof and sound-insulated
- Easy making, rapid installing and convenient maintenance saves cost
- No protrudent flange on the connections, it can save a lot of building space.

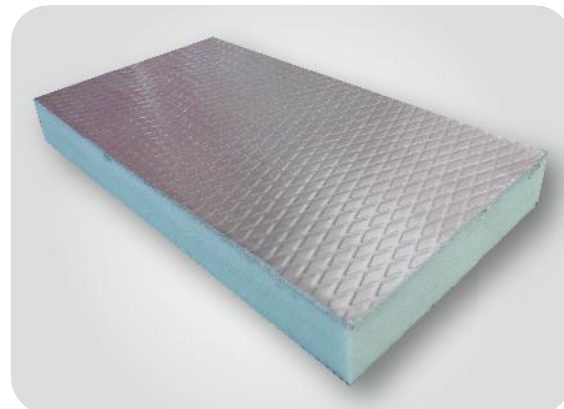
#### Internal Use:

Panel Structure: Alu. Foil/ PU Foam / Alu. Foil  
Foam Density:  $50\text{kg/m}^3$   
Panel Dimension:  $3950\text{mm} \times 1200\text{mm} \times 20\text{mm}$   
Alu. Foil: 80 Micron  
Alu. Finish: Embossed



#### External /Internal Use:

Panel Structure: Alu. Foil/ PU Foam / Alu. Sheet  
Foam Density:  $50\text{kg/m}^3$   
Panel Dimension:  $3950\text{mm} \times 1200\text{mm} \times 20\text{mm}$   
Alu. Foil: 80 Micron  
Alu. Finish: Embossed  
Alu. Sheet: 180 Micron (Smooth or Embossed)



Project Cases of Air Duct  
Samsung Main R&D Center (Korea)







Shenzhen Garden Expo Park (China)



Guangzhou South Railway Station (China)



Ocean Paradise Hotel & Restort (Bangladesh)



Guangzhou the 2010 Asian Games Stadium (China)



Tianjin Jinwan Square (China)





The LOVEHOT® Phenolic Foam Pre-insulated Ductwork System comprise rigid Phenolic insulation foam faced on internal side with a protective 40 micron aluminum foil and external side with 40 micron aluminum foil or 150 micron Aluminum Sheet. They are completely CFC and HCFC free, high intension, fire proof, especially suited for use in HVAC ductwork system. We also supply all kinds of tools and accessories needed for ductwork fabrication and installation. The phenolic foam duct panel can be fabricated into all kinds of rectangular(bended) ducts , then can be assembled into the air ducts of different specifications by using the fire-proof flange and adhesive. It's widely used for the ventilation systems of central air conditioning units in hotels, apartments, hospitals, office buildings and other buildings.

Internal Use:

