

SUBMITTAL COVERSHEET **Nanuet UFSD –Phase 3 Projects**

Architect:

KSQ Architects
215 W 40th Street, 15th Floor
New York, NY 10018

Owner:

Nanuet Union Free School District
101 Church Street
Nanuet, NY 10954

Construction Manager:

Jacobs
One Penn Plaza, 54th floor
New York, NY 10019

Contractor: Joe Lombardo Plumbing & Heating of Rockland Inc

Contract: Ron Lombardo

Address: 321 Spook Rock Road Suite 109A

845-357-6537

Suffern, New York 10901

Telephone:

Fax: 845-357-8529

School Name: Nanuet Union Free School District Phase 3 Bond Projects @ Barr Middle School & Nanuet High School

Type of Submittal:

Re-submittal: [] No [] Yes

[] Shop Drawings

[] Product Data

[] Schedule

[] Sample

[]

[] Test Report

[] Certificate

[] Color Sample

[] Warranty

[]

Submittal Description:

duct insulation , equipment insulation and piping insulation

Product Name:

\REVISION #1 REVISED AND RESUBMITTING

Manufacturer:

Subcontractor/

ATLANTIC CONTRACTING AND SPECIALTIES

Supplier:

References:

Spec. Section No.: 230713 / 230716 & 230719

Drawing No(s):

Paragraph:

Rm. or Detail No(s):

Architect's/ Engineer's Review Stamp

SAGE ENGINEERING ASSOCIATES, LLP

☐ Reviewed

☒ Furnish as Corrected

☐ Rejected

☐ Revise and Resubmit

☐ Submit Specified Item

This review is only for general conformance with the design concept and the information given in the Construction Documents. Corrections or comments made on the shop drawings during this review do not relieve the contractor from compliance with the requirements of the plans and specifications. Review of a specific item shall not include review of an assembly of which the item is a component. The Contractor is responsible for dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of the Work with that of all other trades and performing all Work in a safe and satisfactory manner.

SAGE LOG NO. M-9.1

Date: 9/22/2023

By: J. Venditte

Contractor Review Statement:

These documents have been checked for accuracy and coordinated with job conditions and Contract requirements by this office and have been found to comply with the provisions of the Contract Documents.

Ronald J. Lombardo

9-21-23

Name:

Date:

Company Name:

Joe Lombardo Plumbing & Heating of Rockland Inc.

Remarks:

1. Provide separate submittal to cover refrigerant piping insulation and exterior refrigerant piping PVC protective jacketing system.

SCHEDULE OF INSULATION

| ITEM NO | SYSTEM OR EQUIPMENT | LOCATION | SIZES | INSUL THK | PIPING, DUCT, OR EQUIPMENT | | | | FITTINGS | | REMARKS |
|---------|-----------------------------|------------------|--------------------------------|--------------------|----------------------------|-------------|---------------------|---------------|---------------------|--------|-------------|
| | | | | | INSULATION MATERIAL | SECURED BY | FINISH | SECURED BY | INSULATION MATERIAL | FINISH | |
| 1 | Unlined Supply Air Ductwork | Indoor Concealed | All | 2" | Fiberglass Blanket | Pins + Tape | FSK | N/A | N/A | N/A | See Note #1 |
| 2 | Hot Water S&R Piping | Interior | <= 1-1/4" >= 1-1/2" Runouts | 1-1/2" 2" 1" | Fiberglass Pipe Covering | Self Seal | ASJ | SSL | Fiberglass insert | PVC | See Note #2 |
| 3 | LP Steam Piping | Interior | <= 3" >= 4" | 2-1/2" 3" | Fiberglass Pipe Covering | Self Seal | ASJ | SSL | Fiberglass insert | PVC | See Note #2 |
| 4 | Condensate Drain | Interior | All | 1/2" | Fiberglass Pipe Covering | Self Seal | ASJ | SSL | Fiberglass insert | PVC | See Note #2 |
| 5 | Supply & Return Ductwork | Exterior | All | N/A | N/A | N/A | Weatherproof Jacket | Self Adhesive | N/A | N/A | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Note #1 – Fiberglass blanket insulation will be provided at 1.5 pound per cubic foot density

Note #2 – PVC jacketing will be provided over all exposed, insulated piping lines, including piping lines exposed in mechanical rooms and boiler rooms.

| PRODUCT DATA | | | |
|--------------------------|------------------------------|---------|--------------|
| PRODUCT | MANUFACTURER | PRODUCT | MANUFACTURER |
| Fiberglass Blanket | Knauf, Manson Certainteed | | |
| Fiberglass Pipe Covering | Manson Johns Manville, Knauf | | |
| PVC Covers | Proto, Johns Manville | | |
| Weatherproof Jacket | Ideal | | |
| | | | |

| REVISION | | | |
|----------|--|--|--|
| DATE | | | |
| JOB | <u>Nanuet UFSD Bond Project Phase 3</u> | | |
| LOCATION | <u>Barr Middle School</u> <u>Nanuet High School</u> | | |
| CUSTOMER | <u>Joe Lombardo Plbg. & Htg.</u> | | |

| Atlantic Contracting & Specialties, LLC | |
|---|-----------------|
| 102 New South Road | |
| Hicksville, NY 11801 | |
| Phone: 516-261-9919 | Submittal |
| Fax: 516-261-9925 | Date 9/21/23 |
| | By Tim Hartnett |
| Contract #13200350 | |

DATA SHEET

Atmosphere® Duct Wrap

with ECOSE® Technology



DESCRIPTION

Atmosphere Duct Wrap is a thermal and acoustical insulation blanket made from highly resilient, inorganic fiberglass bonded by ECOSE Technology. It is available unfaced, with a foil-scrim-kraft (FSK) jacket and with a white metalized polypropylene-scrim-kraft (PSK) jacket. Vapor retarders provide a 2" (51 mm) staple flange on one edge, and the factory-applied facing assures uniform quality.

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 COMPLIANCE

U.S.

- ASTM C1290
- ASTM C553
 - Type I, Type II - 0.75 PCF (12 kg/m³)
 - Type I, Type II - 1.0 PCF (16 kg/m³)
 - Type I, II, III - 1.5 PCF (24 kg/m³)
- ASTM C1136; Type II
- NFPA 90A and 90B
- California Title 24 (installed at 25% compression)
- UL/ULC Classified

Canada

- CAN/ULC S102

INDOOR AIR QUALITY

- UL Environment
 - GREENGUARD Certified
 - GREENGUARD Gold Certified
 - Validated to be Formaldehyde-Free
- Does not contain polybrominated diphenyl ethers (PBDE) such as: Penta-BDE, Octa-BDE or Deca-BDE
- EUCEB Certified

CONTRACTOR: _____

JOB: _____

DATE: _____

DOING MORE FOR THE WORLD WE LIVE IN.

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 fiberglass products. The bio-based binder holds our product together, gives the product its unique appearance and makes it formaldehyde-free.

All of our products are made from sustainable resources, such as recycled glass and sand. And we're proud to be putting glass bottles back to work rather than into landfills. Our products are made with a minimum of 50% recycled glass—totaling an average of 26 million bottles each month.



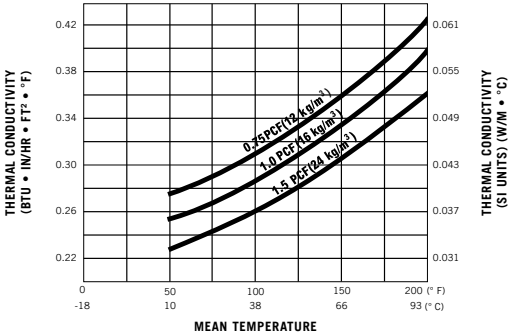
FIBERGLASS AND MOLD

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.

| TECHNICAL DATA | | |
|---|--------------------------------|--|
| Property (Unit) | Test | Performance |
| Corrosiveness | ASTM C665 | Does not accelerate corrosion of steel |
| Corrosion | ASTM C1617 | Pass |
| Maximum Service Temperature | ASTM C411 | Faced: 250° F (121° C), Unfaced: 350° F (177° C) |
| Water Vapor Permeance | ASTM E96, Procedure A | 0.02 perms or less (FSK and PSK facings) |
| Water Vapor Sorption (by weight) | ASTM C1104 | Less than 5% |
| Mold Growth | ASTM C1338 | Pass |
| Surface Burning Characteristics (flame spread/smoke developed) | ASTM E84, UL 723, CAN/ULC S102 | UL/ULC Classified FHC 25/50 (Unfaced and FSK facing) |
| | ASTM E84 | 25/50 (PSK facing) |

| FORMS AVAILABLE | | | | | | |
|------------------------|--------------|-------------------|----------------|-------------------------|---|--------------------------------|
| Density | Thickness | Width | Length | Facing | R-Value (K Value) @ 75°F Mean Temperature | |
| | | | | | Out-Of Package | Installed [at 25% Compression] |
| 0.75 PCF (12 kg/m³) | 1½" (38 mm) | 48" (1,219 mm) | 100' (30.48 m) | FSK, PSK, Unfaced | R-5.1 (0.29) | R-4.2 (0.27) |
| | 2" (51 mm) | | 75' (22.86 m) | | R-6.8 (0.29) | R-5.6 (0.27) |
| | 2¾" (56 mm) | | 75' (22.86 m) | | R-7.4 (0.29) | R-6.0 (0.27) |
| | 3" (76 mm) | | 50' (15.24 m) | | R-10.2 (0.29) | R-8.4 (0.27) |
| | 4⅝" (110 mm) | | 45' (13.71 m) | | R-14.7 (0.29) | R-12 (0.27) |
| 1.0 PCF (16 kg/m³) | 1½" (38 mm) | | 100' (30.48 m) | | R-5.6 (0.27) | R-4.5 (0.25) |
| | 2" (51 mm) | | 75' (22.86 m) | | R-7.4 (0.27) | R-6.0 (0.25) |
| 1.5 PCF (24 kg/m³) | 1½" (38 mm) | | 75' (22.86 m) | | R-6.1 (0.24) | R-4.8 (0.23) |
| | 2" (51 mm) | | 50' (15.24 m) | | R-8.2 (0.24) | R-6.4 (0.23) |

| THERMAL EFFICIENCY ASTM C177 | | | | | | | |
|---|------------------|---------------------|--------|--------------------|--------|--------------------|--------|
|  <p>The graph shows thermal conductivity (k) in BTU-in/hr-ft²-°F and W/m-°C on the y-axis (0.031 to 0.061) against mean temperature in °F and °C on the x-axis (-18 to 200). Three curves are plotted for 0.75 PCF (12 kg/m³), 1.0 PCF (16 kg/m³), and 1.5 PCF (24 kg/m³), all showing an upward trend with temperature.</p> | Mean Temperature | 0.75 PCF (12 kg/m³) | | 1.0 PCF (16 kg/m³) | | 1.5 PCF (24 kg/m³) | |
| | | k | k (SI) | k | k (SI) | k | k (SI) |
| | 50° F (10° C) | 0.28 | 0.040 | 0.26 | 0.037 | 0.23 | 0.033 |
| | 75° F (24° C) | 0.29 | 0.042 | 0.27 | 0.039 | 0.24 | 0.035 |
| | 100° F (38° C) | 0.31 | 0.045 | 0.29 | 0.042 | 0.26 | 0.037 |
| | 125° F (52° C) | 0.33 | 0.048 | 0.31 | 0.045 | 0.28 | 0.040 |
| | 150° F (66° C) | 0.36 | 0.052 | 0.34 | 0.049 | 0.31 | 0.042 |
| | 175° F (80° C) | 0.39 | 0.056 | 0.37 | 0.053 | 0.33 | 0.048 |
| | 200° F (93° C) | 0.43 | 0.063 | 0.40 | 0.058 | 0.36 | 0.052 |

