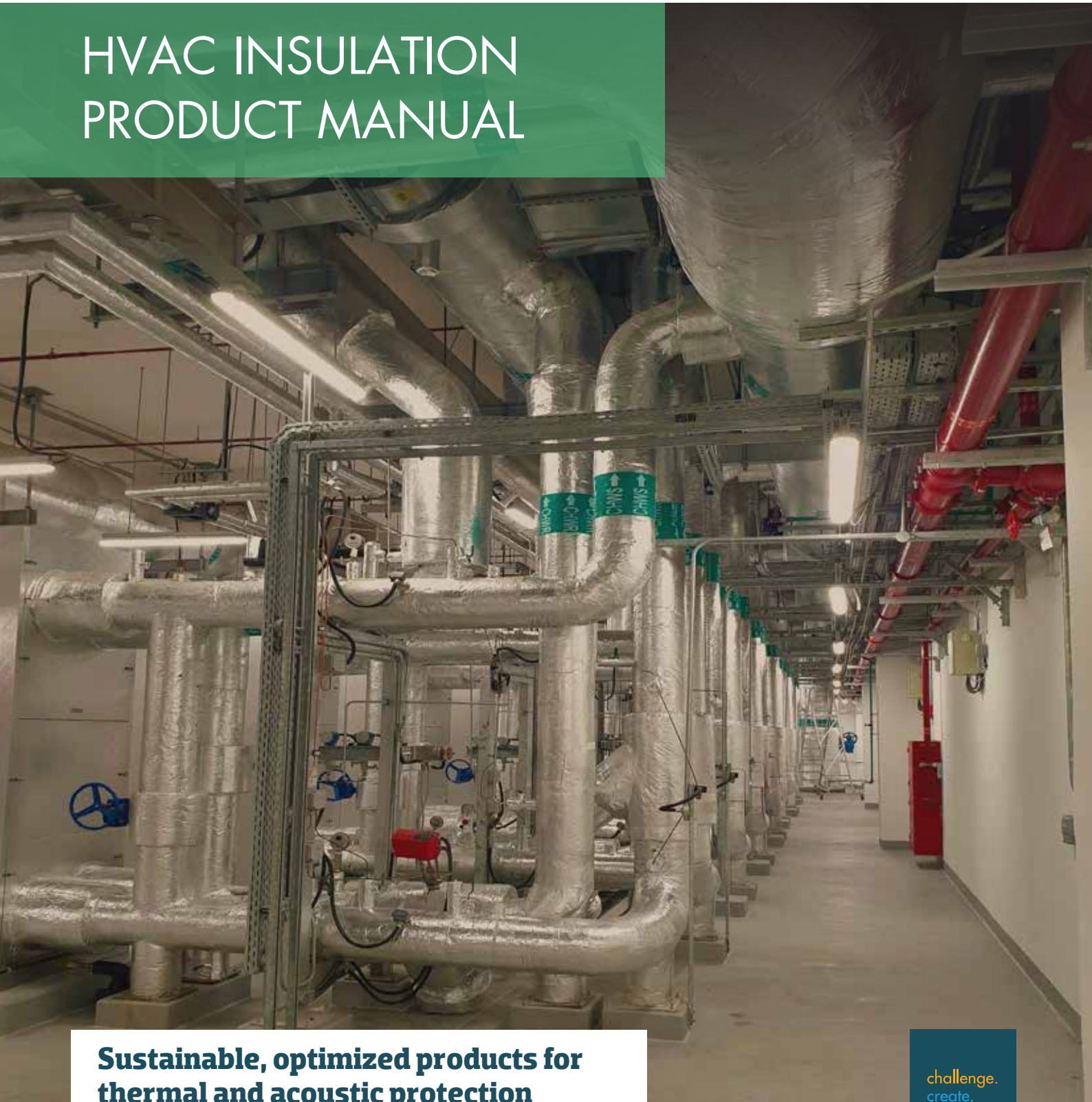


# HVAC INSULATION PRODUCT MANUAL



**Sustainable, optimized products for  
thermal and acoustic protection**

challenge.  
create.  
care.



# FOR A BETTER WORLD

## A NEW VISION OF SUSTAINABILITY

**At Knauf Insulation, sustainability is at the heart of everything we do.**

Our products save energy, cut emissions, and are designed to make sure buildings are good for the environment.

Our new 'FOR A BETTER WORLD' strategy aims to build on previous successes, reveals our future ambitions and focuses on four key sustainable, measurable goals:



**DELIVER A  
CIRCULAR  
ECONOMY**

We will do  
more with less.



**ACHIEVE  
ZERO  
CARBON**

We will minimise  
the impact of our  
products, plants  
and offices.



**PUT  
PEOPLE  
FIRST**

We will ensure  
our communities  
and people  
thrive, safely.



**CREATE  
BETTER  
BUILDINGS**

We will help  
make buildings  
fit for the future.

Learn more about our sustainability strategy at  
[www.knaufinsulation.com/en/sustainability](http://www.knaufinsulation.com/en/sustainability)

# CONTENTS

## ATMOSPHERE™ BENEFITS ..... 4

## DUCT LINER ..... 6

Duct Liner Roll

Duct Liner Slab

Installation Guidelines

## DUCT INSULATION ..... 11

Duct Wrap

Duct Wrap

Installation Guidelines

## PIPE INSULATION ..... 16

Performance

Installation Guidelines

## QUALITY ..... 21

Certifications

Environmental and Sustainability





## A HEALTHIER SERIES OF HVAC INSULATION FOR IMPROVED INDOOR AIR QUALITY



Using ECOSE Technology, it is the only such insulation available that's free of both formaldehyde and Decabromodiphenyl ether (decaBDE) and the first insulation to receive the prestigious Eurofins Indoor Air Quality Gold Standard.



All Atmosphere™ products manufactured by Knauf Insulation are certified by EUCB as free from suspicion of carcinogenic effects, are highly resistant to mold, validated as formaldehyde free and meet the UL Greenguard Gold.



Ideal for schools, healthcare facilities and commercial installations, Atmosphere insulation products fabricate and install quickly, helping to keep construction progress on track and ensure a higher level of air quality and performance.

# ATMOSPHERE™ BENEFITS



## ENERGY EFFICIENCY AND COST SAVINGS



Our Glass Mineral Wool products provide low thermal conductivities and a variety of facings for every application and are ideally suited for energy-conscious, cost-conscious and environmentally friendly use.

Controlling heat losses and gains is fundamental in today's world where energy efficiency is high on the agenda as nations, industries and homeowners support reducing CO2 emissions and energy consumption while increased energy costs are a heavy burden for companies trying to remain competitive. Well designed and specified insulation reduces energy use by 50%.



## SOUND INSULATION

Various studies show that noise reduces productivity by 66%, with air and loud noises from adjacent rooms being particularly disruptive. Reducing the amount of sound transported through mechanical systems is important to ensure a pleasant living and working environment.