Panel Structure: Alu. Foil/ Phenolic Foam / Alu. Foil

Foam Density: 50kg/m<sup>3</sup>

Panel Dimension: 2950mm\*1200mm\*20mm

Alu. Foil: 40 Micron

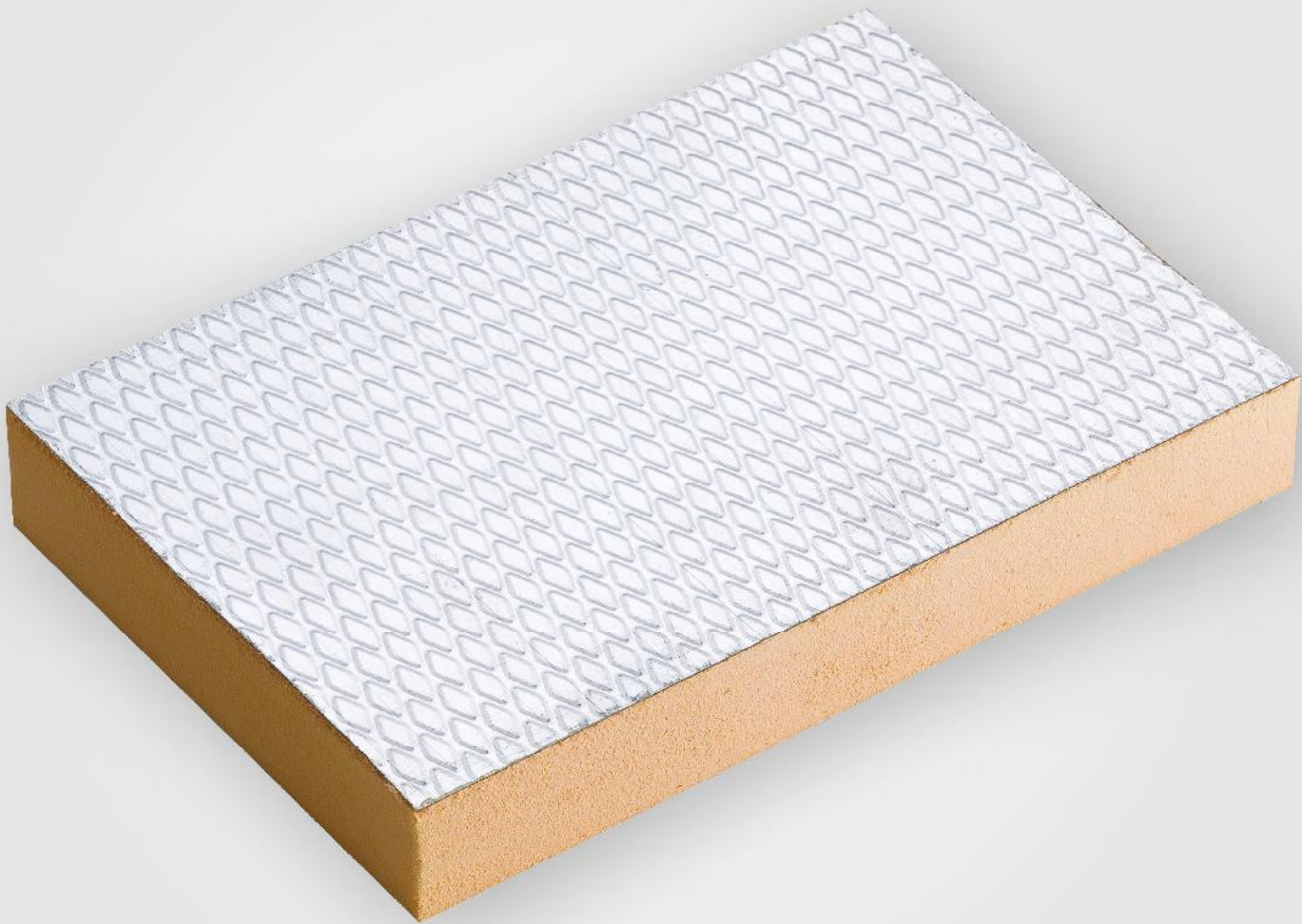
Alu. Finish: Embossed

Fire And Smoke Classification: Class 0 (BS476: Part 6&7 )  
Class A (ASTM E84)





External /Internal Use:  
Panel Structure: Alu. Foil / Phenolic Foam / Alu. Sheet  
Foam Density: 50kg/m3  
Panel Dimension: 2950mm\*1200mm\*20mm  
Alu. Foil: 40 Micron  
Alu. Finish: Embossed  
Alu. Sheet : 150 Micron (Smooth or Embossed)  
Fire And Smoke Classification: Class 0 (BS476: Part 6&7 )  
Class A (ASTM E84)



**Advantages Compared to Traditional Insulated Sheet Metal Ductwork:**  
Lower heat conductivity, higher thermal efficiency  
Low density, light weight  
Foamed with CFC/HCFC free materials, it's environment protective  
Hermetic seal ensures little air leakage  
It's corrosion protective, Hygeian, and has a beautiful appearance  
Foamed with closed-cell structure, it's water-proof and sound-insulated  
Easy making, rapid installing and convenient maintenance saves cost  
No protrudent flange on the connections, it can save a lot of building space.

Specification of LOVEHOT® Phenolic Foam Pre-insulated Duct Panel

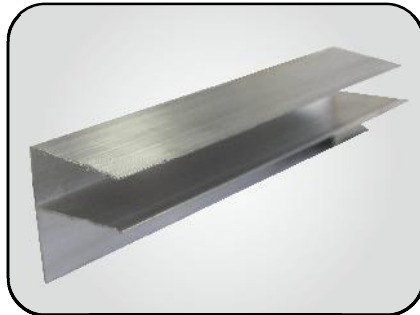
Item	Unit	Specification
Panel Structure		Alu./Foam/Alu.
Standard Panel Size	mm	2950*1200*20
Alu. Foil Thickness	micron	40
Alu. Sheet Thickness	micron	150
Foam Density	kg/m³	50
Thermal Conductivity	W/m.K	0.028
Combustibility Property		Class 0 (BS476 Part 6 & 7) Class A (ASTM E84)
Water Absorption (Volume)	%	1.9
Working Temperature	°C	-250 to +150
Maximum Allowable Wind Velocity	m/s	≤12
Continuous Running Maximum Temperature	°C	≤120
Working Pressure	Pa	≤1500



Special Glue  
Weight: 14kg/drum



PVC F Section Bar  
Length: 4m



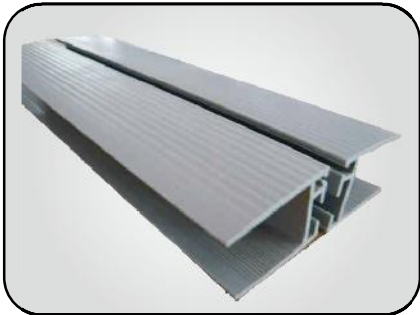
Manual Fabrication Toolkit for Pre-insulated Duct