INSERTION LOSS I (REDUCTION OF SOUND TRANSMITTED THROUGH DUCT WALL)
(SOUND AND VIBRATION DESIGN AND ANALYSIS, NATIONAL ENVIRONMENTAL BALANCING BUREAU, 1994)

| | | Duct Wrap | | Insertion Loss, dB/LF of Duct | | | | | | |
|---------------------------------|-------------|-------------------|------------------------|-------------------------------|-------|-------|-------|--------|--------|--------|
| Duct Dimensions | Sheet Metal | Nominal Thickness | Nominal Density | 63Hz | 125Hz | 250Hz | 500Hz | 1000Hz | 2000Hz | 4000Hz |
| 12" x 12" (305 mm x 305 mm) | 24 GA | 1½" (38 mm) | 0.75 PCF (12 kg/m³) | 0.6 | 0.6 | 0.6 | 0.7 | 7.4 | 14.2 | 20.9 |
| 24" x 12" (610 mm x 305 mm) | 24 GA | 1½" (38 mm) | | 0.6 | 0.6 | 0.6 | 0.7 | 7.4 | 14.2 | 20.9 |
| 48" x 12" (1219 mm x 305 mm) | 22 GA | 1½" (38 mm) | | 0.5 | 0.5 | 0.5 | 0.6 | 7.4 | 14.1 | 20.9 |
| 24" x 24" (610 mm x 610 mm) | 22 GA | 1½" (38 mm) | | 0.5 | 0.5 | 0.5 | 0.6 | 7.4 | 14.1 | 20.9 |
| 24" x 12" (610 mm x 305 mm) | 26 GA | 1½" (38 mm) | | 0.8 | 0.8 | 0.8 | 0.8 | 7.5 | 14.2 | 21.0 |
| 24" x 8" (610 mm x 203 mm) | 26 GA | 2" (51 mm) | | 1.0 | 1.0 | 1.0 | 3.6 | 10.4 | 17.1 | 23.9 |

STRETCH-OUTS

| Labeled Thickness | Installed Compressed Thickness | Round | Square | Rectangular |
|-------------------|--------------------------------|-----------------|-----------------|-----------------|
| 1½" (38 mm) | 1⅝" (29 mm) | P+9½" (241 mm) | P+8" (203 mm) | P+7" (178 mm) |
| 2" (51 mm) | 1½" (38 mm) | P+12" (305 mm) | P+10" (254 mm) | P+8" (203 mm) |
| 2⅜" (56 mm) | 1⅝" (42 mm) | P+13" (330 mm) | P+11" (279 mm) | P+8½" (216 mm) |
| 3" (76 mm) | 2¼" (57 mm) | P+17" (432 mm) | P+14½" (368 mm) | P+11½" (292 mm) |
| 4⅝" (110 mm) | 3¼" (83 mm) | P+22½" (572 mm) | P+18" (457 mm) | P+19" (483 mm) |

P = Perimeter of duct to be installed.

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.

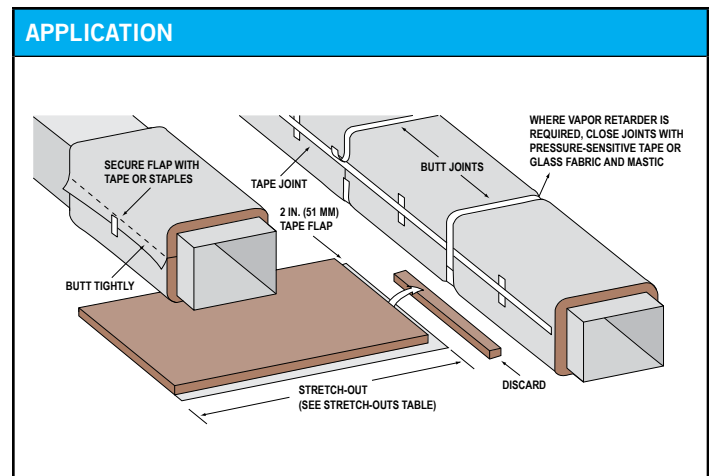
Application

- 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, PSK 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.



CERTIFICATIONS



Check with your Knauf Insulation Territory Manager to ensure information is current.

The chemical and physical properties of this product represent average values determined in accordance with accepted test methods. The data is subject to normal manufacturing variations. The data is supplied as a technical service and is subject to change without notice. References to numerical flame spread ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

This product is covered by one or more U.S. and/or other patents.
See patent www.knaufnorthamerica.com/patents

Visit knaufnorthamerica.com to learn more.

KNAUF INSULATION, INC.

One Knauf Drive
Shelbyville, IN 46176

Technical Support

(317) 398-4434 ext. 8727
info.us@knaufinsulation.com



ALLEY WRAP B™

Temperature Limit: Unfaced 350° F (177° C) | Faced 250° F (121° C)

DESCRIPTION

Alley Wrap B fiberglass blanket insulation is a thermal and acoustical insulation product made from highly resilient, inorganic glass fibers bonded by a thermosetting resin. It is available unfaced or with a multi-purpose foil-scrim kraft (FSK) jacket and with a white metalized polypropylene scrim-kraft (PSK) jacket. Vapor retarders have a 2" (51 mm) stapling flange on one edge, and the factory-applied facing assures uniform quality.

SUSTAINABILITY

Manson 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 fiberglass products. The bio-based binder holds our product together and gives the product its unique appearance.

All of our products are formaldehyde-free and made from sustainable resources, such as recycled glass and sand. And we're proud to be putting glass bottles back to work rather than into landfills. Our products are made with a minimum of 50% recycled glass—totaling an average of 26 million bottles each month.

APPLICATION

Alley Wrap B is used as an external insulation on commercial or residential heating or air conditioning ducts. It is suitable for the exterior of rectangular or round sheet metal ducts and spaces, or surfaces where temperature and condensation must be controlled.

INDOOR AIR QUALITY

- UL Environment
 - GREENGUARD Certified
 - GREENGUARD Gold Certified
 - Validated to be Formaldehyde-Free
- Does not contain polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Octa-BDE, or Deca-BDE
- EUCEB Certified

SPECIFICATION COMPLIANCE

In U.S.

- ASTM C1290
 - Type I - unfaced
 - Type II, III - faced
- ASTM C553
 - Type I, Type II - 0.75 PCF (12 kg/m³)
 - Type I, Type II - 1.0 PCF (16 kg/m³)
 - Type I, II, III - 1.5 PCF (24 kg/m³)
- ASTM C1136; Type II
- California Title 24 (installed at 25% compression)
- NFPA 90A and 90B

In Canada

- CAN/CGSB 51.11-92

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 Manson Insulation Alley Wrap B over clean, dry sheet metal ducts.
- All sheet metal joints and seams must be sealed to prevent air leakage from the duct.

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. Air handling insulation used in the air stream must be discarded if exposed to water.

NOTES

The chemical and physical properties of this product represent average values determined in accordance with accepted test methods. The data is subject to normal manufacturing variations. The data is supplied as a technical service and is subject to change without notice. References to numerical flame spread ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

Check with your Manson Insulation Area Manager to ensure information is current.

TECHNICAL DATA

| PROPERTY (UNIT) | TEST | PERFORMANCE |
|---|--------------------------------|--|
| Corrosiveness | ASTM C665 | Does not accelerate corrosion of steel |
| Corrosion | ASTM C1617 | Pass |
| Water Vapor Permeance | ASTM E96, Procedure A | 0.02 perms |
| Maximum Service Temperature | ASTM C411 | Faced: 250° F (121° C), Unfaced: 350° F (177° C) |
| Mold Growth | ASTM C1338 | Pass |
| Water Vapor Sorption (by weight) | ASTM C1104 | 5% or less |
| Surface Burning Characteristics (flame spread/smoke developed) | ASTM E84, CAN/ULC S102, UL 723 | Unfaced, FSK: UL/ULC Classified FHC 25/50 |
| | ASTM E84 | PSK: 25/50 |

ACOUSTICAL PERFORMANCE

| DUCT WRAP | | | | INSERTION LOSS (Hz) | | | | | | |
|-----------------------------|-------------|-------------------|------------------------|---------------------|-----|-----|-----|------|------|------|
| DUCT DIMENSIONS | SHEET METAL | NOMINAL THICKNESS | NOMINAL DENSITY | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 |
| 12" x 12" (305 mm x 305 mm) | 24 GA | 1½" (38 mm) | 0.75 PCF (12 kg/m³) | 0.6 | 0.6 | 0.6 | 0.7 | 7.4 | 14.2 | 20.9 |
| 24" x 12" (610 mm x 305 mm) | 24 GA | 1½" (38 mm) | | 0.6 | 0.6 | 0.6 | 0.7 | 7.4 | 14.2 | 20.9 |
| 48" x 12" (1219 mm x 305mm) | 22 GA | 1½" (38 mm) | | 0.6 | 0.5 | 0.5 | 0.6 | 7.4 | 14.1 | 20.9 |
| 24" x 24" (610 mm x 610 mm) | 22 GA | 1½" (38 mm) | | 0.6 | 0.5 | 0.5 | 0.6 | 7.4 | 14.1 | 20.9 |
| 24" x 12" (610 mm x 305 mm) | 26 GA | 1½" (38 mm) | | 0.8 | 0.8 | 0.8 | 0.8 | 7.5 | 14.2 | 21.0 |
| 24" x 8" (610 mm x 203 mm) | 26 GA | 2" (51 mm) | | 1.0 | 1.0 | 1.0 | 3.6 | 10.4 | 17.1 | 23.9 |

Insertion Loss: (Reduction of Sound Transmitted Through Duct Wrap) (Sound and Vibration Design and Analysis, National Environmental Balancing Bureau, 1944)

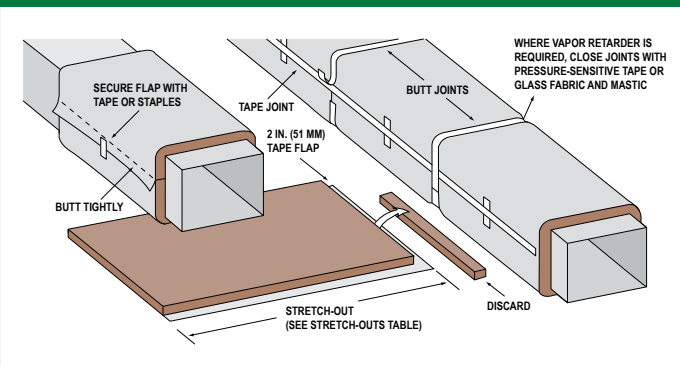
FORMS AVAILABLE

| DENSITY | THICKNESS | WIDTH | LENGTH | FACING | R-VALUE (K VALUE) @ 75° F MEAN TEMPERATURE | |
|------------------------|-------------|-------------------|----------------|-------------------------|--|-----------------------------------|
| | | | | | OUT-OF PACKAGE | INSTALLED [AT 25% COMPRESSION] |
| 0.75 PCF (12 kg/m³) | 1½" (38 mm) | 48" (1,219 mm) | 100' (30.48 m) | FSK, PSK, Unfaced | R-5.1 (0.29) | R-4.2 (0.27) |
| | 2" (51 mm) | | 75' (22.86 m) | | R-6.8 (0.29) | R-5.6 (0.27) |
| | 2¾" (56 mm) | | 75' (22.86 m) | | R-7.4 (0.29) | R-6.0 (0.27) |
| 1.0 PCF (16 kg/m³) | 3" (76 mm) | | 50' (15.24 m) | | R-10.2 (0.29) | R-8.4 (0.27) |
| | 1½" (38 mm) | | 100' (30.48 m) | | R-5.6 (0.27) | R-4.5 (0.25) |
| | 2" (51 mm) | | 75' (22.86 m) | | R-7.4 (0.27) | R-6.0 (0.25) |
| 1.5 PCF (24 kg/m³) | 1½" (38 mm) | | 75' (22.86 m) | | R-6.1 (0.24) | R-4.8 (0.23) |
| | 2" (51 mm) | | 50' (15.24 m) | | R-8.2 (0.24) | R-6.4 (0.23) |

APPLICATION

- Install Manson Insulation Alley Wrap B 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, PSK or foil tape or glass fabric and mastic prior to system startup.
- Pressure sensitive tapes should be a minimum 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.
- It is neither necessary nor desirable to adhere Alley Wrap B to duct surfaces with adhesive.
- Unfaced Alley Wrap B 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 Alley Wrap B. Refer to diagram for staple stitching and butt-joint method.