Our high absorption, acoustic fleece faced insulation can absorb up to 100% of airborne sound and greatly reduce crosstalk or equipment-generated noise transported in ducts.



## ENVIRONMENT AND USER FRIENDLY

Our products contain almost exclusively natural materials as the basic raw material. With our phenol formaldehyde-free binding agent ECOSE® technology, we reduce energy consumption during production and improve the energy balance of our products. Certified by Eurofins Scientific with the Indoor Air Quality Gold Certificate, our insulation materials are proven to contribute to an improved indoor air quality with industry leading low VOC emissions and are ideally suited for sustainable use in HVAC applications.



## CONDENSATION CONTROL

Air conditioning systems, such as chilled water, refrigeration, and cool air duct systems, with surface temperatures far below the average indoor dew point, are highly susceptible to the formation of condensation on their surfaces. As every 1% increase in moisture content translates to a 7.5% loss in thermal value, it's fundamental to select the right thickness, facing and product. Our Glass Mineral Wool is made with factory-applied vapor retarders with 0.00 permeability, does not corrode steel nor supports mold growth and can be selected using NAIMA's 3E software.



## FIRE PROTECTION

Reducing the risk of fire propagation through HVAC systems is one of the most important factors in building codes nowadays, and high-performance insulation plays a significant part to prevent the spread of flames and smoke across rooms in the event of a fire. Our Glass Mineral Wool insulation materials meet the non-combustibility criteria per EN 13501-1 and the surface burning characteristics defined by ASTM E 84 and UL 723.

# DUCT LINER ROLL

## DESCRIPTION

Atmosphere Duct Liner is a flexible, mat-faced insulation bonded with ECOSE Technology. It is faced with a tightly bonded WGF mat to give the airstream a smooth, tough surface, resisting damage during installation and operation. Provides an optimum combination of efficient sound absorption, low thermal conductivity and minimal airstream surface friction.

## APPLICATION

Interior thermal and acoustical insulation material for sheet metal ducts used in heating, ventilating and air conditioning in commercial, institutional, industrial and residential construction, for air handling equipments operating at air-velocities up to 20m/s (4000 FPM) and temperatures up to 121°C (250°F).

## SPECIFICATION

Atmosphere Duct Liner complies with the following standards, as well as being approved by DCL, ADQCC and Civil Defense

- ASTM C1071
- ASTM C1338
- NFPA 90A and 90B
- ASHRAE 62
- EN 13162



## INDOOR AIR QUALITY

Atmosphere Duct Liner meets the strictest requirements on VOC Emissions

- Validated to be formaldehyde-free
- Eurofins Indoor Air Quality Gold
- EUCB Certified
- Does not contain Asbestos, Mercury, Halons, CFC's, HCFC's, Pentanes or chlorinated alkanes, ethenes and benzenes

## FIRE PERFORMANCE

Core meets the criteria for non-combustibility in accordance with EN 13501-1 and the surface burning characteristics tested under ASTM E84

## TECHNICAL DATA

Property	Test	Performance
Corrosiveness	ASTM C665	Does not accelerate corrosion of steel
Sound Absorption	ASTM C423	Minimum NRC criteria for Type I and II
Maximum Service Temp	ASTM C411	121° C (250° F) with WGF facing
Maximum Air Velocity	UL 181 Erosion Test	Max. 4,000 ft./min. (20.3 m/sec.) Tested to 10,000 ft./min. (50.8 m/sec.)
Water Vapor Sorption (by weight)	ASTM C1104	Less than 3%
Mold Growth	ASTM C1338	Pass
Thermal Conductivity	ASTM C518	Lower than 0.036 W/mK at 38° C
Surface Burning Characteristics (flame spread/smoke developed)	ASTM E84	FSi < 25 & SDi < 50

# DUCT LINER ROLL

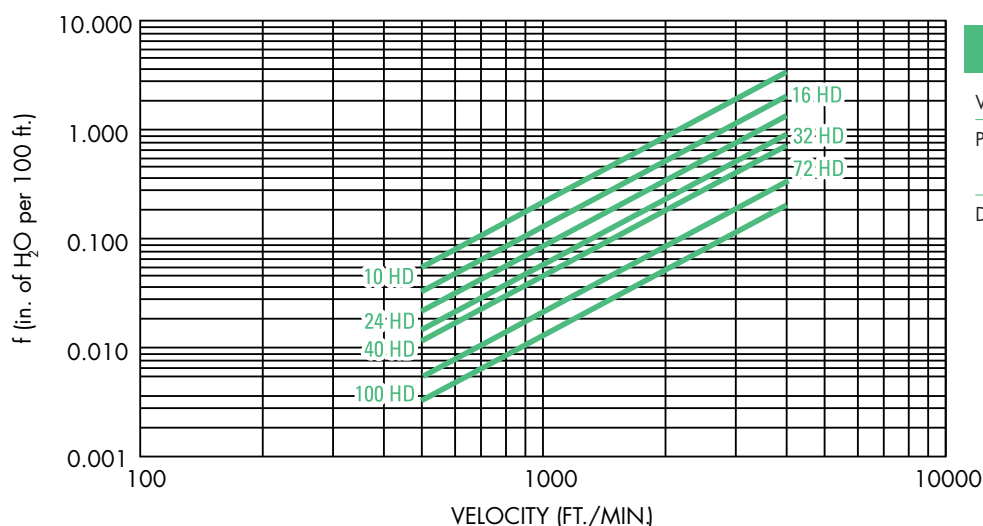
## PERFORMANCE AND FORM

Product	Thickness (mm)	Width (m)	Length (m)	Area per pack (m <sup>2</sup> )	Conductivity ( $\lambda$ ) W/mK	Resistance ("R") m <sup>2</sup> K/W	Conductance ("C") W/(m <sup>2</sup> K)
24 kg/m <sup>3</sup> (1.5 PCF)	25	1.2	20	24	0.035	0.71	1.40
	38		12	14.4		1.09	0.92
	50		10	12		1.43	0.70
32 kg/m <sup>3</sup> (2.0 PCF)	15	1.2	30	36	0.033	0.45	2.20
	25		20	24		0.76	1.32
	38		12	14.4		1.15	0.87
	50		10	12		1.52	0.66

## SOUND ABSORPTION COEFFICIENTS | ASTM C423, TYPE A MOUNTING

Product		Octave Band Frequency (Hz)						NRC
		125	250	500	1000	2000	4000	
24 kg/m <sup>3</sup> (1.5 PCF)	25 mm	0.21	0.42	0.93	0.98	0.67	0.36	0.75
	38 mm	0.23	0.50	0.87	0.92	0.93	0.93	0.80
	50 mm	0.23	0.61	0.92	1.05	1.03	0.92	0.90
32 kg/m <sup>3</sup> (2.0 PCF)	15 mm	0.21	0.36	0.49	0.74	0.58	0.39	0.55
	25 mm	0.16	0.38	0.85	0.99	0.90	0.58	0.80
	38 mm	0.27	0.55	0.87	0.99	1.00	0.98	0.85
	50 mm	0.37	0.76	1.02	1.00	0.98	0.92	0.95

(HD=Hydraulic Diameter)



### TO CONVERT TO METRIC VALUES

Velocity	Multiply fpm by 0.00508 to obtain m/s.
Pressure Loss	Multiply in. w.g. /100 ft of duct by 8.164 to obtain Pa/m of duct.
Diameter	Multiply inches by 25.4 to obtain millimeters.