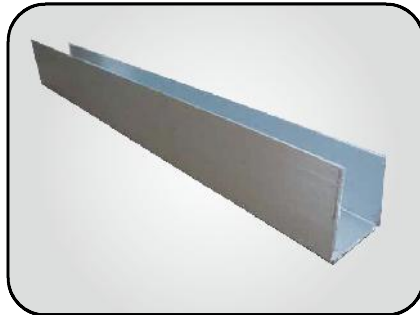
Edge Cutters



PVC Invisible Flange Joint  
Length: 4m



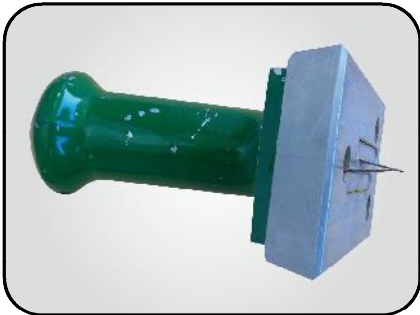
PVC U Section Bar  
Length: 4m



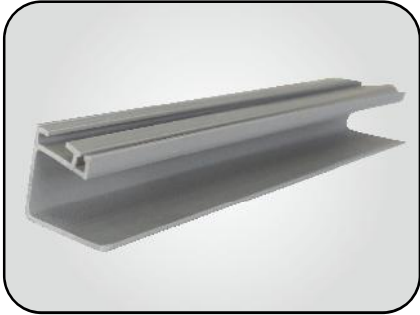
45°/90° "V" Groove Cutter



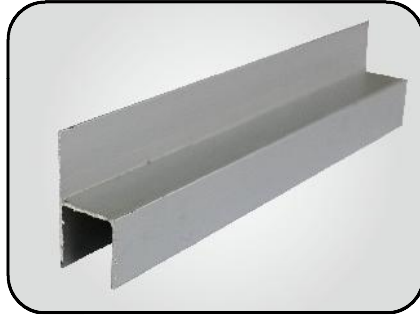
15° Cutter for Making Phenolic Elbow



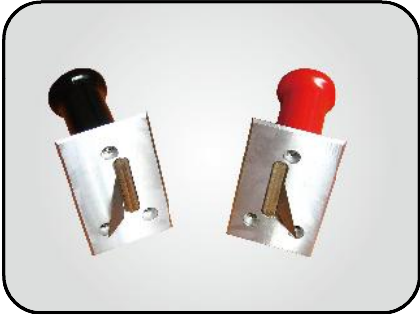
PVC Tee Connector Joint  
Length: 4m



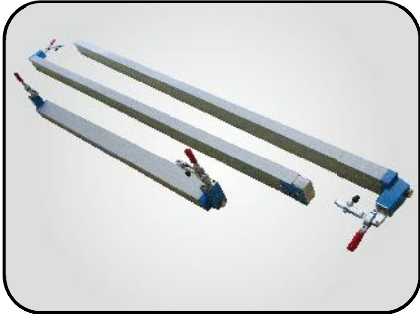
PVC Chair Section Bar  
Length: 4m



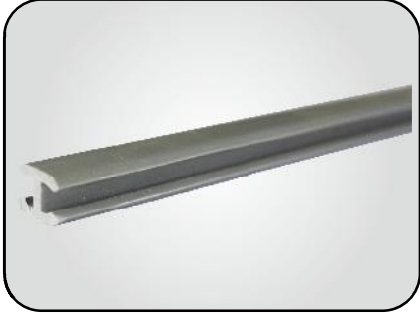
Left / Right 45° Cutters



Aluminum Ruler



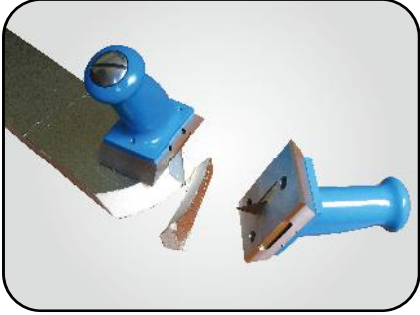
PVC H Bayonet  
Length: 4m



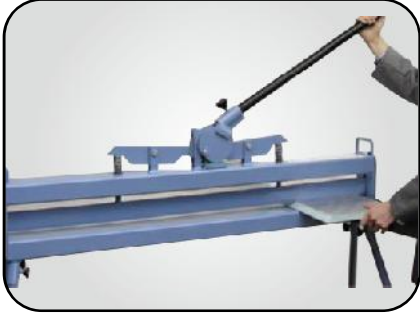
Aluminum Adhesive Tape  
Size: 100m\*5cm\*30u



Straight Cutter



Manual Bending Machine





Phenolic Foam in Building Applications



Phenolic foam is a very versatile material suitable for a large range of applications where thermal performance, moisture resistance, fire performance and in certain cases structural strength are key performance criteria. Phenolic foam is the only material that can provide this unique range of benefits and is used in a variety of applications.

Phenolic foam is used in many building applications, typically continuously laminated phenolic board is used in roofing, cavity board, external wall board, plasterboard dry lining systems, wall insulation, floor insulation and as a sarking board. The superior fire performance of phenolic foam is being recognised and this is leading to increased market share in these areas.

Phenolic foam offer significant advantages over other insulation materials which are summarized below. A range of phenolic foam boards is available to suit most new buildings or refurbishment applications.