APPLICATION



INSTALLATION PROCEDURES

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

| STRETCH-OUTS | | | | |
|-------------------|--------------------------------|--------------|---------------|---------------|
| LABELED THICKNESS | INSTALLED COMPRESSED THICKNESS | ROUND | SQUARE | RECTANGULAR |
| | | P* + | P* + | P* + |
| 1" (25 mm) | ¾" (19 mm) | 7" (128 mm) | 6" (152 mm) | 5" (127 mm) |
| 1½" (38 mm) | 1⅛" (29 mm) | 9½" (241 mm) | 8" (203 mm) | 7" (178 mm) |
| 2" (51 mm) | 1½" (38 mm) | 12" (305mm) | 10" (254 mm) | 8" (203 mm) |
| 2⅝" (56 mm) | 1⅞" (42 mm) | 13" (330 mm) | 11" (279 mm) | 8½" (216 mm) |
| 3" (76 mm) | 2¼" (57 mm) | 17" (432 mm) | 14½" (368 mm) | 11½" (292 mm) |

*P = Perimeter of duct to be installed.

Manson Insulation | www.imanson.com

One Knauf Drive, Shelbyville, IN 46176

Sales 1-800-626-7661

Technical Support (317) 398-4434, ext. 8727

Manufactured by Knauf Insulation

09-21



SoftTouch™ and WideWrap™ Duct Wrap Insulation

PRODUCT DESCRIPTION

Basic Use: SoftTouch™ and WideWrap™ Duct Wrap Insulation is used to insulate rectangular and round heating, ventilating and air-conditioning ductwork.

Benefits: SoftTouch and WideWrap provide thermal efficiency that reduces unwanted heat loss or gain from equipment and ductwork. When properly installed in the correct thickness, this product virtually eliminates condensation problems on cold duct surfaces. The 5' width accommodates larger ducts and means less labor, less wasted material and a cleaner installed appearance.

Composition and Materials: SoftTouch and WideWrap Duct Wrap is a blanket-type insulation composed of tan, uniformly textured, inorganic fibrous glass formed with a formaldehyde-free, plant-based binding agent. It is available unfaced or with FSK or white PSK vapor retarder facing. On faced products, a stapling/taping tab is provided on one edge.

Limitations: The product should be kept clean and dry from the time of manufacture through job site installation and system operation.

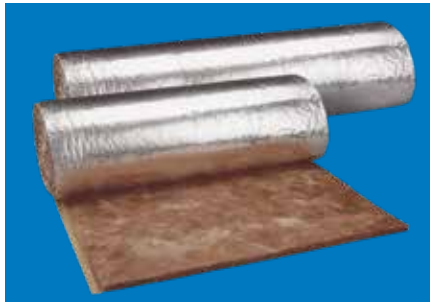
SoftTouch and WideWrap are suitable for use with most heating, ventilating and air-conditioning ductwork operating at temperatures from 35°F to 250°F (1.7°C to 121°C) for faced SoftTouch and WideWrap Duct Wrap and from 35°F to 450°F (1.7°C to 232°C) for unfaced.

Sizes: See table on back for available sizes. Contact CertainTeed for other sizes and minimum order quantities.

INSTALLATION

Sheet metal ducts must be clean, dry and sealed tightly prior to insulating with CertainTeed SoftTouch and WideWrap Duct Wrap.

To ensure installed thermal performance, Duct Wrap must be cut to "stretch-out" dimensions. This requires measurement of the duct perimeter, then cutting the duct wrap to the dimensions (perimeter + add-on) indicated in the stretch-out table on the next page. A 2" piece of insulation is removed from the facing at the end of the piece of insulation to form an overlapping stapling and taping flap.



| | |
|--------------|--|
| Product Name | CertainTeed SoftTouch™ and WideWrap™ Duct Wrap Insulation |
| Manufacturer | CertainTeed Corporation |
| Address | 20 Moores Road Malvern, PA 19355 |
| Phone | 800-233-8990 |
| Website | www.certainteed.com/technicalinsulation |

TECHNICAL DATA

Applicable Standards

- Model Building Codes:
 - ICC
- Material Standards:
 - ASTM C1290
 - Type I, Unfaced
 - Type III, FSK & PSK – White
 - ASTM C553
 - Type I, Type 75 Duct Wrap
 - Type II, Type 100 & 150 Duct Wrap
 - Type III, Type 150 Duct Wrap
 - CAN/CGSB-51.11-92
 - ASTM C1136: FSK & White PSK, Type II, Type IV
- Fire Safety Standards:
 - NFPA 90A, NFPA 90B

Fire Resistance

- Fire Hazard Classification:
 - UL 723, ASTM E84, CAN/ULC-S102
 - Max. Flame Spread Index: 25
 - Max. Smoke Developed Index: 50
- Non-Combustible:
 - ASTM E136
 - Meets test requirements

Physical/Chemical Properties

- Thermal Performance:
 - See table on other side
- Operating Limits:
 - Temperature: ASTM C411
 - Faced: Max. 250°F / 121°C
 - Unfaced: Max. 450°F / 232°C
- Water Vapor Sorption:
 - ASTM C1104
 - < 5% by weight
- Water Vapor Transmission – Facing:
 - ASTM E96, Desiccant Method
 - FSK and white PSK: Max. 0.02 perms (1.15 x 10⁻⁹ g/Pa•s•m²)
- Corrosiveness:
 - ASTM C665 / Pass testing
- Fungi Resistance:
 - ASTM C1338 / Pass testing
- Odor Emission:
 - ASTM C1304 / Pass testing

Quality Assurance



CertainTeed's commitment to quality and the environment has ensured the registration of the Athens, Chowchilla and Kansas City plants to ISO 9001 and ISO 14001 Quality and Environmental Management System standards.

SoftTouch and WideWrap are installed by wrapping the insulation around the perimeter of the duct with the facing out. Adjacent sections of duct wrap are tightly butted with the 2" taping flap overlapping. Seams must be stapled with outward-clinching staples on approximately 6" centers. When a vapor retarder is required, all seams, joints, tears, punctures and/or other penetrations of the duct wrap must be sealed with a pressure-sensitive vapor retarder tape that matches the facing, or a suitable mastic system.

Where rectangular ducts are 24" in width or greater, Duct Wrap must be additionally secured to the bottom of the duct with mechanical fasteners spaced 18" on center to prevent sagging.

For additional installation details, consult the National Commercial and Industrial Insulation Standards (current edition) published by the Midwest Insulation Contractors Association (MICA).

AVAILABILITY AND COST

Manufactured and sold throughout the United States. Available in select Western U.S./Canada regions. For availability and cost, contact your local distributor or call CertainTeed Sales Support Group at 800-233-8990.

WARRANTY

Refer to CertainTeed's Limited Warranty for Fiberglass Duct Wraps (30-32-113).

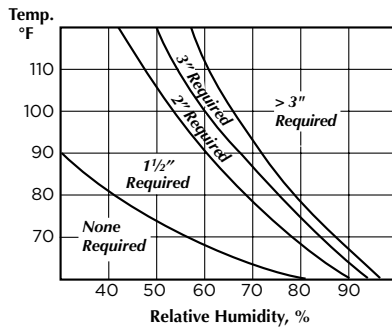
MAINTENANCE

An inspection and preventative maintenance program for the HVAC system is recommended to ensure optimum performance.

TECHNICAL SERVICES

Technical assistance can be obtained either from your local CertainTeed sales representative, or by calling CertainTeed Sales Support Group at 800-233-8990.

CONDENSATION CONTROL



This chart is based on indoor conditions so far as wind and other factors are concerned.

To determine thickness to prevent condensation, based on installed thickness at 75% of nominal (out-of-package) thickness and a duct internal air temperature of 55°F, refer to the condensation control chart.

To use:

- 1) Select maximum relative humidity (%) on lower axis;
- 2) Read up vertically until that line intersects the maximum ambient air temperature;
- 3) Select the thickness indicated at the point of intersection.

THERMAL PERFORMANCE

| Type | Product Thickness | | Uncompressed R-Value | | Installed Duct R-Value | | Uncompressed K-Value | | Installed Duct K-Value | |
|------|-------------------|-----|----------------------|-----------|------------------------|-----------|----------------------|-----------|------------------------|-----------|
| | | | h•ft²•°F / Btu | | h•ft²•°F / Btu | | Btu•in / h•ft²•°F | | Btu•in / h•ft²•°F | |
| | in. | mm | m²•°C / W | m²•°C / W | m²•°C / W | m²•°C / W | W / m²•°C | W / m²•°C | W / m²•°C | W / m²•°C |
| 75 | 1 | 25 | 3.4 | 0.61 | 2.8 | 0.49 | 0.29 | 0.042 | 0.27 | 0.039 |
| | 1 1/2 | 38 | 5.2 | 0.91 | 4.2 | 0.74 | 0.29 | 0.042 | 0.27 | 0.039 |
| | 2 | 51 | 6.9 | 1.21 | 5.6 | 1.00 | 0.29 | 0.042 | 0.27 | 0.039 |
| | 2 1/2 | 54 | 7.3 | 1.29 | 6.0 | 1.06 | 0.29 | 0.042 | 0.27 | 0.039 |
| | 3 | 76 | 10.3 | 1.82 | 8.3 | 1.46 | 0.29 | 0.042 | 0.27 | 0.039 |
| 100 | 4 | 102 | 13.8 | 2.43 | 11.0 | 1.94 | 0.29 | 0.042 | 0.27 | 0.039 |
| | 1 | 25 | 3.8 | 0.68 | 3.0 | 0.53 | 0.26 | 0.038 | 0.25 | 0.036 |
| | 1 1/2 | 38 | 5.8 | 1.02 | 4.5 | 0.79 | 0.26 | 0.038 | 0.25 | 0.036 |
| 150 | 2 | 51 | 7.7 | 1.35 | 6.0 | 1.06 | 0.26 | 0.038 | 0.25 | 0.036 |
| | 1 | 25 | 4.2 | 0.73 | 3.2 | 0.56 | 0.24 | 0.035 | 0.23 | 0.033 |
| | 1 1/2 | 38 | 6.3 | 1.10 | 4.8 | 0.85 | 0.24 | 0.035 | 0.23 | 0.033 |
| | 2 | 51 | 8.3 | 1.47 | 6.4 | 1.13 | 0.24 | 0.035 | 0.23 | 0.033 |

Tested in accordance with ASTM C518 and/or ASTM C177 at 75°F (24°C) mean temperature. R means resistance to heat flow. The higher the R-value, the greater the insulating power. The installed R-value and K-value are based upon 25% compression of the product thickness during installation. To get the installed R-value, it is essential that this insulation be installed properly. If you do it yourself, follow the installation instructions carefully.