# DUCT LINER SLAB

## DESCRIPTION

Atmosphere Duct Liner Slab is a semi-rigid, mat-faced insulation bonded with ECOSE Technology. Its tightly bonded WGF mat gives the airstream a smooth, resistant surface, preventing damage during installation and operation. Provides an optimum combination of efficient sound absorption, low thermal conductivity and minimal airstream surface friction.

## APPLICATION

Thermal and acoustical insulation material for plenums and sheet metal ducts used in heating, ventilating and air conditioning in all types of construction, rated for air-velocities up to 30m/s (6000 FPM) and temperatures up to 121°C (250°F).

## SPECIFICATION

Atmosphere Duct Liner Slab complies with the following standards, as well as being approved by DCL, ADQCC and Civil Defense

- ASTM C1071
- ASTM C1338
- NFPA 90A and 90B
- ASHRAE 62
- EN 13162



## INDOOR AIR QUALITY

Atmosphere Duct Liner meets the strictest requirements on VOC Emissions

- Validated to be formaldehyde-free
- Eurofins Indoor Air Quality Gold
- EUCB Certified
- Does not contain Asbestos, Mercury, Halons, CFC's, HCFC's, Pentanes or chlorinated alkanes, ethenes and benzenes

## FIRE PERFORMANCE

Core meets the criteria for non-combustibility in accordance with EN 1-13501 and the surface burning characteristics tested under ASTM E84

## TECHNICAL DATA

Property	Test	Performance
Corrosiveness	ASTM C665	Does not accelerate corrosion of steel
Sound Absorption	ASTM C423	Minimum NRC criteria for Type I and II
Maximum Service Temp	ASTM C411	121° C (250° F) with WGF facing
Maximum Air Velocity	UL 181 Erosion Test	Max. 4,000 ft./min. (20.3 m/sec.) Tested to 10,000 ft./min. (50.8 m/sec.)
Water Vapor Sorption (by weight)	ASTM C1104	Less than 3%
Mold Growth	ASTM C1338	Pass
Thermal Conductivity	ASTM C518	Lower than 0.036 W/mK at 38° C
Surface Burning Characteristics (flame spread/smoke developed)	ASTM E84	FSi < 25 & SDi < 50



# DUCT LINER SLAB

## PERFORMANCE AND FORM

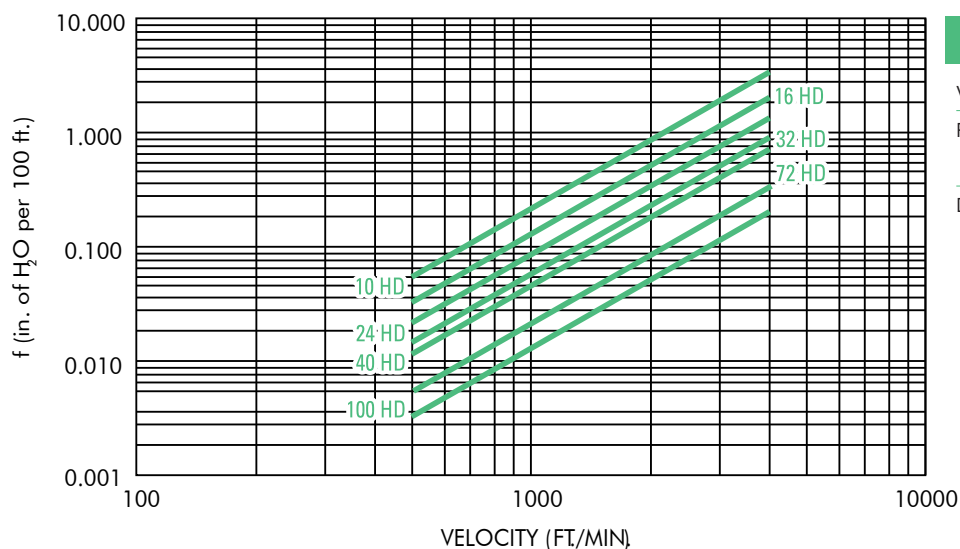
Product	Thickness (mm)	Width (m)	Length (m)	Area/pack (m <sup>2</sup> )	Slabs/pack (nos)	Conductivity ( $\lambda$ ) W/mK	Resistance ("R") m <sup>2</sup> K/W	Conductance ("C") W/(m <sup>2</sup> K)
24 kg/m <sup>3</sup> (1.5 PCF)	25	1.2	1	14.4	12	0.035	0.71	1.40
	50			7.2	6		1.43	0.70
48 kg/m <sup>3</sup> (3.0 PCF)	15	1.2	1	24	20	0.031	0.48	2.07
	25			14.4	12		0.81	1.24
	50			7.2	6		1.61	0.62

## SOUND ABSORPTION COEFFICIENTS | ASTM C423, TYPE A MOUNTING

Product		Octave Band Frequency (Hz)						NRC
		125	250	500	1000	2000	4000	
24 kg/m <sup>3</sup> (1.5 PCF)	25 mm	0.21	0.42	0.93	0.98	0.67	0.36	0.75
	50 mm	0.23	0.61	0.92	1.05	1.03	0.92	0.90
48 kg/m <sup>3</sup> (3.0 PCF)	15 mm	0.13	0.24	0.56	0.83	0.92	0.98	0.65
	25 mm	0.23	0.53	0.87	1.07	0.91	0.84	0.85
	50 mm	0.20	0.72	1.09	1.19	1.10	0.96	1.00

## FRICTION LOSS | INCHES OF WATER PER 100'

(HD=Hydraulic Diameter)



### TO CONVERT TO METRIC VALUES

Velocity	Multiply fpm by 0.00508 to obtain m/s.
Pressure Loss	Multiply in. w.g. /100 ft of duct by 8.164 to obtain Pa/m of duct.
Diameter	Multiply inches by 25.4 to obtain millimeters.

# LINER INSTALLATION

## APPLICATION & SPECIFICATION GUIDELINES

### Storage

- Inside storage is recommended.