Flexible-faced phenolic foam boards used in the building industry are typically manufactured in the continuous lamination process. This involves spraying a mixture of phenolic resin, catalyst and blowing agent onto a moving facing. A top facing is then introduced and the product then goes through a heated conveyor press and heated ovens and is then cut to the required size. Phenolic foam products with Agreement certification are available for roofing, cavity board, floor board, dry lining, external wall board and sarking board.

Advantages of Phenolic Foam Insulation Board:

Space saving: the exceptionally low thermal conductivity of closed cell phenolic foam boards means that appropriate insulation efficiency can be achieved with the thinnest possible material.

Class 0 fire rating in accordance with BS 476 Part 6 & 7

Factory applied Class 0 rated aluminum foil or glass tissue facings are available

Exceptionally low smoke emission

Excellent moisture resistance as a result of low water vapour permeability and 90% closed cell structure

Manufactured under ISO 9001:2008 Quality Management System

Uniform in Appearance as a result of continuously laminating

AVAILABILITY

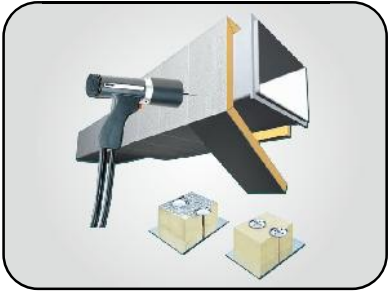
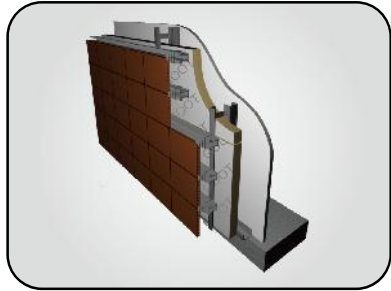
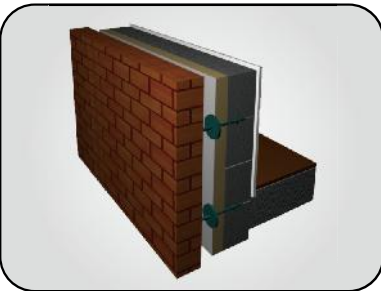
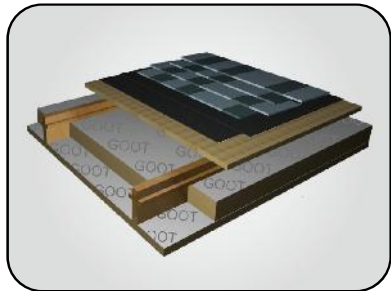
Thickness: 20mm to 120mm

Width: 300mm, 400mm, 600mm or 1200mm

Length: 400mm, 600mm, 1200mm, or 2400mm (other lengths available on request)

Facing material: glass tissue, aluminum foil, glass tissue reinforced aluminum, craft paper or aluminum paper

Density: 30-120kg/m<sup>3</sup>



Specification of Phenolic Foam Insulation Board (Continuously Laminated)

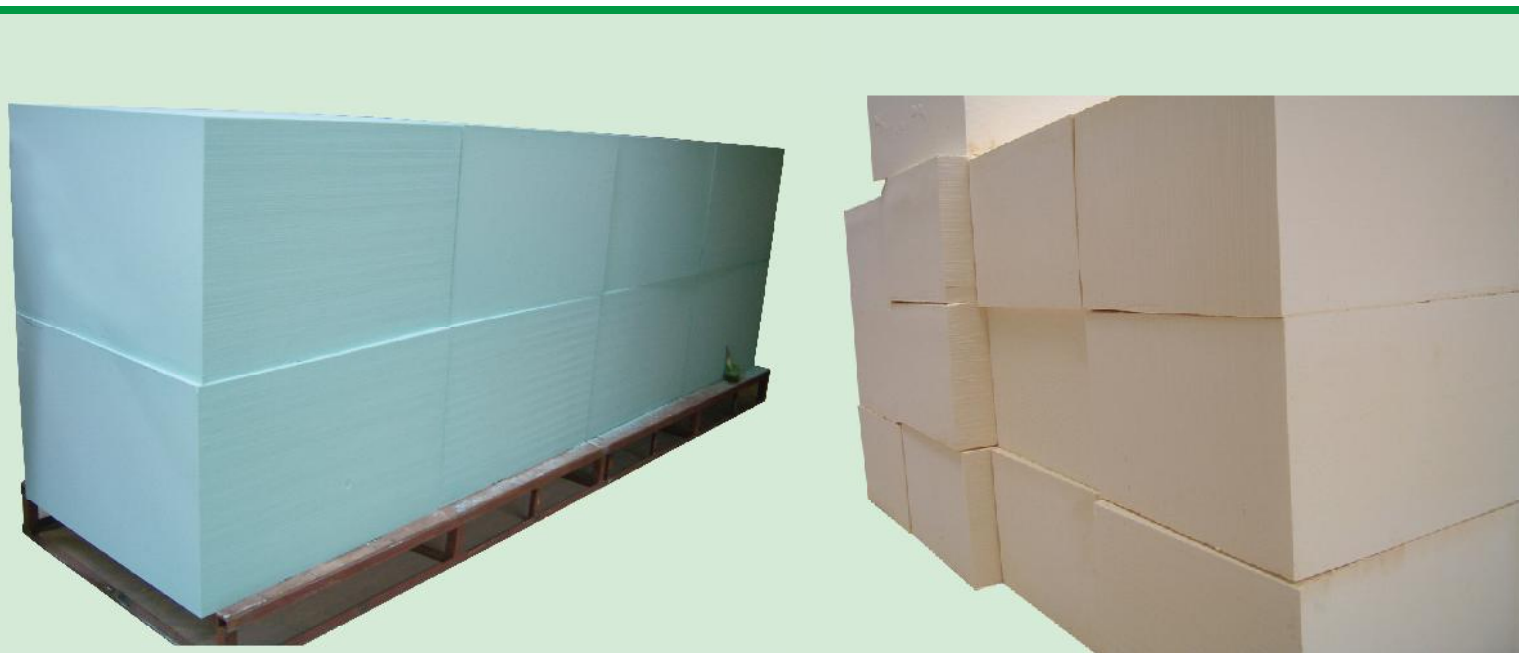
Item	Unit	Specification
Density	kg/m <sup>3</sup>	40
Thermal Conductivity	W/m.K	0.022
Combustibility Property		Class 0 (BS 476 Part 6 & 7)
Water Absorption (Volume)	%	1.9
Max Smoke Density	%	2
Dimension Change	%	0.3
Working Temperature	°C	-250- +150