INSTALLATION STRETCH-OUT DIMENSIONS

| Product Label Thickness | | Average Installed Thickness | | | Stretch-Out Dimensions¹ | | | | | |
|-------------------------|-----|-----------------------------|----|----|-------------------------|-----|-------------|-----|------------------|-----|
| | | | | | Round Duct | | Square Duct | | Rectangular Duct | |
| | | | | | in. | mm | in. | mm | in. | mm |
| 1 | 25 | 0.75 | 19 | P+ | 7 | 178 | 6 | 152 | 5 | 127 |
| 1 1/2 | 38 | 1.13 | 29 | P+ | 9.5 | 241 | 8 | 203 | 7 | 178 |
| 2 | 51 | 1.50 | 38 | P+ | 12 | 305 | 10 | 254 | 8 | 203 |
| 2 1/2 | 54 | 1.59 | 40 | P+ | 12.6 | 321 | 10.4 | 270 | 8.4 | 213 |
| 3 | 76 | 2.25 | 57 | P+ | 17 | 432 | 14.5 | 368 | 11.5 | 292 |
| 4 | 102 | 3.00 | 76 | P+ | 22 | 559 | 18.5 | 470 | 14.5 | 368 |

¹The stretch-out dimension is equal to the duct perimeter (P) plus the add-on factor for the type of duct being installed.

AVAILABLE SIZES

| Product Type | Thickness | | Length | | Width | |
|--------------|-----------|----|--------|------|-------|------|
| | in. | mm | ft. | m | in. | mm |
| 75 | 1 | 25 | 100 | 30.5 | 48 | 1219 |
| | 1 1/2 | 38 | 100 | 30.5 | | |
| | 2 | 51 | 75 | 22.9 | | |
| | 2 1/2 | 54 | 75 | 22.9 | | |
| | 3 | 76 | 50 | 15.2 | | |
| 100 | 1 | 25 | 100 | 30.5 | | |
| | 1 1/2 | 38 | 100 | 30.5 | | |
| | 2 | 51 | 75 | 22.9 | | |
| 150 | 1 | 25 | 100 | 30.5 | | |
| | 1 1/2 | 38 | 75 | 22.9 | | |
| | 2 | 51 | 50 | 15.2 | | |

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NAIMA
NORTH AMERICAN INSULATION
MANUFACTURERS ASSOCIATION



Cert. #000213



ALLEY-K®

Operating Temperature: 0° F – 1000° F (-18° C – 538° C)

DESCRIPTION

Alley-K pipe insulation is a preformed insulation product composed of high quality glass fibers bonded together with a thermosetting resin. The 36" pipe sections are available with or without the all service jacket (ASJ). Our all service vapor retarder jacket (ASJ) reinforced with glass fibers comes with a factory-applied, pressure-sensitive self-sealing lap closure system (SSL). Butt strips are also supplied.

SUSTAINABILITY

Manson 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 fiberglass products. The bio-based binder holds our product together and gives the product its unique appearance.

All of our products are formaldehyde-free and made from sustainable resources, such as recycled glass and sand. And we're proud to be putting glass bottles back to work rather than into landfills. Our products are made with a minimum of 50% recycled glass—totaling an average of 26 million bottles each month.

APPLICATION

Manson Insulation pipe insulation is intended as a thermal insulation product for hot and cold service piping. Typical uses include domestic hot and cold water, hot water heating, high temperature, dual temperature, steam, condensate and refrigerated lines. As a component of a suitable insulation system, plain pipe insulation may be used for light industrial applications, while pipe insulation with ASJ jacket may be used for commercial and institutional usage.

INSTALLATION

Manson Insulation pipe insulation should be installed in accordance with the procedure in the publication "Commercial & Industrial Standards" by the National Insulation Association (NIA).

INDOOR AIR QUALITY

- UL Environment
 - GREENGUARD Certified
 - GREENGUARD Gold Certified
 - Validated to be Formaldehyde-Free
- Does not contain polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Octa-BDE, or Deca-BDE
- IgCC Section 806.6 Compliant
- EUCB certified

SPECIFICATION COMPLIANCE

- ASTM C547; Type I, Type IV
- ASTM C585
- MIL-DTL-32585; Type I, Form 4, Facing A and D
- UL/ULC Classified
- USCG 164.109/A4/0

- ASTM C795
- MIL-I-24244
- NRC Reg. Guide 1.36
(Certification needs to be specified at the time of the order)

Jacketing

- UL 723/ASTM E84
- CGSB 51-GP-52M
- ASTM C1136; Type I, II
- NFPA 90A and 90B

PRODUCT FORMS AND SIZES

- Produced in 3' (914 mm) sections
- For iron pipe ½" – 24" (15 mm – 610 mm) nominal pipe size
- For copper tube ⅝" – 6⅞" (16 mm – 156 mm)
- All insulation inner and outer diameters comply with ASTM C585.
- Wall thicknesses from ½" to 6" (13 mm to 152 mm) in single layer for most sizes
- With or without a white, factory-applied jacket, ASJ (allservice jacket) is composed of aluminum foil, reinforced with a glass scrim bonded to a white kraft paper
- A matching ASJ butt strip is supplied for each section
- The longitudinal lap of the jacket has the SSL self-sealing lap that creates a strong and lasting bond

PRECAUTIONS**Hot Pipe**

- May be installed while the system is in operation, at all temperatures up to 1000° F (538° C).
- Manson Insulation recommends, for insulation thicknesses greater than 6" (152 mm), the temperature must be increased from 500° F (260° C) to maximum temperature at a rate not exceeding 100° F (37.8° C) per hour.
- During initial heat-up to operating temperatures above 350° F (177° C), 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.
- A maximum of 6" (152 mm) wall thickness is recommended.

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 ASJ jacket shall be protected with a PVC vapor retarding 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 12' to 21' 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. Proto® Indoor/Outdoor PVC Jacketing is recommended. See Manson Insulation Guide Specifications for recommended PVC jacketing application guidelines.
- Apply jacketing, mastics or vapor retardant adhesives per manufacturer's instructions.
- For metallic jackets, factory-applied moisture retarders are recommended.

ASJ SSL

- Keep adhesive and contact surfaces free from dirt and water. Seal immediately once adhesive is exposed.
- Apply when ambient and insulation temperatures are between 20° F and 130° F (-6.7° C and 54° C).
- If stored below 20° F or above 130° F, allow insulation cartons to stand within recommended temperature range for 24 hours prior to application.
- Do not store product below -20° F (-29° C) or above 150° F (66° C).
- When using Manson Insulation's SSL Advanced Closure System, make sure the longitudinal and circumferential joints are properly sealed by rubbing the closure firmly with a squeegee. Use of staples is not recommended.
- When using Alley-K® pipe insulation, the surface temperature of the ASJ facing should not exceed 150° F (66° C).

Fittings and Hangers

- Use Proto 25/50 Rated (ASTM E84) PVC Fitting Covers, applying PVC fittings per Proto's Data Sheet.
- 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.

ADDITIONAL PRECAUTIONS

- Fiberglass may cause temporary skin irritation. Wear long-sleeved, loose-fitting clothing, head covering, gloves and eye protection when handling and applying material.
- Wash with soap and warm water after handling.
- Wash work clothes separately and rinse washer afterwards.
- Use a disposable mask/respirator designed for nuisance-type dusts where sensitivity to dust and airborne particles may cause irritation to the nose or throat.

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.
- Seal circumferential joint with a minimum 3" (76 mm) wide butt strip.
- Jackets, coating and adhesives should have a comparable F.H.C. rating.
- ASJ may be painted. As with traditional ASJ, Manson Insulation does not encourage the painting of ASJ because the application of any paint may change the surface burning characteristics and will void the UL Classification and Manson Insulation Limited Warranty.

Insulation Limited Warranty

Where painting is necessary use common water, oil, or solvent-based paints. All paints should be tested for compatibility and adhesion before use.

- 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.
- Faced insulation should not have a facing temperature above 150° F (66° C).

SSL Installation Instructions:

- To install SSL, first remove the kraft release liner to expose adhesive.
- Carefully align the jacketing. Starting in the center of the insulation section, begin initial SSL tack using pressure in the direction of the overlap. Again, starting in the center of the insulation section, with a plastic squeegee begin to apply firm pressure to the bonded lap area swiping from the center of the insulation section toward each end.

- NOTE:** After initial SSL adhesive tack, it is critical that the closure is not re-opened and repositioned on the facing. Doing so will delaminate the jacket and adhesive, diminishing the bond strength.

Butt Strip Installation Instructions:

- To install Butt Strips, remove the kraft release liner by separating the butt strip from the kraft using the convenient, easy release kiss cut.
- Simply wrap the butt strip, centered around the joint, and apply firm pressure with a squeegee.
- NOTE:** After initial Butt Strip adhesive tack, it is critical that the closure is not re-opened and repositioned on the facing. Doing so will weaken the adhesive and diminish bond strength.

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.

NOTES

The chemical and physical properties of this product represent average values determined in accordance with accepted test methods. The data is subject to normal manufacturing variations. The data is supplied as a technical service and is subject to change without notice. References to numerical flame spread ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

Check with your Manson Insulation Area Manager to ensure information is current.

TECHNICAL DATA

| PROPERTY (UNIT) | TEST | PERFORMANCE |
|--|--------------------------------|--|
| Corrosiveness | ASTM C665 | Does not accelerate corrosion of steel |
| Corrosion | ASTM C1617 | Pass |
| Linear Shrinkage | ASTM C356 | Less than 0.3% |
| Maximum Service Temperature | C411 | 1000° F (538° C) |
| Water Vapor Sorption (by weight) | ASTM C1104 | Less than 5% |
| Water Vapor Permeance | ASTM E96 | 0.02 perms |
| Puncture Resistance | TAPPI T803, Beach Units | Min. rating of 50 |
| Microbial Growth | ASTM C1338 | Pass |
| Surface Burning Characteristics (flame spread/smoke developed) | ASTM E84, UL 723, CAN/ULC S102 | UL/ULC Classified FHC 25/50 |

ASHRAE 90.1-2016 REQUIREMENTS

MINIMUM PIPE INSULATION THICKNESS

| FLUID OPERATING TEMPERATURE RANGE AND USAGE | INSULATION CONDUCTIVITY | | NOMINAL PIPE OR TUBE SIZE | | | | |
|---|---|----------------------------|---------------------------|---------|---------|--------|-----|
| | CONDUCTIVITY RANGE BTU-IN./(HR · FT² · °F) | MEAN TEMPERATURE RATING | <1" | 1"–<1½" | 1½"–<4" | 4"–<8" | ≥8" |
| HEATING AND HOT WATER SYSTEMS (STEAM, STEAM CONDENSATE, HOT-WATER HEATING AND DOMESTIC WATER SYSTEMS) A, B, C, D | | | | | | | |
| Above 350° F | 0.32–0.34 | 250° F | 4½" | 5" | 5" | 5" | 5" |
| 251–350° F | 0.29–0.31 | 200° F | 3" | 4" | 4½" | 4½" | 4½" |
| 201–250° F | 0.27–0.30 | 150° F | 2½" | 2½" | 2½" | 3" | 3" |
| 141–200° F | 0.25–0.29 | 125° F | 1½" | 1½" | 2" | 2" | 2" |
| 105–140° F | 0.22–0.28 | 100° F | 1" | 1" | 1½" | 1½" | 1½" |
| COOLING SYSTEMS (CHILLED WATER, BRINE, REFRIGERANT) A, B, C, D | | | | | | | |
| 40–60° F | 0.21–0.27 | 75° F | ½" | ½" | 1" | 1" | 1" |
| Below 40° F | 0.20–0.26 | 50° F | ½" | 1" | 1" | 1" | 1½" |

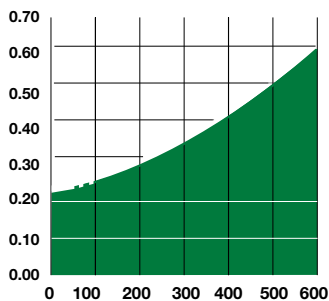
a. For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows: $T = r \{ (1 + t/r)^{K/k} - 1 \}$, where T=minimum insulation thickness (in.), r=actual outside radius of pipe (in.), t=insulation thickness listed in this table for applicable fluid temperature and pipe size, K=conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu · in. (h · ft² · °F)); and k=the upper value of the conductivity range listed in this table for the applicable fluid temperature.

b. These thicknesses are based on energy efficiency considerations only.