### Fabrication and Application

- Fabricate in compliance with the latest edition of "NAIMA's Fibrous Glass Duct Liner Standard."
- Liner shall be folded and compressed in the corners of rectangular duct sections or shall be cut and fit to assure lapped, compressed joints. Longitudinal joints in duct liner should occur at the corners of ducts. However, duct size and standard duct liner product dimensions may make exposed longitudinal joints necessary. In such cases, the exposed joints shall be coated with adhesive and additionally secured with mechanical fasteners in accordance with NAIMA Fibrous Glass Duct Liner Standard. All damaged areas of the air stream surface shall be repaired with an adhesive which conforms to ASTM C916.
- Liner should be adhered to the duct with 90% minimum area coverage of an adhesive which conforms to ASTM C916.
- Mechanical fasteners should not compress the insulation more than 1/8" (3 mm), and shall be installed perpendicular to the duct surface. All fasteners should comply with the guidelines of NAIMA's "Fibrous Glass Duct Liner Standard and the Mechanical Fastener's Standard MF-1975-1."
- Metal nosings shall be securely installed over transversely oriented liner edges facing the airstream at fan discharge, at access doors and at any interval of lined duct preceded by unlined duct. In addition, where velocities exceed 4,000 ft./min. (20.3 m/sec.), metal nosing shall be used on upstream edges of liner at every transverse joint (See illustration)

### Limitations

Should not be used in systems operating at velocities exceeding 6,000 ft./min. (30.5 m/sec.) or at temperatures above 250° F (121° C).

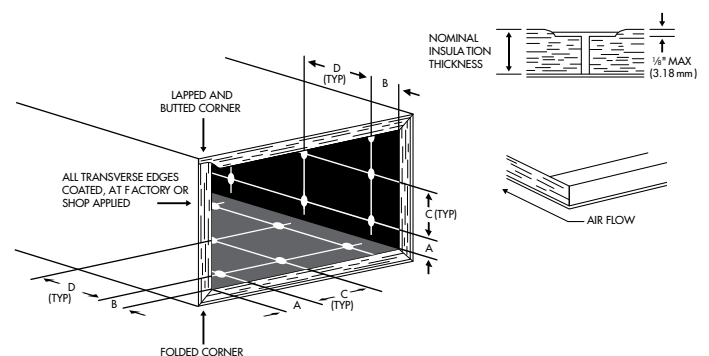
## MAINTAINED DUCT SYSTEMS ARE KEY

The best way to ensure that an HVAC system, whether bare metal or internally insulated, will continue to provide efficient, quiet air delivery, occupant comfort, and cost-effectiveness is by following a regular system operation and maintenance schedule. This, along with a high-efficiency filtration system, assures protection of both HVAC system components and building occupants. Maintenance procedures include inspection, detection, and remediation of probable sources of air-borne contaminants and moisture.

## FIBERGLASS AND MOLD

Fiberglass insulation will not sustain mold growth. However, mold can grow on almost any material when it becomes wet and contaminated. Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold, it must be discarded. If the material is wet but shows no evidence of mold, it should be dried rapidly and thoroughly. If it shows signs of facing degradation from wetting, it should be replaced.

Insulation used in direct contact with air streams that provide conditioning to occupied spaces must be discarded if exposed to water.



### LINER INTERIOR WIDTH

No. Pins	Inches	(mm)
0	≤8	≤203
2	9-16	229-406
3	17-28	432-711
4	29-40	737-1016
5	41-52	1041-1321
6	53-64	1346-1626
7	65-76	1651-1930
8	77-88	1956-2235
9	89-100	2261-2540

### MECHANICAL FASTENER LOCATION

Velocity per ft./min. (m/sec.)	0-2500 (0-12.7)	2501-5000 (12.7-25.4)
A. From corners of duct	4" (102 mm)	4" (102 mm)
B. From transverse end of duct liner	3" (76 mm)	3" (76 mm)
C. Across width of duct, on centers (min. 1/side)	12" (305 mm)	6" (152 mm)
D. Across length of duct, on centers (min. 1/side)	18" (457 mm)	16" (406 mm)

# DUCT WRAP ROLL

## DESCRIPTION

Atmosphere Duct Wrap Roll with ECOSE® Technology is a thermal and acoustical fiberglass insulation blanket for HVAC wrapping, made from highly resilient, inorganic glass mineral wool bonded by ECOSE Technology.

It is available with a foil-scrim-kraft (FSK) jacket and Aluglass jacket, factory-applied to ensure uniformity.

## APPLICATION

External insulation on commercial or residential heating or air conditioning ducts, suitable for the exterior of rectangular or round sheet metal ducts and spaces or surfaces where temperature and condensation must be controlled.

## SPECIFICATION

Atmosphere Duct Wrap complies with the following standards, as well as being approved by DCL, ADQCC and Civil Defense:

- ASTM C553 Type I, II and III
- ASTM C1338
- NFPA 90A and 90B
- UL Listed
- EN 13162



## INDOOR AIR QUALITY

Atmosphere Duct Wrap meets the strictest requirements on VOC Emissions

- Validated to be formaldehyde-free
- Eurofins Indoor Air Quality Gold
- EUCB Certified
- Does not contain Asbestos, Mercury, Halons, CFC's, HCFC's, Pentanes or chlorinated alkanes, ethenes and benzenes

## FIRE PERFORMANCE

Core meets the criteria for non-combustibility in accordance with EN 1-13501 and the surface burning characteristics tested under ASTM E84

## TECHNICAL DATA

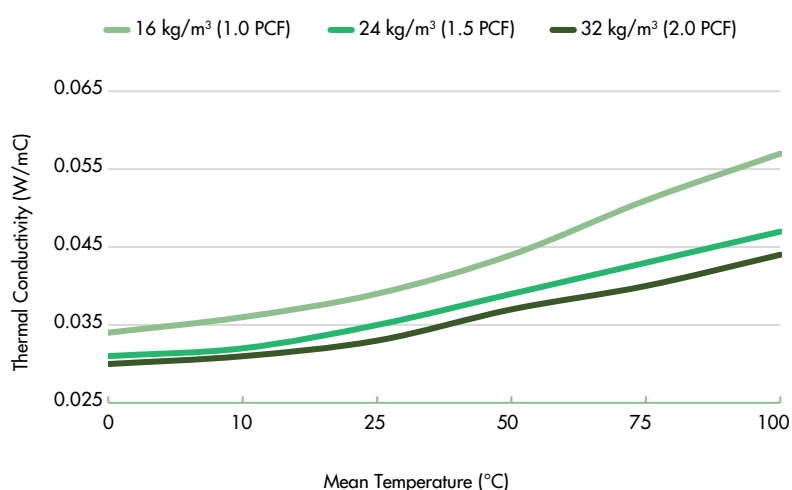
Property	Test	Performance
Corrosiveness	ASTM C665	Does not accelerate corrosion of steel
Corrosion	ASTM C795	Falls under the acceptability curve
Maximum Service Temperature	ASTM C411	121° C (250° F) Faced, 232° C (450° F) Unfaced
Water Vapor Permeance	ASTM E96	0.02 perms (FSK) 0.00 perms (Aluglass)
Water Vapor Sorption (by weight)	ASTM C1104	Less than 3%
Mold Growth	ASTM C1338	Pass
Thermal Conductivity	ASTM C518	Lower than 0.038 W/mK at 24° C
Surface Burning Characteristics (flame spread/smoke developed)	ASTM E84	FSi < 25 & SDi < 50