The exceptionally high level of closed cells and the fine cell structure gives phenolic foam excellent thermal properties. Closed cell phenolic foams are the most thermally efficient insulation materials commonly available. The product is manufactured in a number of forms including blocks, continuously produced flexible faced laminate, rigid faced laminates and composite panels in addition to highly specialized applications such as fire doors and molded products. Being based on a phenolic resin it has outstanding fire characteristics and extremely low smoke emission when exposed to a flame source.

Phenolic Foam Block is a highly efficient energy saving insulation material, with good thermal conductivity and fire resistance. Phenolic Foam Block has passed the E84/BS fire tests according to ASTM standards with proven results of 10 flames spread and 0 smoke develop which complies to most of the North American and European building inspection standards.

By using CNC Cutting Machines, Phenolic Foam Block can be cut into specific pipe insulation sections, pipe support, and insulation boards.



#### Advantages of Phenolic Foam Block:

Close cell insulation material, high thermal performance

Fire-resistant (BS476 Part 6&7 Class 0, with approved and audited test report)

Moisture resistance with low water vapour permeance & low water absorption

Light weight but with an excellent structural strength

Environmental Friendly material, CFC & HCFC Free

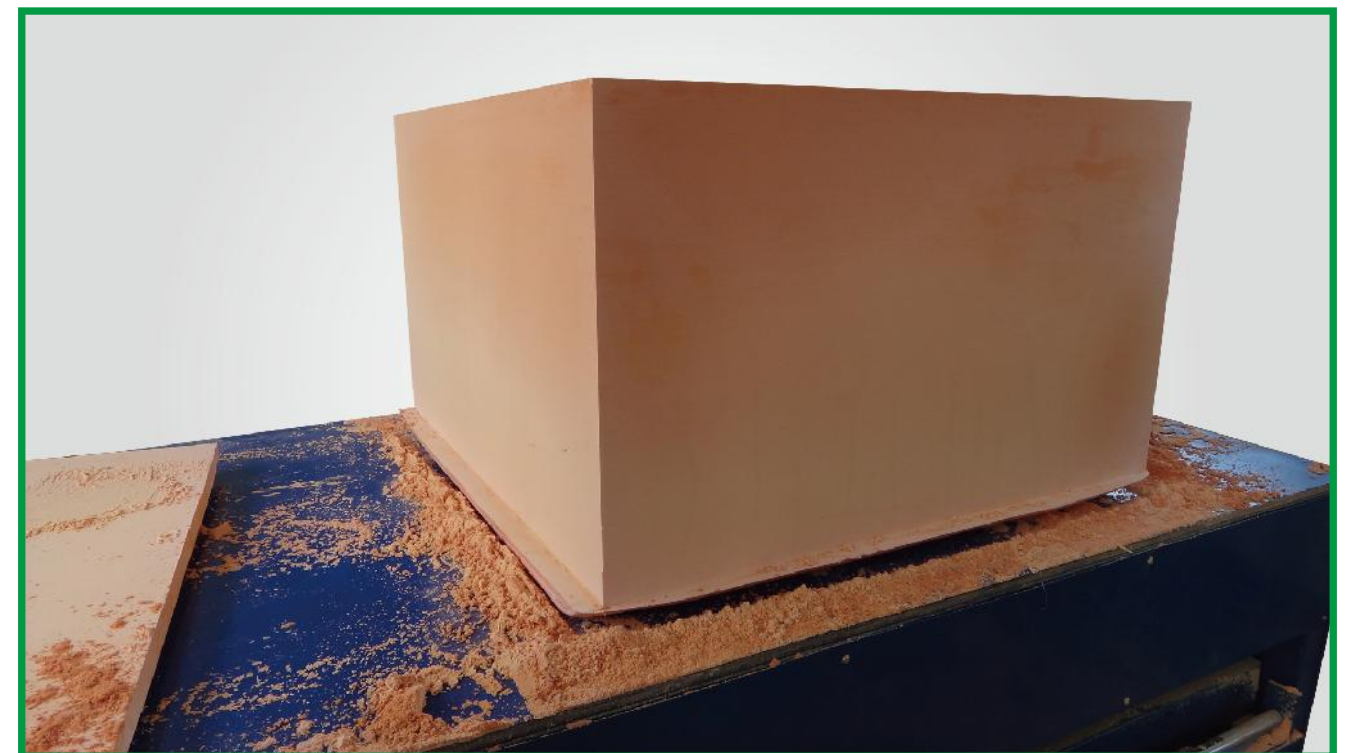
#### Applications:

Used in HVAC system as air duct insulation board or Pre-insulated Duct Board

Used in process/petrochemical applications for the insulation of pipework, tanks, vessel

Used in roofing, cavity board, external wall board, plasterboard dry lining systems, wall insulation, floor insulation and as a sarking board

Specialized applications including fire doors, highly fire resistant panels and for insulation in surface ships, off-shore installations and submarines.



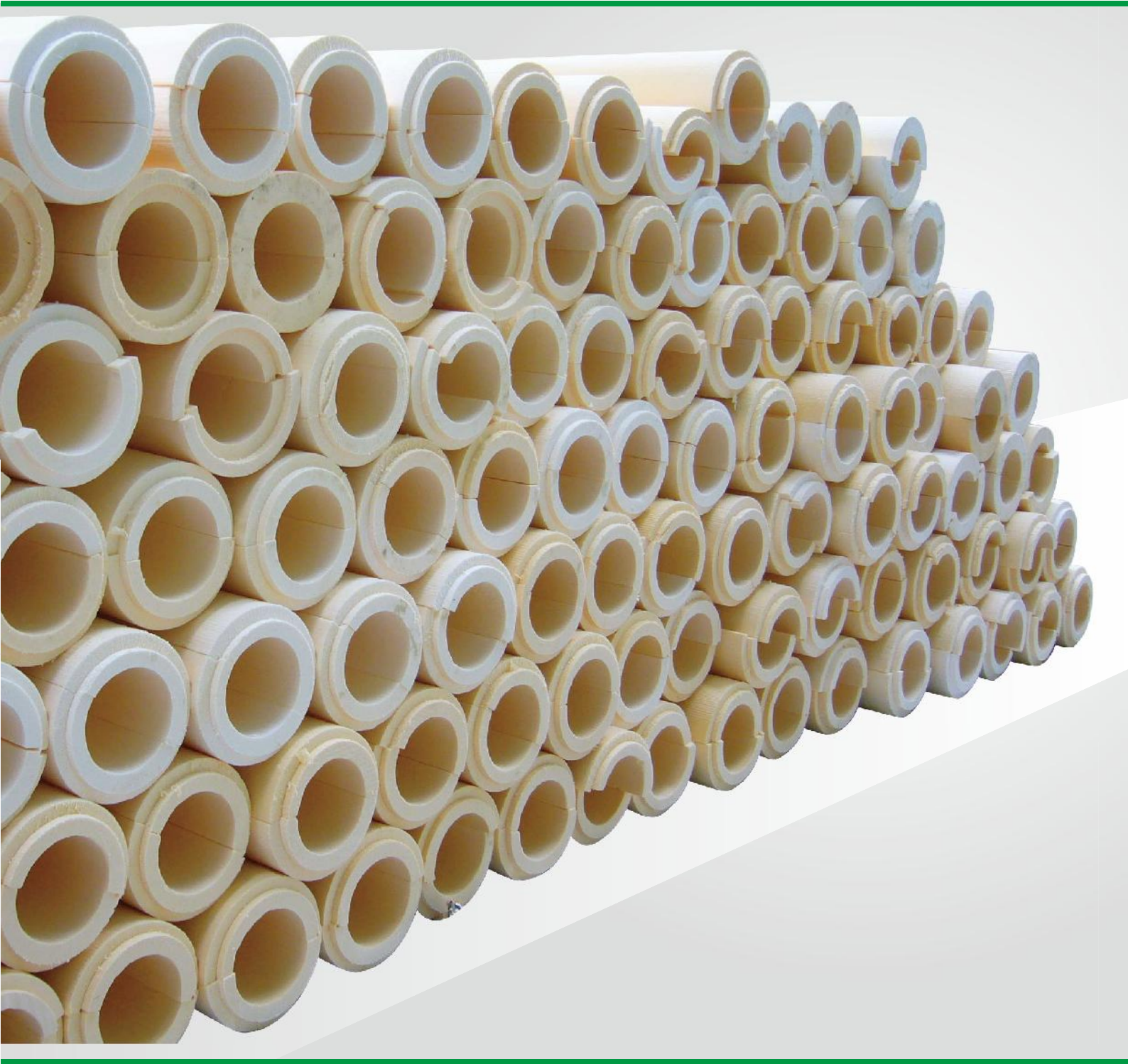
Available Color: green, grey, yellow, pink