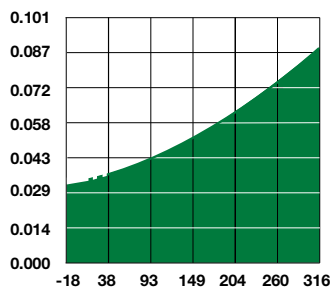
c. For piping smaller than 1½" and located in partitions within conditioned spaces, reduction of these thicknesses by 1" shall be permitted (before thickness adjustment required in footnote a) but not to thicknesses below 1". These thicknesses are based on energy efficiency considerations only. Issues such as water vapor permeability or surface condensation sometimes require vapor retarders or additional insulation.

d. The table is based on steel pipe. Non-metallic pipes schedule 80 thickness or less shall use the table values. For other non-metallic pipes having thermal resistance greater than that of steel pipe, reduced insulation thicknesses are permitted if documentation is provided showing that the pipe with the proposed insulation has no more heat transfer per foot than a steel pipe of the same size with the insulation thickness shown on the table.

THERMAL CONDUCTIVITY BTU · IN/FT² · HR. · °F



METRIC THERMAL CONDUCTIVITY | W/M · °C



THERMAL CONDUCTIVITY | ASTM C335

| MEAN TEMPERATURE | | BTU · IN/FT² · HR. · °F | W/M · °C |
|------------------|--------|-------------------------|----------|
| 75° F | 24° C | 0.23 | 0.033 |
| 100° F | 38° C | 0.24 | 0.035 |
| 200° F | 93° C | 0.28 | 0.040 |
| 300° F | 149° C | 0.34 | 0.049 |
| 400° F | 204° C | 0.42 | 0.061 |
| 500° F | 260° C | 0.51 | 0.074 |
| 600° F | 316° C | 0.62 | 0.089 |

FIRE HAZARD CLASSIFICATION

| FACING | FLAME SPREAD | SMOKE DEVELOPED |
|--------|--------------|-----------------|
| Plain | 25 | 50 |
| ASJ | 25 | 50 |

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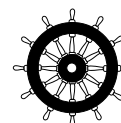
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Technical Support (317) 398-4434, ext. 8727

Manufactured by Knauf Insulation

01-22



DESCRIPTION

Micro-Lok HP fiberglass pipe insulation is a high-performance insulation made from biosoluble glass fibers bonded with a thermosetting resin and produced in 36" (0.92 m) lengths. Micro-Lok HP insulation is used to insulate standard iron pipe, plastic pipe and copper tubing. The 3' (0.92 m) sections are available plain or with a factory-applied vapor-barrier jacket. The all-service (ASJ) vapor-retarder jacket includes a longitudinal, self-sealing closure lap. The jacket system is adhered to each fiberglass section using a specially formulated adhesive to ensure jacket securement.

The factory-installed tape system permits installation at ambient temperatures down to 20°F (-7°C) and will not soften or separate when exposed to high ambient temperatures and humidity.

USES

Micro-Lok HP fiberglass pipe insulation is suitable for installation over hot, cold, concealed and exposed piping systems with operating temperatures up to 850°F (454°C). Weather-protective jacketing is required for outdoor applications. Pipes operating below ambient temperatures require all joints to be sealed with the factory-applied, self-seal lap and butt strips. Micro-Lok HP is UL listed and labeled over plastic pipes for air plenum applications when used at 1.0" thickness or greater.

PHYSICAL PROPERTIES

| | |
|--|---|
| Service Temp. Range (ASTM C411) | 0°F to 850°F (-18°C to 454°C) |
| Moisture Sorption | <5% by weight |
| Corrosivity (ASTM C1617) | <5 ppm chloride standard |
| Shrinkage (ASTM C356) | None |
| Microbial Growth (ASTM C1338) | Does not promote microbial growth |
| Surface Burning Characteristics | Composite FHC 25/50 per ASTM E84, NFPA 255, CAN/ULC S102.2 |
| Limited Combustibility | NFPA 90A and 90B |
| Jacketing | ASTM C1136 (Type I & II) |
| Water Vapor Permeance (ASTM E96 – Procedure A) | 0.02 perms max. |
| Burst Strength (ASTM D774) | 55 lbs/in ² (4.6 Kg/cm ²) |
| Tensile Strength (ASTM D828) | 45 lbs./in. (7.9N/mm) width min. (MD) 30 lbs./in. (5.23N/mm) width min. (CD) |

SPECIFICATION COMPLIANCE

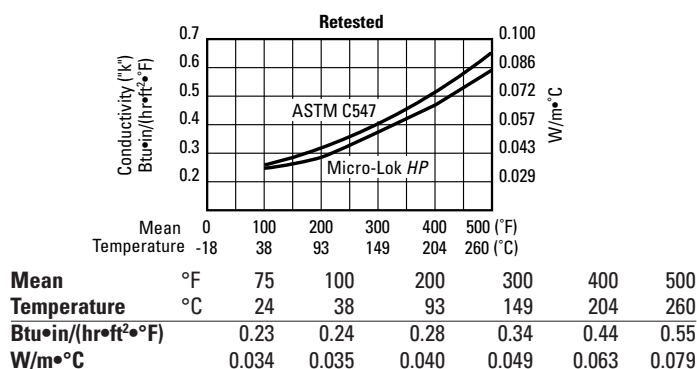
- ASTM C547 Type I (Replaces HH-I-558B, Form D, Type III, Class 12, Class 13 up to 850°F [454°C])
- ASTM C585 – Dimension Standard
- ASTM C1136 (Jacketing) (Replaces HH-B-100B, Type I & II)
- MIL-DTL-32585 Type 1, Form 4, Facing A ([unjacketed only](#))
- MIL-I-22344D, MIL-PRF-22344E
- Coast Guard/IMO Approved 164.109/56/0 (plain, unjacketed only – excluding 7/8 x 1/2 [22 mm x 13 mm], 1/2 x 1/2 [13 mm x 13 mm])
- Bureau of Household Goods and Services CA-T1039 (CO)
- Firestop Assemblies: Meets requirement for jacketed fiberglass pipe insulation product density at or above 3.5 pcf.
- ASTM E84, CAN ULC S102.2 – 25/50 listed and labeled Intertek testing laboratories, listed and labeled Underwriter Laboratories
- NRC 1.36, ASTM C795, MIL-I-24244C, MIL-DTL-24244D*

*When ordering material to comply with these specifications a statement of that fact must appear on the purchase order. Specific lot testing will be conducted and a certification of compliance can be provided.

Operating Temperature Limits: 0°F to 850°F (-18°C to 454°C)



THERMAL CONDUCTIVITY ("K") *



* Apparent thermal conductivity values are determined by applying procedures dictated per ASTM C1045 on test data obtained using ASTM Test Method C335. All values are based on nominal manufacturing and testing parameters, are subject to normal variation, and are not guaranteed for specification purposes or otherwise.

SUSTAINABLE BUILDING ATTRIBUTES

| | | |
|---|------------------------|-----------|
| Manufacturing Location | Defiance, Ohio (43512) | |
| Recycled Content (glass only) | 41% | |
| Recycled Content (total product) | 28% | |
| Volatile Organic Compounds (ASTM D5116) | Total | 0.22 g/l |
| (Analysis ASTM D6196 & ASTM D5197) | | |
| Fiberglass Pipe Insulation | Formaldehyde | 0.009 ppm |
| | Aldehydes | 0.043 ppm |
| Volatile Organic Compounds (Calculated) | Total | <49 g/l |
| Self-Sealing Lap & Butt Strips | | |

SUSTAINABLE BUILDING CERTIFICATIONS

| | |
|------------------|---|
| GREENGUARD® | Certified |
| GREENGUARD® GOLD | Certified |
| LEED® Credits | To see LEED info call technical support |
| LEED-NC | |



MICRO-LOK® HP
HIGH-PERFORMANCE FIBERGLASS PIPE INSULATION

DATA SHEET

SIZE AVAILABILITY

| Insulation Thickness | | Iron Pipe Size Range | | Copper Tubing Size Range | |
|----------------------|-----|----------------------|--------|--------------------------|--------|
| in. | mm | in. | mm | in. | mm |
| ½ | 13 | ½–6 | 13–152 | ⅝–4½ [§] | 16–105 |
| 1 | 25 | ½–24 | 13–610 | ⅝–6⅛ | 16–156 |
| 1½ | 38 | ½–24 | 13–610 | ⅝–6⅛ | 16–156 |
| 2 | 51 | ½–24 | 13–610 | 1⅛–6⅛ | 29–156 |
| 2½ | 64 | 1–24 | 25–610 | 1⅜–6⅛ | 35–156 |
| 3 | 76 | 1–24 | 25–610 | 1⅜–6⅛ | 35–156 |
| 3½ | 89 | 1½–24* | 38–610 | – | – |
| 4 | 102 | 3–24** | 76–610 | – | – |
| 4½ | 114 | 3–24† | 76–610 | – | – |
| 5 | 127 | 3–20†† | 76–508 | – | – |

Notes:

*2½" and 23" IPS not available in this insulation thickness.

**22" and 23" IPS not available in this insulation thickness.

†21", 22" and 23" IPS not available in this insulation thickness.

††19" IPS not available in this insulation thickness.

§3⅝" CTS not available in this insulation thickness.

QUALIFICATIONS FOR USE

A sufficient thickness of insulation must be used to keep the maximum surface temperature of Micro-Lok HP insulation below 150°F (66°C). In addition, at operating temperatures above 500°F (260°C), Micro-Lok HP pipe insulation must be applied in a thickness ranging from 2" (51 mm) minimum to 6" (152 mm) maximum.

During initial heat-up to operating temperatures above 350°F (177°C), an acrid odor and some smoke may be given off as the organic binders used in the fiberglass pipe insulation begin to decompose. When this occurs, caution should be exercised to ventilate the area well. This loss of binder does not directly affect the thermal performance of the pipe insulation, but the compressive strength and resiliency of the product are reduced. For applications with excessive physical abuse or vibration at high temperatures, consult your local Insulation Systems Market Development Manager for alternate material recommendations.

CHILLED WATER SYSTEMS

For chilled water systems, see [3-Part Specification, MECH-261](#).

APPLICATION RECOMMENDATIONS*

MICRO-LOK HP PIPE INSULATION AND BUTT STRIPS

1. Do not apply Micro-Lok HP insulation if air temperature is below 20°F (-7°C) or above 130°F (54°C) due to the effect of temperature on tape performance. We recommend stapling when application falls outside this temperature range.