# DUCT WRAP ROLL

## PERFORMANCE AND FORM

Product	Thickness (mm)	Width (m)	Length (m)	Area per pack (m <sup>2</sup> )	Conductivity ( $\lambda$ ) W/mK	Resistance ("R") m <sup>2</sup> K/W	Conductance ("C") W/(m <sup>2</sup> K)
16 kg/m <sup>3</sup> (1.0 PCF)	25	1.2	20	24	0.039	0.64	1.56
	50		10	12		1.28	0.78
24 kg/m <sup>3</sup> (1.5 PCF)	25	1.2	20	24	0.035	0.71	1.40
	50		10	12		1.43	0.70
32 kg/m <sup>3</sup> (2.0 PCF)	25	1.2	20	24	0.033	0.76	1.32
	50		10	12		1.52	0.66



## THERMAL EFFICIENCY | ASTM C518

Mean Temperature	16 kg/m <sup>3</sup> (1.0 PCF)	24 kg/m <sup>3</sup> (1.5 PCF)	32 kg/m <sup>3</sup> (2.0 PCF)
	$\lambda$	$\lambda$	$\lambda$
0	0.034	0.031	0.030
10	0.036	0.032	0.031
25	0.039	0.035	0.033
50	0.044	0.039	0.037
75	0.051	0.043	0.040
100	0.057	0.047	0.044

## MINIMUM DUCT INSULATION THICKNESS TO CONTROL CONDENSATION

Insulation Conductivity $\lambda = 0.035$ (W/mK), Ambient temperature of 25 °C and RH of 80%, low emissivity surface				Insulation Conductivity $\lambda = 0.038$ (W/mK)			
Operating Temperature (°C)				Operating Temperature (°C)			
0	5	10	15	0	5	10	15
Conditioned Spaces   BS 5422:2009				Unconditioned Spaces   DGBR			
84	64	45	25	127	107	84	61

# DUCT WRAP SLAB

## DESCRIPTION

Atmosphere Duct Wrap Slab with ECOSE® Technology is a semi-rigid thermal and acoustical fiber-glass insulation board for HVAC wrapping, made from highly resilient, inorganic glass mineral wool bonded by ECOSE Technology.

It is available with a foil-scrim-kraft (FSK) jacket and Aluglass jacket, factory-applied to ensure uniformity.

## APPLICATION

External insulation on commercial or residential heating or air conditioning ducts, suitable for the exterior of rectangular sheet metal ducts, power and process equipment, boiler and stack installations.

## SPECIFICATION

Atmosphere Duct Wrap Slab complies with the following standards, as well as being approved by DCL, ADQCC and Civil Defense:

- ASTM C612 Type IA and IB
- ASTM C1338
- NFPA 90A and 90B
- UL Listed
- EN 13162



## INDOOR AIR QUALITY

Atmosphere Duct Wrap meets the strictest requirements on VOC Emissions

- Validated to be formaldehyde-free
- Eurofins Indoor Air Quality Gold
- EUCB Certified
- Does not contain Asbestos, Mercury, Halons, CFC's, HCFC's, Pentanes or chlorinated alkanes, ethenes and benzenes

## FIRE PERFORMANCE

Core meets the criteria for non-combustibility in accordance with EN 1-13501 and the surface burning characteristics tested under ASTM E84

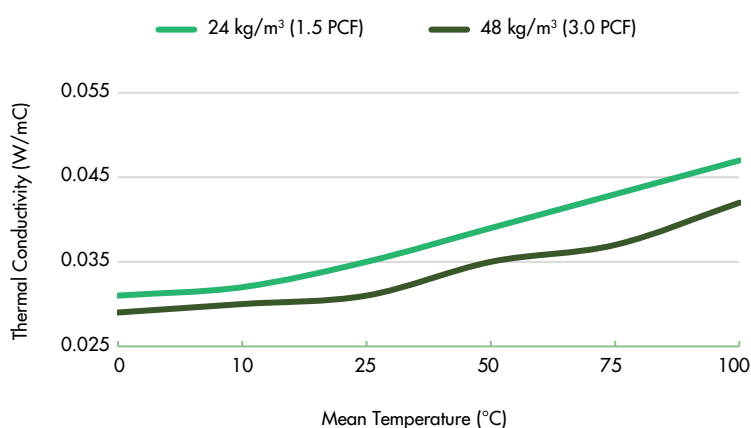
## TECHNICAL DATA

Property	Test	Performance
Corrosiveness	ASTM C665	Does not accelerate corrosion of steel
Corrosion	ASTM C795	Falls under the acceptability curve
Maximum Service Temperature	ASTM C411	121° C (250° F) Faced, 232° C (450° F) Unfaced
Water Vapor Permeance	ASTM E96	0.02 perms (FSK) 0.00 perms (Aluglass)
Water Vapor Sorption (by weight)	ASTM C1104	Less than 3%
Mold Growth	ASTM C1338	Pass
Thermal Conductivity	ASTM C518	Lower than 0.037 W/mK at 24° C
Surface Burning Characteristics (flame spread/smoke developed)	ASTM E84	FSi < 25 & SDi < 50

# DUCT WRAP SLAB

## PERFORMANCE AND FORM

Product	Thickness (mm)	Width (m)	Length (m)	Area/pack (m <sup>2</sup> )	Slab/pack (nos)	Conductivity ( $\lambda$ ) W/mK	Resistance ("R") m <sup>2</sup> K/W	Conductance ("C") W/(m <sup>2</sup> K)
24 kg/m <sup>3</sup> (1.5 PCF)	25	1.2	1	14.4	12	0.035	0.71	1.40
	50			7.2	6		1.43	0.70
48 kg/m <sup>3</sup> (3.0 PCF)	25	1.2	1	14.4	12	0.031	0.81	1.24
	50			7.2	6		1.61	0.62



## THERMAL EFFICIENCY | ASTM C518

Mean Temperature	24 kg/m <sup>3</sup> (1.5 PCF)	32 kg/m <sup>3</sup> (2.0 PCF)
	$\lambda$	$\lambda$
0	0.031	0.029
10	0.032	0.030
25	0.035	0.031
50	0.039	0.035
75	0.043	0.037
100	0.047	0.042

## MINIMUM DUCT INSULATION THICKNESS TO CONTROL CONDENSATION

Insulation Conductivity $\lambda = 0.035$ (W/mK), Ambient temperature of 25 °C and RH of 80%, low emissivity surface				Insulation Conductivity $\lambda = 0.038$ (W/mK)			
Operating Temperature (°C)				Operating Temperature (°C)			
0	5	10	15	0	5	10	15
Conditioned Spaces   BS 5422:2009				Unconditioned Spaces   DGBR			
84	64	45	25	127	107	84	61



# DUCT WRAP INSTALLATION

## APPLICATION & SPECIFICATION GUIDELINES

### Storage

- Protect stored insulation from water damage, construction damage and other abuse.
- If stored outside, proper protection from weather conditions should be provided.