Available Dimension: 2m\*1m\*0.8m, 1m\*1m\*0.8m, 2m\*1m\*0.6m, 1m\*1m\*0.6m

Available Density: 30-120kg/m<sup>3</sup>

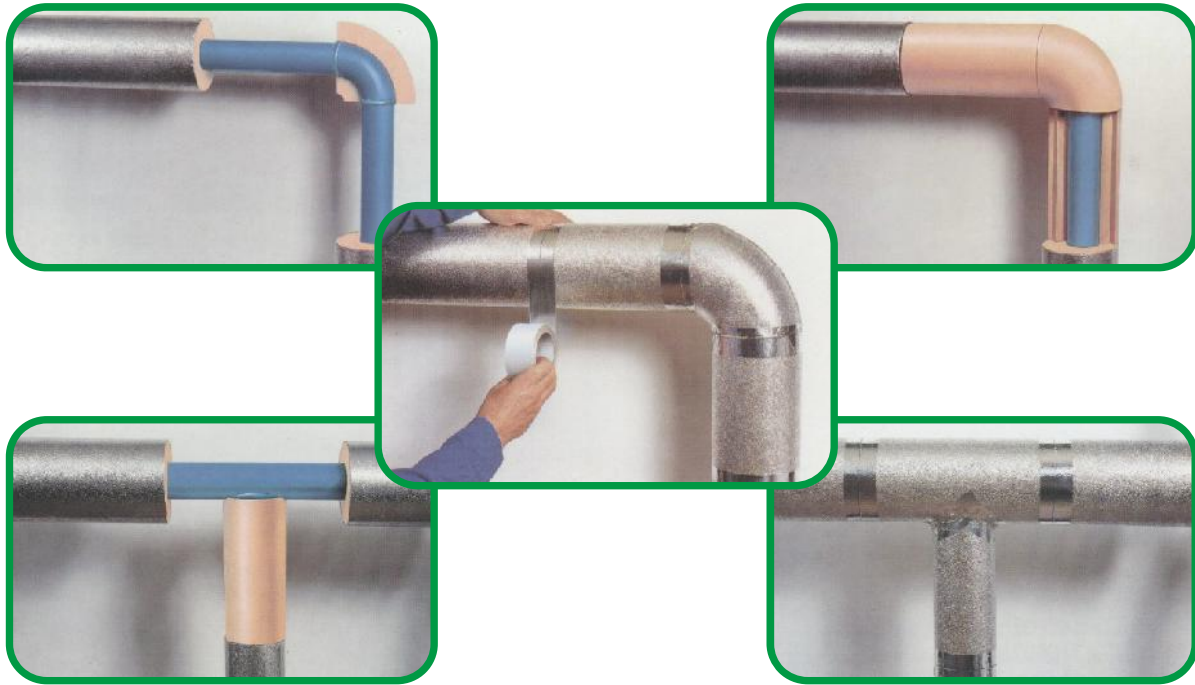


Rigid Phenolic Foam Pipe Insulation retaining all the benefits of rigid polyurethane (PU) and rigid polyisocyanurate (PIR) insulation and it has a far superior resistance to burning and spread of flame, and the lowest thermal conductivity.