When stapling, we recommend mastic be applied over staples to prevent moisture penetration.

2. If stored below 20°F (-7°C) or above 130°F (54°C), insulation cartons should stand within the recommended temperature range for 24 hours prior to application.

3. Once release paper is removed, both adhesive and lap must be kept free of dirt and water, and the lap sealed immediately.

4. When adhered, the lap and butt strips must be pressurized by rubbing firmly with a plastic squeegee or the back of a knife blade to ensure positive closure.

*For complete application recommendations and installation instructions, see MECH-261 InsulSpec Specifications.



**North American Sales Offices,
Insulation Systems**

Eastern Region and Canada

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Defiance, OH 43512
800-334-2399
Fax: 419-784-7866

Western Region

P.O. Box 5108
Denver, CO 80217
800-368-4431
Fax: 303-978-4661

Technical specifications as shown in this literature are intended to be used as general guidelines only. Please refer to the Safety Data Sheet and product label prior to using this product. The physical and chemical properties of Micro-Lok HP listed herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Any references to numerical flame spread or smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with your customer service representative for current information.

All Johns Manville products are sold subject to Johns Manville's standard Terms and Conditions, which includes a Limited Warranty and Limitation of Remedy. For a copy of the Johns Manville standard Terms and Conditions or for information on other Johns Manville thermal insulation and systems, visit www.jm.com/terms-conditions or call (800)654-3103.

DATA SHEET

Earthwool® 1000° Pipe Insulation

with ECOSE® Technology



DESCRIPTION

Earthwool 1000° Pipe Insulation is a molded, one-piece insulation made from highly resilient, inorganic glass fibers bonded with ECOSE Technology.

APPLICATION

- Iron, copper, stainless steel, PVC, and CPVC piping
- Hot, cold, concealed and exposed piping systems operating at temperatures 0° F-1000° F (-18° C to 538° C)
- Additional weather protection is needed for outdoors use

SPECIFICATION COMPLIANCE

U.S.

- ASTM C547; Type I, Type IV
- ASTM C585
- ASTM C1136 (jacket); Type I, II, III, IV, VII, VIII, X
- NFPA 90A and 90B
- Conformity for fit Marine Equipment IMO 1408
- MIL-DTL-32585; Type 1, Form 4, Facing A and D
- USCG 164.109/4/1
- UL/ULC Classified

- ASTM C795, MIL-I-24244, NRC Reg. Guide 1.36 (Certification needs to be specified at time of order)

Canada

- CAN/ULC S102
- CGSB 51-GP-9M
- CGSB 51-GP-52M (jacket)
- CAN/CGSB-51.9 (obsolete, replaced by ASTM C547)

CONTRACTOR: _____

JOB: _____

DATE: _____

DOING MORE FOR THE WORLD WE LIVE IN.

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 fiberglass products. The bio-based binder holds our product together and gives the product its unique appearance.

All of our products are formaldehyde-free and made from sustainable resources, such as recycled glass and sand. And we're proud to be putting glass bottles back to work rather than into landfills. Our products are made with a minimum of 50% recycled glass—totaling an average of 26 million bottles each month.



TECHNICAL DATA

| Property (Unit) | Test | Performance |
|--|--------------------------------|--|
| Corrosiveness | ASTM C665 | Does not accelerate corrosion of steel |
| Corrosion | ASTM C1617 | Pass |
| Maximum Service Temperature | ASTM C411 + ASTM C447 | 1000° F (538° C) |
| Water Vapor Permeance | ASTM E96, Procedure A | 0.01 perms or less |
| Water Vapor Sorption (by weight) | ASTM C1104 | Less than 5% |
| Shrinkage | ASTM C356 | Negligible |
| Mold Growth | ASTM C1338 | Pass |
| Surface Burning Characteristics (flame spread/smoke developed) | ASTM E84, UL 723, CAN/ULC S102 | UL/ULC Classified FHC 25/50 |

INDOOR AIR QUALITY

- UL Environment
 - GREENGUARD Certified
 - GREENGUARD Gold Certified
 - Validated to be Formaldehyde-Free
- Does not contain polybrominated diphenyl ethers (PBDE) such as: Penta-BDE, Octa-BDE or Deca-BDE
- EUCEB Certified
- IgCC Section 806.6 compliant

PRODUCT FORMS AND SIZES

- Produced in 3' (914 mm) sections
- For iron pipe ½" – 24" (15 mm – 610 mm) nominal pipe size
- For copper tube ⅝" – 6⅞" (16 mm – 156 mm)
- All insulation inner and outer diameters comply with ASTM C585.

- Wall thicknesses from ½" to 6" (13 mm to 152 mm) in single layer for most sizes
- With or without a white, factory-applied jacket, ASJ+ (all-service jacket) is composed of aluminum foil, reinforced with a glass scrim bonded to a kraft paper interleaving with an outer film layer leaving no paper exposed.
- A matching ASJ+ butt strip is supplied for each section
- The longitudinal lap of the jacket has the SSL+ self-sealing lap that creates a strong and lasting bond

Packaging

- Four carton sizes for easy ordering, inventory tracking and storage
- Reinforced carton handles for strength and easy lifting
- Bar-coded cartons for accurate shipments and tracking
- Full product range stocked at distributors for fast availability

THERMAL CONDUCTIVITY | ASTM C335

| Mean Temperature | k | k (SI) |
|------------------|------|--------|
| 75° F (24° C) | 0.23 | 0.033 |
| 100° F (38° C) | 0.24 | 0.035 |
| 200° F (93° C) | 0.28 | 0.040 |
| 300° F (149° C) | 0.34 | 0.049 |
| 400° F (204° C) | 0.42 | 0.061 |
| 500° F (260° C) | 0.51 | 0.074 |
| 600° F (316° C) | 0.62 | 0.089 |

ASHRAE 90.1-2016 REQUIREMENTS

| MINIMUM PIPE INSULATION THICKNESS | | | | | | | | |
|---|--|-------------------------|---------------------------|---------|---------|--------|-----|--|
| Fluid Operating Temperature Range and Usage | Insulation Conductivity | | Nominal Pipe or Tube Size | | | | | |
| | Conductivity Range BTU-in./(hr · ft² · °F) | Mean Temperature Rating | <1" | 1"-<1½" | 1½"-<4" | 4"-<8" | ≥8" | |
| Heating and Hot Water Systems (Steam, Steam Condensate, Hot-Water Heating and Domestic Water Systems) a, b, c, d | | | | | | | | |
| Above 350° F | 0.32–0.34 | 250° F | 4½" | 5" | 5" | 5" | 5" | |
| 251–350° F | 0.29–0.31 | 200° F | 3" | 4" | 4½" | 4½" | 4½" | |
| 201–250° F | 0.27–0.30 | 150° F | 2½" | 2½" | 2½" | 3" | 3" | |
| 141–200° F | 0.25–0.29 | 125° F | 1½" | 1½" | 2" | 2" | 2" | |
| 105–140° F | 0.22–0.28 | 100° F | 1" | 1" | 1½" | 1½" | 1½" | |
| Cooling Systems (Chilled Water, Brine, Refrigerant) a, b, c, d | | | | | | | | |
| 40–60° F | 0.21–0.27 | 75° F | ½" | ½" | 1" | 1" | 1" | |
| Below 40° F | 0.20–0.26 | 50° F | ½" | 1" | 1" | 1" | 1½" | |

a. For insulation outside the stated conductivity range, the minimum thickness (T) shall be determined as follows: $T = r \{ (1 + t/r)^{K/k} - 1 \}$, where T=minimum insulation thickness (in.), r=actual outside radius of pipe (in.), t=insulation thickness listed in this table for applicable fluid temperature and pipe size, K=conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu · in.(h · ft² · °F)); and k=the upper value of the conductivity range listed in this table for the applicable fluid temperature.

b. These thicknesses are based on energy efficiency considerations only.

c. For piping smaller than 1½" and located in partitions within conditioned spaces, reduction of these thicknesses by 1" shall be permitted (before thickness adjustment required in footnote a) but not to thicknesses below 1". These thicknesses are based on energy efficiency considerations only. Issues such as water vapor permeability or surface condensation sometimes require vapor retarders or additional insulation.

d. The table is based on steel pipe. Non-metallic pipes schedule 80 thickness or less shall use the table values. For other non-metallic pipes having thermal resistance greater than that of steel pipe, reduced insulation thicknesses are permitted if documentation is provided showing that the pipe with the proposed insulation has no more heat transfer per foot than a steel pipe of the same size with the insulation thickness shown on the table.

PRECAUTIONS

Hot Pipe

- May be installed while the system is in operation, at all temperatures up to 1000° F (538° C).
- Knauf Insulation recommends, for insulation thicknesses greater than 6" (152 mm), the temperature must be increased from 500° F (260° C) to maximum temperature at a rate not exceeding 100° F (37.8° C) per hour.
- During initial heat-up to operating temperatures above 350° F (177° C), 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.
- A maximum of 6" (152 mm) wall thickness is recommended.

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 ASJ+ jacket shall be protected with a PVC vapor retarding 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 12' to 21' 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. Proto® Indoor/Outdoor PVC Jacketing is recommended. See Knauf Insulation Guide Specifications for recommended PVC jacketing application guidelines.
- Apply jacketing, mastics or vapor retardant adhesives per manufacturer's instructions.
- For metallic jackets, factory-applied moisture retarders are recommended.

ASJ+ SSL+

- Keep adhesive and contact surfaces free from dirt and water. Seal immediately once adhesive is exposed.

- Apply when ambient and insulation temperatures are between 20° F and 130° F (-6.7° C and 54° C).
- If stored below 20° F or above 130° F, allow insulation cartons to stand within recommended temperature range for 24 hours prior to application.
- Do not store product below -20° F (-29° C) or above 150° F (66° C).
- When using Knauf Insulation's SSL+ Advanced Closure System, make sure the longitudinal and circumferential joints are properly sealed by rubbing the closure firmly with a squeegee. Use of staples is not recommended.
- When using Earthwool® 1000° pipe insulation, the surface temperature of the ASJ+ facing should not exceed 150° F (66° C).

Fittings and Hangers

- Use Proto 25/50 Rated (ASTM E84) PVC Fitting Covers, applying PVC fittings per Proto's Data Sheet.
- 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.
- Seal circumferential joint with a minimum 3" (76 mm) wide butt strip.
- Jackets, coating and adhesives should have a comparable F.H.C. rating.
- ASJ+ may be painted. As with traditional ASJ, Knauf Insulation does not encourage the painting of ASJ+ because the application of any paint may change the surface burning characteristics and will void the UL Classification and Knauf Insulation Limited Warranty.

Insulation Limited Warranty

- Where painting is necessary, use common water, oil, or solvent-based paints. All paints should be tested for compatibility and adhesion before use.
- 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.
- Faced insulation should not have a facing temperature above 150° F (66° C).

SSL+ Installation Instructions:

- To install SSL+, first remove the kraft release liner to expose adhesive.
- Carefully align the jacketing. Starting in the center of the insulation section, begin initial SSL+ tack using pressure in the direction of the overlap. Again, starting in the center of the insulation section, with a plastic squeegee begin to apply firm pressure to the bonded lap area swiping from the center of the insulation section toward each end.
- **Note:** After initial SSL+ adhesive tack, it is critical that the closure is not re-opened and repositioned on the facing. Doing so will delaminate the jacket and adhesive, diminishing the bond strength.