### Preparation

- Install over clean, dry sheet metal ducts.
- All sheet metal joints and seams must be sealed to prevent air leakage from the duct.

### Fabrication and Application

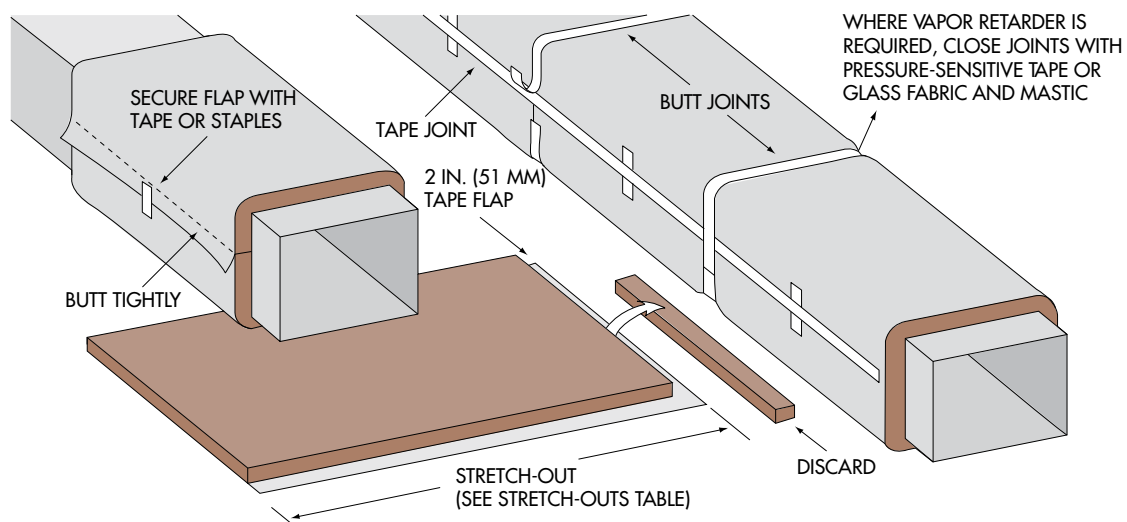
- Install with facing to the outside to obtain specified R-value using a maximum of 25% compression.
- Butt all insulation joints firmly together. Longitudinal seam of the vapor retarder must be overlapped a minimum of 2" (51 mm). A 2" (51 mm) tab is provided for the circumferential seam and must be overlapped.
- Where vapor retarder performance is necessary, all penetrations, joints, seams and damage to the facing should be sealed with an FSK, Aluglass or foil tape or glass fabric and mastic prior to system startup.
- Pressure sensitive tapes should be a nominal 3" (76 mm) wide and be applied with moving pressure using an appropriate sealing tool. Staples should be outward clinch and placed approximately 6" (152 mm) on center.
- Closure systems should have a 25/50 F.H.C. per UL 723.

- For rectangular ducts over 24" (610 mm) wide, secure the insulation to the bottom side of the duct with mechanical fasteners spaced on 18" (457 mm) centers to reduce sag. Care should be taken to avoid over-compressing the insulation with the retaining washer.
- The use of bonding adhesive is not recommended for attaching duct wrap to the duct surface. The use of bonding adhesive may restrict duct wrap from expanding to full thickness. This loss of thickness will result in decreased thermal performance which may lead to condensation issues on below ambient ductwork. Use of bonding adhesive voids warranty and performance claims and potentially the UL rating of Knauf Insulation duct wrap.
- Unfaced Duct Wrap should be overlapped with a minimum of 2" (51 mm) and fastened with 4" (102 mm) to 6" (152 mm) nails or skewers placed 4" (102 mm) apart, or secured with a wire or banding system.
- Care must be taken to avoid damaging the duct wrap.
- Refer to diagram for staple stitching and butt-joint method.

### Installation Procedures

- Use the Application graphic to determine stretch-outs required for the nominal thickness of insulation to limit average compression of the insulation 25% or less.

## APPLICATION





# DISCOVER FIBERGLASS PIPE INSULATION

All you need to know to specify Glass Mineral  
Wool Preformed Pipe Insulation for your next Project

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## WHAT'S COVERED:

- Specification
- Applications
- Performance
- Sustainability
- Thermal Performance
- Minimum Thicknesses

# ATMOSPHERE™ PIPE INSULATION BENEFITS

## WHAT IS FIBERGLASS PREFORMED PIPE INSULATION?

Fiberglass Pipe Insulation is a molded, rigid, high-density, one-piece insulation made from inorganic glass fibers bonded with the revolutionary ECOSE® Technology.

Knauf Insulation products with ECOSE Technology are made using our patented, bio-based binder - a smarter alternative to the phenol/formaldehyde (PF) binder traditionally used in mineral wool products. The bio-based binder holds our product together, gives the product its unique appearance.

## APPLICATION

Piping systems (copper, iron, stainless steel, PVC and CPVC pipe) and equipment operating at temperatures from up to 454°C.

- Steam and condensate lines
- Hot and cold domestic water
- Chilled water systems
- Industrial processes

## SPECIFICATION

Pipe Insulation complies with the following standards, as well as being approved by DCL, ADQCC and Civil Defense:

- ASTM C547 Type I
- ASTM C1338
- NFPA 90A and 90B
- ASHRAE 90
- UL Listed

## INDOOR AIR QUALITY

Pipe insulation meets the strictest requirements on VOC Emissions

- Validated to be formaldehyde-free
- Eurofins Indoor Air Quality Gold
- EUCB Certified
- Does not contain Asbestos, Mercury, Halons, CFC's, HCFC's, Pentanes or chlorinated alkanes, ethenes