Technical Data of Phenolic Foam Insulation Pipe Section

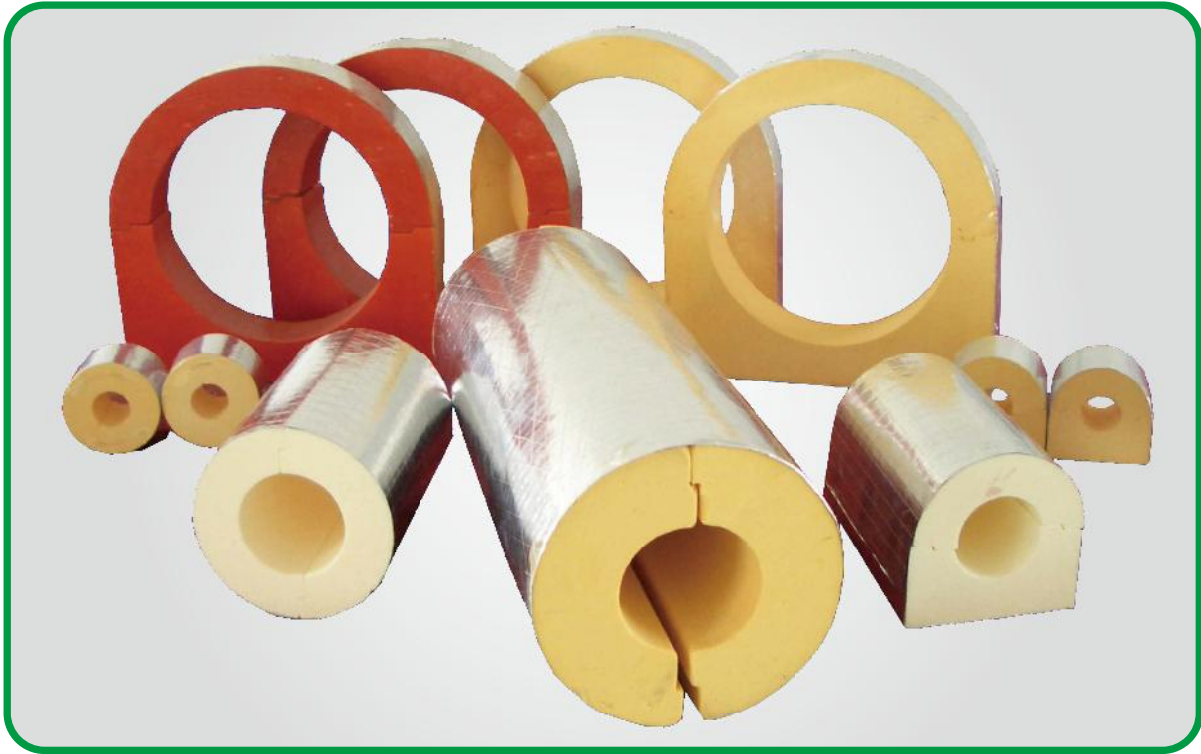
Item	Standard	Specification
Standard Length		1000mm
Density	BS 4370	40kg/m <sup>3</sup>
Thermal Conductivity	BS 4370	0.02W/m.K
Compressive Strength	ASTM D1621-00	137.7 psi
Tensile Strength	ASTM 1623-00	61.4 psi
Fire Test Classifications	BS 476 part 6 and part 7	Class 0
Water Absorption (Volume)	ASTM C209-98	0.25%
Dimension Stability	ASTM 2126-99	0.3%
Working Temperature		-250–150 °C
Foam acid and alkali		PH=7 Neutral
CFCs &HCFCs Test	Headspace GC/MS	Not detected





Technical Data of High Density Phenolic Foam Insulation Pipe Support

Item	Unit	Specification			
Density	kg/m³	80	120	160	200
Thermal Conductivity	W/m.K	0.031	0.033	0.035	0.038
Compressing Strength (parallel to rise, perpendicular to rise)	kPa	650	1350	2300	2600
		400	950	1650	2200



Recommended Thickness for Hot & Cold Insulation

DN (mm)	Outside Diameter (mm)	Insulated Temperature (°C)																
		130	80	50	10	0	-10	-20	-30	-40	-60	-80	-10 0	-12 0	-14 0	-16 0	-19 0	
15	22	45	25	20	20	25	30	35	40	45	50	60	65	70	75	80	85	
20	27	45	30	25	25	30	35	40	45	45	55	60	70	75	80	85	90	
25	33.4	50	30	25	25	30	35	40	45	50	60	65	75	80	85	90	95	
32	42.2	50	30	25	25	30	35	40	45	50	60	70	75	80	85	90	100	
40	48.3	55	35	25	25	35	35	45	50	55	65	70	80	85	90	95	100	
50	60.3	55	35	25	25	35	40	45	50	55	65	75	80	90	95	100	110	
65	73	60	35	30	30	35	40	50	55	60	70	80	85	95	100	105	115	
80	89	60	35	30	30	35	40	50	55	60	70	80	90	100	105	110	120	
100	114.3	65	40	30	30	40	45	50	55	65	75	85	95	105	110	115	125	
125	141.3	65	40	30	30	40	45	55	60	65	80	90	100	110	115	120	130	
150	168.3	70	40	30	30	40	45	55	60	70	80	90	100	120	120	125	135	
200	219	70	40	30	30	40	45	60	65	70	85	95	110	120	125	135	145	
250	273	75	45	30	30	45	50	60	65	75	90	100	110	125	130	140	150	
300	323.8	75	45	35	30	45	50	60	65	75	90	105	115	130	135	145	155	
350	356	75	45	35	35	45	50	60	70	75	90	105	120	130	140	145	160	
400	406	80	50	35	35	45	50	60	70	80	95	110	120	130	140	150	160	
450	457	85	60	40	35	45	50	60	70	85	100	115	125	135	145	155	170	
Equipment Insulation		100	70	50	35	45	55	65	75	90	105	125	140	155	170	180	200	





Properties Comparison Between Different Typical Insulation Materials

Insulation Material	CFC/ HCFC Free	Low Flame / Low Smoke	Closed Cell	Low Thermal Conductivity
Phenolic Foam	√	√	√	√
Fiber Glass	√	√	X	X
Mineral Wool	√	√	X	X
Cellular Glass	√	√	√	X
Polystyrene	√	X	√	X
Expanded Rubber	√	X	√	X
Polyurethane (PU)	√	X	√	√

Advantages of Phenolic Foam Pipe Insulation Materials:  
CFC and HCFC free material, environmentally safe and compliant with international protocols - Zero ODP  
Low flame spread and low smoke emissions – BS 476 Class 0  
Closed cell material, resists moisture ingress  
Lower thermal conductivity, higher R value  
Easy installation  
Clean and seamless appearance  
Space and energy saving  
Light weight for handling