Butt Strip Installation Instructions:

- To install Butt Strips, remove the kraft release liner by

separating the butt strip from the kraft using the convenient, easy release kiss cut.

- Simply wrap the butt strip, centered around the joint, and apply firm pressure with a squeegee.
- **Note:** After initial Butt Strip adhesive tack, it is critical that the closure is not re-opened and repositioned on the facing. Doing so will weaken the adhesive and diminish bond strength.

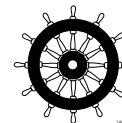
Recommended Thicknesses (ASHRAE 90.1-2016)

The minimum thicknesses are based on ASHRAE 90.1-2016 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 or NAIMA 3E Plus programs or as specified.

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.

CERTIFICATIONS



Check with your Knauf Insulation Territory Manager to ensure information is current.

The chemical and physical properties of this product represent average values determined in accordance with accepted test methods. The data is subject to normal manufacturing variations. The data is supplied as a technical service and is subject to change without notice. References to numerical flame spread ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

This product is covered by one or more U.S. and/or other patents.
See patent www.knaufnorthamerica.com/patents

Visit knaufnorthamerica.com to learn more.

KNAUF INSULATION, INC.

One Knauf Drive
Shelbyville, IN 46176

Technical Support

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DESCRIPTION

The Proto Fitting Cover System consists of one or two piece pre-molded high impact, UV resistant, LoSmoke® PVC fitting covers with or without formaldehyde free fiberglass inserts and accessories. This product line is designed to cover all standard and specialty fittings; which include elbows, tee/valves, end caps, mechanical line couplings, and many more. When combined with our PVC jacketing and solvent welding adhesive or tape, our PVC fitting covers form a completely sealed system that may be used for below ambient applications. Colored PVC is manufactured from a LoSmoke® formula that is suitable for indoor use only.

AVAILABLE FORMS

Thickness: Standard and Heavy Duty

Fitting Covers: 45° and 90° small and long radius, tees, valves, flanges, reducers, end caps, traps, mechanical groove - fittings and many more

Jacketing: PVC rolls and cut and curl are available in thickness ranging from 10 to 40 mil at a 35 1/2" and 48" width

OPERATING TEMPERATURE

PVC: -20° F (-29° C) to 150° F (66° C)

(exposed surface)

Inserts: - 20° F (-29° C) to 1000° F (538° C)

PHYSICAL PROPERTIES

| | | |
|--|------------------------|-----------------|
| Specific Gravity (ASTMD-792) | 1.41 | |
| Tensile Modulus, PSI (ASTMD-638) | 361,000 (25,380kg/cm2) | |
| Tensile Strength, PSI (ASTMD-638) | 6,011 | |
| Flexural Strength, PSI (ASTMD-790) | 9,396 | |
| IZOD Impact (1/4") ft. lb./in(ASTMD-256) | 3.7 | |
| Heat Deflection Temp. (ASTMD-648) @ 264 PSI (8.95 kg/cm2) | 157° F (70° C) | |
| VICAT Softening Temp. (ASTMD-1525) | 198° F (92° C) | |
| Permeance (WVTR) | 0.015" thick | ≤0.058 |
| ASTM E E96 | 0.020" thick | ≤0.047 |
| Procedure A Perm, (grains/hr-ft2in Hg) | 0.030" thick | ≤0.027 |
| Tested over code compliant Vapor barrier* | 0.02" thick | ≤0.02 |
| *ASTM C1136@ ≤ 0.02 perm | | |
| ASTM E 84 and CAN/ULC S102 | Flame | ≤25 |
| Surface Burning Characteristics | Smoke | ≤50 |
| Puncture Resistance (ASTMD781) | 0.006" thick | 178 Beach Units |
| | 0.015" thick | 221 Beach Units |
| Electrical resistance | Non-conductor | |

SPECIFICATION COMPLIANCE

| | |
|-----------------------|---|
| ASTM E84 | Surface burning characteristics |
| ASTM E136 | Non-combustibility (insert only) |
| ASTM C585 | Standard dimensions for pipe |
| ASTM D1784 | Specification for rigid PVC |
| ASTM C1338 | Fungi test |
| ASTM G21 & G22 | Fungi and bacteria test |
| Federal Specification | |
| LP-1035A | Federal standard PVC - Type II Grade GU |
| LP-535E | US Army standard PVC - Type II Grade GU |
| USDA | United States Department of Agriculture |
| New York City MEA | Toxicity |
| Canada | |
| CAN/CGSB – 51.53.95 | PVC Jacketing |
| CAN/ULC S102 | Surface burning characteristics |
| Agriculture Canada | |
| ICC | International code council |
| IBC | International building code |
| IMC | International mechanical code |

GREEN BUILDING ATTRIBUTES

| | |
|------------------------|---|
| Manufacturing Location | Clearwater, FL |
| Recycled Content | Pre 55+% |
| CA 1350 - VOC | Pass office and School |
| Berkeley Analytical | Cert NO 160504 – 10 |
| LEED Credits per V4 | Contributes EA, MR, EQ (See Proto LEED credit guide) |
| RoHS | Heavy metal compliant |
| DecaBDE ≤0.01% | Pass State of Oregon |
| Rigid PVC | No plasticizers or phthalates |

INSERTS

Formaldehyde free preformed fiber glass inserts which are cut to a specific size and shape save time and labor and are an integral part of our LoSmoke PVC fitting system. This 1000° F rated, 1 pcf dense, insulation classified as noncombustible, meets all fungi and corrosion resistance criteria and design requirements of ASHRAE 90.1-10. The product is designed to be installed using one insert per each inch of installed pipe insulation thickness.

Specification compliance:

ASTM C553, ASTM C547, C665, C1338, C1617, C795, ASTM E84, ASTM E136
ASHRAE 90.1
ASTM E84 & CAN ULC S102
GREENGUARD: Gold
Recycled content: 53% pre and post consumer content
Decabrom free

INSERT COMPRESSED THERMAL CONDUCTIVITY

| Mean Temperature | | K value | |
|------------------|----|-------------------|-------|
| F° | C° | BTU in/sq ft hr F | W/M C |
| 75 | 24 | 0.23 | 0.033 |
| 150 | 66 | 0.27 | 0.039 |
| 300 | 40 | 0.4 | 0.058 |

APPLICATION FOR USE

Storage:

Protect cartons from water damage or other abuse. Proto cartons are not designed for outside storage.

Preparation:

Proto fitting covers and inserts should be applied on a clean, dry surface.

Above ambient – General installation:

A Proto fiberglass insert shall be wrapped completely around the metal fitting leaving no voids or open spaces. A loose wrapping of twine or tape may be helpful to hold insulation in place. The Proto Fitting Cover shall then be applied over the insert, and secured by using serrated stainless steel tacks or by taping.

Cold pipe:

Fitting systems below ambient temperature must have a continuous vapor retarder or vapor retardant mastic as specified by the engineer. When using Proto PVC Tape, a 2" (51mm) minimum downward overlap is recommended for optimum performance. Care should be taken not to stretch the last 2" (51mm) of Proto PVC Tape, to avoid stretching or creeping.

Hot system:

Use proper insulation thickness to ensure PVC covers are kept below 150°F (66°C). PVC jackets and fitting covers should be kept away from direct contact or exposure to radiated heat. For conditions where operating temperatures exceed 250°F (121°C) or where pipe insulation thickness is greater than 1" (25.4mm), two or more layers of insulation inserts are required beneath the fitting cover.

Refrigerant Systems and/or Cold Systems In Severe Ambient Conditions:

An intermediate layer of low perm facing or vapor-compatible mastic with PVC is required to completely seal the insulation prior to installing the PVC fitting cover. Vapor barrier mastic should be applied between the pipe insulation and the insert, fitting cover, throat of the fitting cover, and overlap seam.

Totally Sealed Systems (USDA):

20 mil (0.5 mm) minimum LoSmoke PVC jacketing should be applied to pipe insulation in conjunction with LoSmoke PVC fitting covers. Circumferential and longitudinal jacketing and fitting cover seams should be sealed with solvent welding adhesive. Circumferential seams should be a minimum of 1 ½" - 2" (38mm to 51mm) overlap and longitudinal seams should be 1½" - 2" (38mm to 51mm) overlap (with 6-8 inches for expansion joints). All seams should visually be checked for seal and, if necessary, repaired. Slip joints will be required between fixed supports and on continuous long runs of straight piping.

Outdoors (for white only):

Proto PVC Jacketing thickness for outdoor applications should be a minimum of 0.030" (0.8 mm) and 0.040"(1.0 mm) for any O.D. over 15". The PVC Jacketing shall be overlapped a minimum of 2" (51 mm) on the down side so as to shed water. All longitudinal and circumferential joints shall be completely weather sealed with caulk adhesive. Additionally, a slip type expansion joint of 8" (202 mm) minimum width shall be applied at least every 25 lineal feet (6.1 lineal meters) and between fittings.

The physical and chemical properties of Proto Corp. PVC represent typical average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Numerical flame spread rating is not intended to reflect hazards presented by this or any other materials under actual fire conditions. Check with Proto Corp. office to assure current information. Purchaser will be responsible to determine suitability of this product for purchaser's use. Proto Corp. liability will be limited to the purchase price of the material. No person is authorized to alter this without a Proto Corp. officer's written approval.

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FEATURES

Zeston 2000® series white PVC is intended for the protection of insulated or bare pipes. The system has long-lasting protection, an attractive finished appearance, and easy installation. It meets most requirements for federal, state and local fire-safety codes and is accepted for commercial, institutional, industrial, and residential projects in all parts of the US. Zeston 2000 Series fittings are also available with Hi-Lo Temp fiber glass inserts.

APPLICATIONS

Commercial, institutional and industrial applications

CONSTRUCTION

Zeston 2000 Series is manufactured from high-impact, gloss white, UV-resistant polyvinyl chloride jacketing.

APPLICATION RECOMMENDATIONS

- Wrap the Hi-Lo Temp fiber glass insert completely around the pipe fitting without overly compressing it or leaving any voids
- Ensure that the insulation insert covers all exposed surfaces
- Install the Zeston PVC fitting cover over the pipe fitting and fiber glass insert by securing the throat of the Zeston PVC insert using either serrated tacks, Perma-Weld adhesive or Zeston Z-Tape
- If applied in an outdoor setting or exposed to the sun, precautions should be taken to account for expansion joints

QUALIFICATIONS FOR USE

Hot Systems

- Use proper insulation thickness to ensure PVC covers are kept below 150°F (66°C)
- PVC covers should be kept away from contact with and/or exposure to sources of direct or radiated heat
- For fittings where operating temperatures exceed 250°F (121°C) or where pipe insulation thickness is greater than 1½" (38mm), two or more layers of Hi-Lo Temp insulation inserts are required beneath the fitting cover (refer to MECH-261 Zeston Hi-Lo Temp Inserts)

Cold Systems

- An approved vapor-barrier compatible with PVC must be applied between pipe insulation and fitting cover and on fitting cover throat overlap. Please refer to Insulspec MECH-261 on jm.com
- For fittings where operating temperature is below 45°F (7°C) or where the pipe insulation thickness is greater than 1½" (38mm), two or more layers of Hi-Lo Temp insulation inserts are required beneath fitting cover (refer to MECH-261 Zeston Hi-Lo Temp Inserts)



Refrigerant Systems and Cold Systems In Severe Ambient Conditioning

- Mitered pipe insulation segments, fabricated or pre-molded insulation shapes may be used in lieu of Hi-Lo temp insulation inserts
- An intermediate vapor-barrier compatible with PVC is required to completely seal the insulation prior to installing the Zeston 2000 PVC fitting cover
- Care should be taken to ensure the vapor barrier mastic is applied between the pipe insulation and the fitting cover and on the fitting cover throat overlap seam