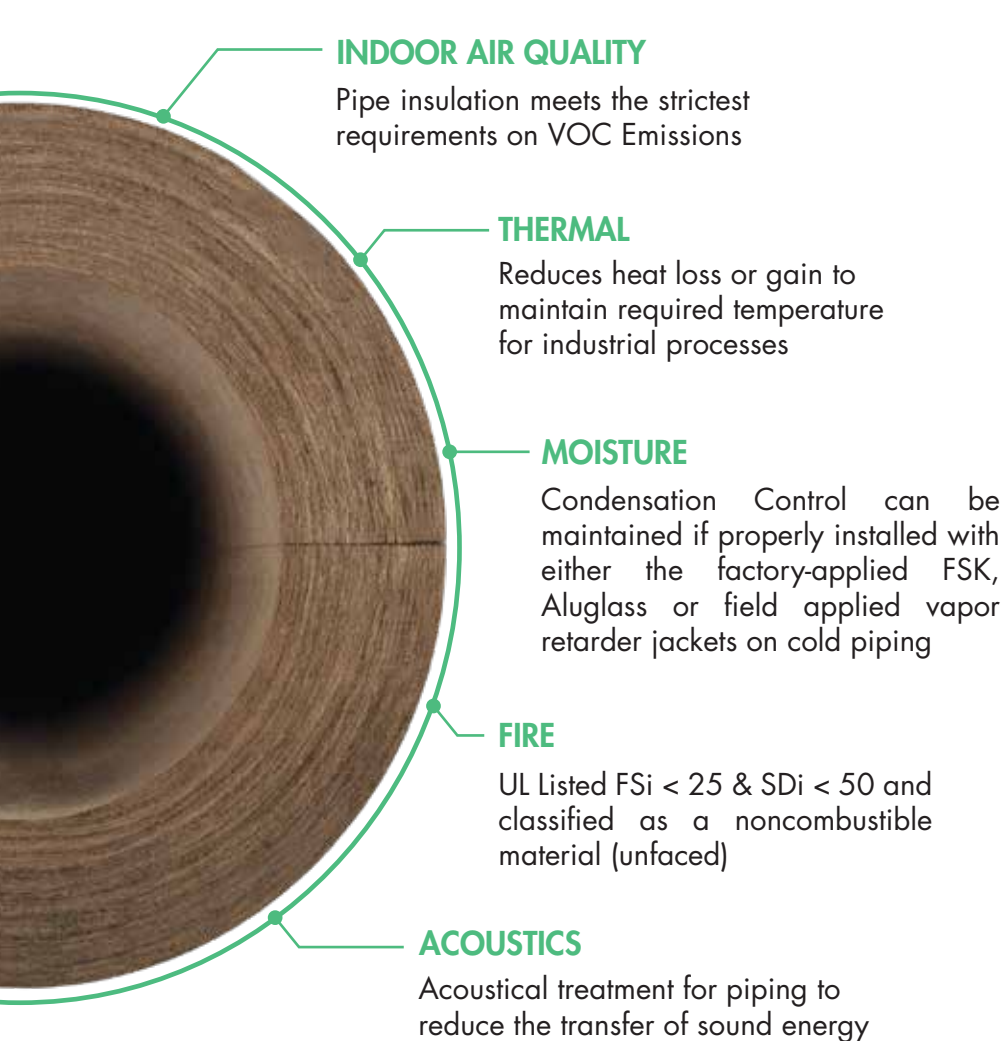
## FIRE PERFORMANCE

Core meets the criteria for non-combustibility in accordance with EN 1-13501 and the surface burning characteristics tested under ASTM E84





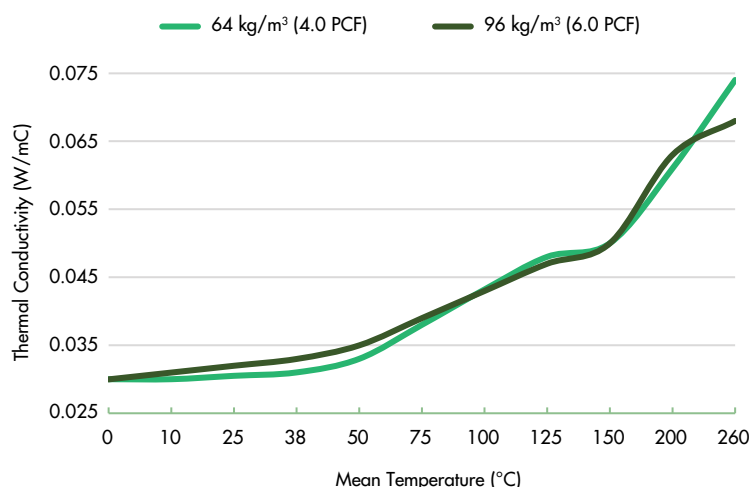
# PIPE INSULATION PERFORMANCE



## TECHNICAL DATA

Property	Test	Performance
Linear Shrinkage	ASTM C356	Less than 2% change after soaking heat at maximum temperature
Stress Corrosion Performance	ASTM C795	Falls under the acceptability curve
Maximum Service Temperature	ASTM C411	232° C Faced, 454° C Unfaced
Water Vapor Permeance	ASTM E96	0.02 perms (FSK), 0.00 perms (Aluglass)
Water Vapor Sorption (by weight)	ASTM C1104	Less than 5%
Mold Growth	ASTM C1338	Pass
Thermal Conductivity	ASTM C335	Lower than 0.036 W/mK at 38° C
Surface Burning Characteristics (flame spread/smoke developed)	ASTM E84	FSi < 25 & SDi < 50
Sag Resistance	ASTM C167	Less than 5%

# PIPE INSULATION PERFORMANCE



## THERMAL EFFICIENCY | ASTM C335

Mean Temperature	64 kg/m³ (4.0 PCF) λ (W/mK)	80 kg/m³ (5.0 PCF) λ (W/mK)	96 kg/m³ (6.0 PCF) λ (W/mK)
0	0.030	0.028	0.030
10	0.030	0.028	0.031
25	0.031	0.029	0.032
38	0.031	0.029	0.033
50	0.033	0.032	0.035
75	0.038	0.037	0.039
100	0.043	0.042	0.043
125	0.048	0.046	0.047
150	0.050	0.049	0.050
200	0.061	0.062	0.063
260	0.074	0.070	0.068

## MINIMUM PIPE INSULATION THICKNESS TO CONTROL CONDENSATION

Pipe Nominal Size (mm)	Insulation Conductivity λ = 0.035 (W/mK), Ambient temperature of 25 °C and RH of 80%, low emissivity surface			Insulation Conductivity λ = 0.038 (W/mK)		
	Operating Temperature (°C)			Operating Temperature (°C)		
	0	5	10	0	5	10
	Conditioned Spaces   BS 5422:2009			Unconditioned Spaces   DGBR		
15	32	25	18	30	30	30
20	34	27	20	30	30	30
25	36	29	21	40	35	30
32	39	31	22	40	35	30
40	41	32	23	40	35	30
50	44	34	25	45	40	30
65	47	37	27	45	40	40
80	49	39	28	45	40	40
100	53	42	30	45	40	40
150	59	46	33	50	45	40
200	64	50	36	55	45	45
250	68	53	38	55	55	45
300	71	55	40	80	75	70

## WHAT IS FIBERGLASS PREFORMED PIPE INSULATION?

### ▪ Regional extraction processing and manufacturing

Made in Abu Dhabi, UAE

### ▪ Optimized energy performance

Reduces energy demand, is extremely low emitting and does not sustain growth of fungi, mold or vermin

### ▪ Innovation in design

Eurofins Scientific Indoor Air Quality Gold Certified and Validated to be Formaldehyde-Free



Our Pipe Insulation has a minimum of **50% recycled content** by weight, **80% of it from post-consumer glass**.

We use glass bottles that would have normally found their way to a landfill and melt them with other raw materials to make glass fibers.

# INSTALLATION RECOMMENDATIONS

## RECOMMENDATIONS

### Hot Pipe

- May be installed while the system is in operation, at all temperatures up to 850° F (454° C).
- Knauf Insulation recommends, for insulation thicknesses greater than 6" (152 mm), the temperature must be increased from 260° C (500° F) to maximum temperature at a rate not exceeding 37.8° C (100° F) per hour.
- During initial heat-up to operating temperatures above 177° C (350° F), a slight odor and some smoke may be given off as a portion of the bonding material used in the insulation begins to undergo a controlled decomposition.
- If natural convection is not adequate in confined areas, forced ventilation should be provided in order to protect against any harmful fumes and vapors that might be generated.
- Care must also be taken when using sealants, solvents or flammable adhesive during installation.

### Cold Pipe

- Use a continuous vapor retarder on piping operating below ambient temperatures.
- Seal all joints, surfaces, seams and fittings to prevent condensation.
- On below freezing applications, and in high-abuse areas, the factory jacket shall be protected with an aluminium cladding outer jacket. In addition, exposed ends of insulation shall be sealed with vapor barrier mastic installed per the mastic manufacturer's instructions. Vapor seals at butt joints shall be applied at 3.0 to 6.0m intervals; at the Engineer's discretion and at each fitting to isolate any water incursion.
- On chilled water systems operating in high humidity conditions, it is recommended that the same guidelines be followed as listed above for below freezing applications. Exterior hanger supports are recommended.

### Outside Application

- Do not expose pipe insulation to weather. It must be covered with appropriate jacketing, mastic or vapor retardant coatings.
- All exposed surfaces must be protected.
- Apply jacketing, mastics or vapor retardant adhesives per manufacturer's instructions.

### Fittings and Hangers

- Fittings should be insulated to same thickness as the adjoining insulation.
- Apply fittings per manufacturer's instructions.
- When required by specification, a hard insert of sufficient length should be used to avoid compression of the insulation.

## APPLICATION GUIDELINES

### Storage

- Protect insulation from water damage or other abuse, welding sparks and open flame.
- Cartons are not designed for outside storage.

### Preparation

- Apply only on clean, dry surfaces
- Pipe or vessel should be tested and released before insulation is applied.

### General Guidelines

- All sections should be firmly butted.
- The surface temperature of the facing should not exceed 60° C (140° F). Select appropriate insulation thickness.
- Jackets, coating and adhesives should have a comparable F.H.C. rating.
- Knauf Insulation does not encourage the painting of facing surface because the application of any paint may change the surface burning characteristics and will void the fire certifications and Knauf Insulation Limited Warranty.
- All piping should have continuous insulation.
- Position longitudinal lap downward to avoid dirt and moisture infiltration.
- Do not expose pipe insulation to excessive vibration or physical abuse.

### Recommended Thicknesses

The minimum thicknesses are based on BS 5422 and DGBR standards and do not necessarily represent the Economic Thickness of Insulation or the thickness required for proper condensation control. Rather, they serve as minimum recommendations for commercial applications. For recommended Economic Thickness, install according to Knauf Insulation, NAIMA 3E Plus programs or as specified.



# PRODUCT QUALITY

## CERTIFICATIONS

Products listed in this document have been assessed by independent third party laboratories and local authorities having jurisdiction for use in all types of HVAC and MEP systems.

Atmosphere™ range is regularly tested and certified by fire safety and product conformity approvers in accordance with the latest building codes.



## Knauf Insulation NAIMA 3E Plus® Makes Specifying Insulation Simple

Thickness is a critical factor in the success or failure of an insulation system. But without the right tool for the job, determining the appropriate glass wool insulation thickness for a particular application can be challenging.

Knauf Insulation partnered with NAIMA to bring you custom 3E Plus® calculation software. NAIMA's 3E Plus® software makes it easy to calculate the appropriate insulation thickness necessary for any application.

3E Plus® has all of the standard HVAC insulation products from Knauf Insulation pre-loaded for your convenience.

### Insulation Thickness Computer Program

**Calculate**

- thickness of insulation for condensation control
- greenhouse gas emissions and reductions
- insulation needed for personnel production

**Determine**

- economic thickness of insulation based on fuel cost
- installed cost, tax rates, maintenance, etc.
- surface temperature and heat loss or gain efficiency

**Perform**

- calculations for flat surfaces and various pipe sizes

**KNAUF INSULATION**

version 4.1

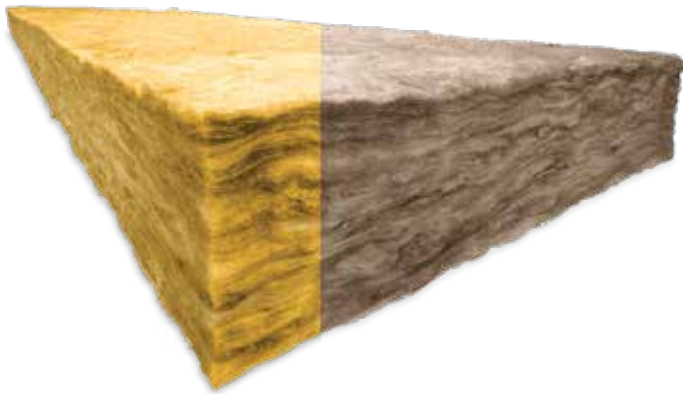
# 3E plus®

Brought to you by  
**NAIMA**  
NATIONAL ASSOCIATION  
MANUFACTURERS ASSOCIATION

# EXPERIENCE A HIGHER LEVEL OF SUSTAINABILITY WITH OUR REVOLUTIONARY BIO-BASED BINDER

Traditional (mineral wool insulation with Phenol Formadehyde resin)

with **ECOSE** TECHNOLOGY



## BENEFITS FOR SPECIFIERS AND INSTALLERS

### Eurofins Gold Certified Indoor Air Quality

- Enhancement of indoor air quality
- Proved compliance to all relevant labels on VOC emissions
- No dyes, artificial colours or harmful substances

### Sustainable Products

- Contribute extensively to several green building rating schemes such as LEED, BREEAM, ESTIDAMA, AL SA'FAT
- High environmental standards with ISO 14001 certifications
- Less energy intensive to make therefore more eco-friendly

### Meet Technical Requirements

- Product properties meeting or exceeding requirements from DCL, AD, SASO, UL, ASTM, NFPA, BS and Civil Defense

### Safety and Reliability

- Meets the requirements of EN 13501-1 A1/A2, ASTM E84 and BS 476 Class 0 & 1
- High manufacturing quality meeting ISO 9001 standards

### User Friendly

- Low weight, high elasticity and resistance to handling or mechanical abuse
- Easy to cut
- No odours





# OUR PROJECTS

The Royal Atlantis



Abu Dhabi Airport



Mashreq Bank HQ



SeaWorld Abu Dhabi



Bluewaters Island



DIFC



Dubai Hills Mall



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challenge.  
create.  
care.