Totally Sealed Systems (USDA Approval)

- 20 or 30 mil (0.5 mm or 0.8mm) Zeston PVC jacketing should be applied to pipe insulation in conjunction with Zeston fitting covers
- Circumferential and longitudinal jacket and fitting cover seams should be sealed with Zeston Perma-Weld solvent welding adhesive
- Circumferential seams should be a minimum of 1" (25mm) overlap and longitudinal seams should be 1½" - 2" (38mm to 51mm) overlap
- Upon completion, all seams should visually be checked for seal and, if necessary, touched up
- Slip joints are periodically required between fixed supports and on continuous long runs of straight piping.
- To implement a slip joint, increase the circumferential overlap to 8" to 10" (203 mm to 254 mm) and apply a flexible white caulking in the overlap area to maintain a sealed system
- Refer to Zeston installation instructions CI-35 at www.jm.com

ZESTON 2000® SERIES WHITE PVC

INSULATED FITTING COVERS AND JACKETING

PERFORMANCE SPECIFICATIONS

| | |
|--------------------------------------|---------------------|
| Electrical Conductance | Non-conductor |
| Elongation at Yield (MD), % | 3.0 |
| Flame Spread | 25 or less |
| Smoke Developed | 50 or less |
| Flexural Modulus, psi (kPa) | 430,000 (2,964,750) |
| Flexural Strength, psi (kPa) | 11,000 (75,850) |
| | 10 mil (0.3 mm) 1.3 |
| Gardner - SPI Impact, | 15 mil (0.4 mm) 1.4 |
| in.lb/mil by Ductile Failure | 20 mil (0.5 mm) 1.5 |
| | 30 mil (0.8 mm) 1.6 |
| Specific Gravity | 1.48 |
| Tensile Modulus, psi (kPa) | 425,000 (2,930,270) |
| Tensile Strength at Yield, psi (kPa) | 6,000 (41,370) |

SPECIFICATION COMPLIANCE

| | |
|--------------------|---|
| ASTM | D257 (Electrical surface resistance) |
| | D638 (Tensile strength) |
| | D790 (Flexural Strength) |
| | D792 (Density & specific gravity) |
| | D1784 (Specification for rigid PVC) |
| | D3679 (Specification for rigid PVC) |
| | E84 (Surface burning characteristics) |
| | E136 25/50 non-combustibility (fiber glass inserts) |
| Agriculture Canada | Pass (Canada Department of Agriculture) |
| Canada | CGSB51-GP-53M |
| CAN/ULC | S102 |
| L-P*: Composition | 535E (Federal standard for PVC) |
| A, Type II, Grade | 1035A (US Army standard PVC) |
| GU | |
| New York City MEA | #7-87 (Toxicity test) |
| USDA | US Department of Agriculture |

COMPRESSED THERMAL CONDUCTIVITY ZESTON HI-LO TEMP INSULATION INSERTS

| Mean Temperature | | "K" | |
|------------------|-----|---------------------------------|--------|
| °F | °C | BTU•in/(hr•ft ² •°F) | W/M•°C |
| 75 | 24 | 0.23 | 0.033 |
| 150 | 66 | 0.27 | 0.039 |
| 300 | 149 | 0.40 | 0.058 |



717 17th St.
Denver, CO 80202
(800) 654-3103
JM.com

Technical specifications as shown in this literature are intended to be used as general guidelines only. Please refer to the Safety Data Sheet and product label prior to using this product. The physical and chemical properties of the product listed herein represent typical, average values obtained in accordance with accepted test methods and are subject to normal manufacturing variations. They are supplied as a technical service and are subject to change without notice. Any references to numerical flame spread or smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with the Regional Sales Office nearest you for current information.

All Johns Manville products are sold subject to Johns Manville's standard Terms and Conditions, which includes a Limited Warranty and Limitation of Remedy. For a copy of the Johns Manville standard Terms and Conditions or for information on other Johns Manville thermal insulation and systems, visit www.jm.com/terms-conditions or call (800)654-3103.

DESCRIPTION

Zeston® Hi-Lo Temp fiberglass insulation inserts are flexible, pre-cut inserts for PVC pipe fittings. They are sized for each specific PVC fitting and are a lower-cost alternative to preformed or fabricated insulated elbows. The inserts are designed to meet the thermal requirements of ASTM C553 and ASHRAE 90.1.

Zeston Hi-Lo Temp Insulation Inserts are manufactured from rotary-process fiberglass bonded with a Formaldehyde-free™ resin. They are cut to size to be used in conjunction with JM's Zeston PVC fittings. Zeston Hi-Lo Temp Insulation Inserts are flexible, odorless, and vibration resistant. They can save time and labor during installation and are designed to meet corresponding pipe insulation thermal value. The Zeston Hi-Lo Temp Insulation Inserts are made with a formaldehyde-free binder; however, all bonded fibrous insulation products made with formaldehyde-free binders will result in some formaldehyde emissions at temperatures that exceed 450°F.

USES

Zeston Hi-Lo Temp Insulation Inserts are used to insulate PVC fittings in operating temps between 0°F-850°F/-18°C-454°C. JM recommends installing one (1) Zeston Hi-Lo Temp Insulation Insert for every 1" of corresponding pipe insulation thickness. The insulation insert may emit minimal smoke and odor during the initial exposure to elevated temperatures. Keep the area well-ventilated during the initial heat-up.

PHYSICAL PROPERTIES

- 2" thick 1.0 PCF density
- Formaldehyde-free™ binder
- Insulation is a white, light-weight, highly resilient, blanket-type thermal insulation manufactured from rotary process fiber glass
- Inserts are tabbed on sizes 2-10 and cut all the way through for large-size fitting inserts, to accommodate easy separation and resist tearing
- Service Temp. Range (ASTM C411) 0°F - 850°F/-18°C - 454°C
- Corrosivity (ASTM 1617) Pass
- Limited Combustibility <3500 BTU/LB
- Microbial Growth (ASTM C1338) Pass
- Moisture Sorption <5% by weight
- pH 7.5 - 12
- Surface Burning Characteristics (ASTM E84) ≤ 25/50 (flame/smoke)
- Uncompressed Insulation thickness/density 2" Thick/1 PCF Density



COMPRESSED THERMAL CONDUCTIVITY

| Mean Temperature | | K | |
|------------------|-----|--------------------------|--------|
| °F | °C | BTU • in/(hr • ft² • °F) | W/m•°C |
| 75 | 24 | .23 | .033 |
| 150 | 66 | .27 | .039 |
| 300 | 149 | .40 | .058 |

SPECIFICATION COMPLIANCE

ASTM C553
 ASHRAE 90.1
 ASTM E84 25/50 rating
 NRC 1.36, ASTM C795, MIL-DTL-24244*

*Before ordering material to comply with these specifications, a statement of the fact must appear on the purchase order. Specific lot testing will be conducted and a certification of compliance can be provided.

SUSTAINABLE BUILDING ATTRIBUTES

Recycled Content: 20%



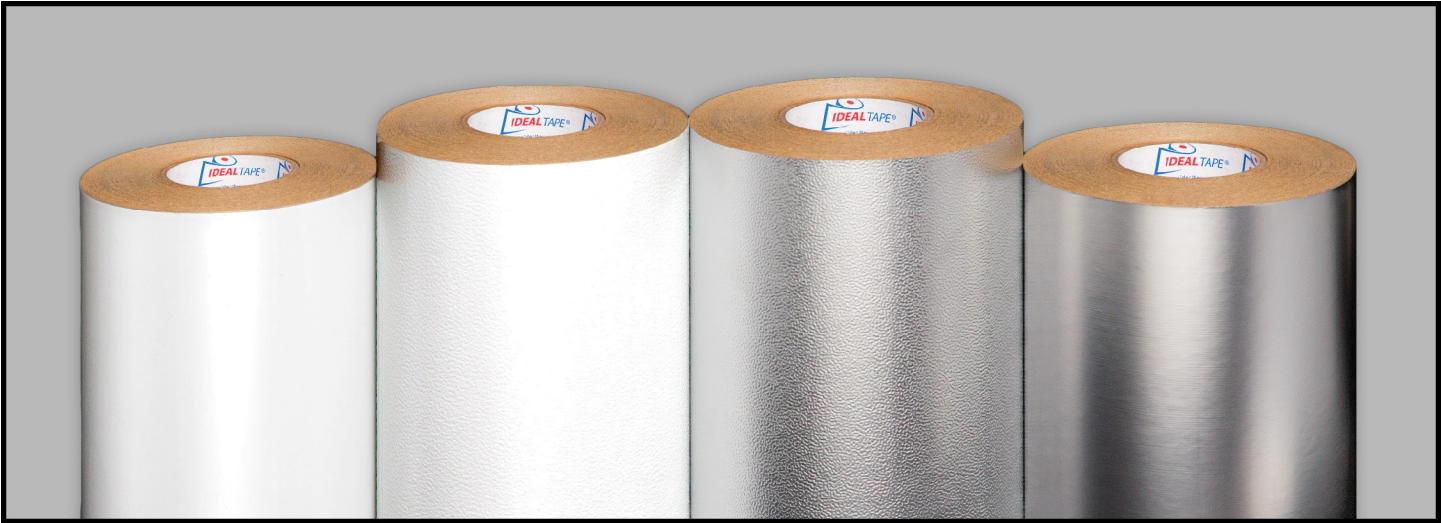
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SELF-ADHESIVE JACKETING (CLADDING)

IDEAL SHIELD®



Ideal Shield® Jacketing

Ideal Shield is a multifunctional, self-adhesive laminate protective jacket for outdoor applications. It provides a zero perm vapor barrier over insulation on rooftop duct work, piping, and equipment. Our unique design offers repositioning and easy installation. Ideal Shield is an all-weather jacketing system that delivers cost savings through reduced labor. It can also be used as a heavy-duty patch and repair and strapping tape. When a specification allows for “or equivalent” products, or where Ideal Seal 777 is already specified, Ideal Shield Jacketing is both the equivalent and replacement.

Aluminum Finishes

| | |
|---|--|
| COLOR Embossed Aluminum/Flat Aluminum | ADHESIVE SYSTEM Acrylic |
| STOCK SIZES 35.25" x 50 yds - 30 per pallet | ADHESION TO STEEL 70 oz/in (766 N/mm) |
| TAPE THICKNESS 12.5 mils (318 µm) / 9.6 mils (244 µm) | APPLICATION TEMPERATURE -20°F to 160°F |
| TENSILE STRENGTH 30 lbs/in (5.25 N/mm) | SERVICE TEMPERATURE -70°F to 250°F |
| SHELF LIFE 24 months | WARRANTY 10 years |

White Finishes

| | |
|---|---|
| COLOR Embossed White/Gloss White | ADHESIVE SYSTEM Acrylic |
| STOCK SIZES 35.25" x 50 yds - 30 per pallet | ADHESION TO STEEL 70 oz/in (766 N/mm)/85 oz/in (930 N/mm) |
| TAPE THICKNESS 10 mils (254 µm) / 8 mils (203 µm) | APPLICATION TEMPERATURE -20°F to 160°F |
| TENSILE STRENGTH 65 lbs/in (11 N/mm) | SERVICE TEMPERATURE -70°F to 250°F |
| SHELF LIFE 24 months | WARRANTY 10 years |

To learn more about Ideal Shield®, visit www.idealtape.com. Download technical data sheets, view the installation guide, and watch an instructional video.

