Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
P.O. Box 16620
Little Rock, AR 72231
Phone 501-834-3320
Fax 501-834-5416

Date: 3/13/2024
Return Request: 3/23/2024
Project: Stone Bank HQ - Chenal
Supplier: Pro Insulation
Manufacturer: Various
Submittal: HVAC Insulation
Submittal Number: 23 07 00-01
Drawing # and Installation: Mechanical Drawings

ARCHITECT
WDD Architects
5050 Northshore Lane
N. Little Rock, AR 72118
501-376-6681

ENGINEER
Batson Inc.
1300 Brookwood Dr.
Little Rock, AR 72202
501-664-3311

GENERAL CONTRACTOR
East Harding
2230 Cottondale Lane #3
Little Rock, AR 72202
501-661-1646

MECHANICAL SUBCONTRACTOR
Comfort Systems USA (Arkansas), Inc.
9924 Landers Rd.
N. Little Rock, AR 72117
501-834-3320

Notes:

dpierce@comfortar.com

Pro Insulation

4414 South 16th Street
Ft. Smith, AR 72901
Ph. 479-646-5644
Fax 479-646-5654

February 27, 2024

Comfort Systems USA, Inc.
P.O. Box 16620
Little Rock, AR 72231

Mr. Daniel Pierce

Re: Mechanical Insulation Submittals for Stone Bank Headquarters Renovations, Little Rock, Arkansas.

Spec Section 23 07 19.

The following items will be insulated with Armacell Armaflex pipe cover. All joints and seams will be sealed with 520 adhesive.

Item #1 HVAC Condensate Drains---------- ½" Thick

Thank You,

Mike Galatzer

AP/Armaflex®
Black LapSeal™

Tube Insulation with
Reinforced Lap Seal

Fiber Free

The original flexible elastomeric pipe insulation with a new and improved lap seal for greater seam security and increased protection against condensation, mold and energy loss.

- Angled cut with more surface area for a better bond
- A single interior adhesive liner for quicker application
- New durable, low-profile lap seal with wider release tab, stays closed and looks neat
- Easy to install – an excellent choice for retrofit applications
- 25/50 rated for use in air plenums
- Fiber-free, formaldehyde-free, low VOC and non-particulating formulation protects indoor air quality
- Microban® antimicrobial product protection inhibits the growth of mold and mildew in the insulation

armacell®

GREENGUARD GOLD
PRODUCT CERTIFIED FOR LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

FM APPROVED

U.S. GREEN BUILDING COUNCIL MEMBER

Microban® antimicrobial product protection

GREENGUARD Certified products are certified to GREENGUARD standards for low chemical emissions into indoor air during product usage. For more information, visit ul.com/gg.

Microban antimicrobial product protection is limited to the product itself and is not designed to protect the users of these products from disease causing microorganisms, or as a substitute for normal cleaning and hygiene practices.*

Technical Data: AP Armaflex® Black LapSeal™ Tube Insulation

Description:

Black flexible closed-cell elastomeric thermal insulation in tubular form with a self-seal system reinforced with lap seal tape

Applications:

Insulation for piping associated with HVAC, VRV and VRF systems, chillers, hot and cold water, refrigeration

Specifications Compliance:

ASTM C 534, Type I – Grade 1 ASTM E 84 NFPA 255	UL 723 NFPA 90A, 90B UL 181	ASTM G-21/C1338 ASTM G-22 ASTM D 1056, 2B1

Approvals, Certifications, Compliances:

- Key physical properties are approved by Factory Mutual.
- GREENGUARD Gold Certified.
- Manufactured without CFCs, HFCs, HCFCs, PBDEs, or Formaldehyde.
- Made with EPA registered Microban® antimicrobial product protection..
- All Armacell facilities in North America are ISO 9001:2008 certified.

Typical Properties

Specifications:	Values:		Test Method:
	3/8" through 1" Walls	**1-1/2" and 2" Walls**	
Thermal Conductivity: Btu • in./h • ft² • °F (W/mK)			
75°F Mean Temperature (24°C) 90°F Mean Temperature (32°C)	0.245 (0.0353) 0.254 (0.0366)	0.28 (0.040) 0.286 (0.041)	ASTM C 177 or C 518
Water Vapor Permeability: Perm-in. [Kg/(s • m • Pa)]	0.05 (0.725 x 10^{-13})	0.08 (1.16 x 10^{-13})	ASTM E 96, Procedure A
Flame Spread and Smoke Developed Index:	25/50 rated	25/50 rated	ASTM E 84
Water Absorption, % by Volume:	0.2%	0.2%	ASTM C 209
Mold Growth: **Fungi Resistance:** **Bacterial Resistance:**	Passed	Passed	UL181 ASTM G21/C1338 ASTM G22
Upper Use Limit:	220°F (105°C)	220°F (105°C)	ASTM C534
Lower Use Limit: [1]	-297°F (-183°C) [2]	-297°F (-183°C) [2]	ASTM C534
Ozone Resistance:	GOOD	GOOD	Ozone Chamber Test

Sizes:

Wall Thickness (nominal) Form	3/8", 1/2", 3/4", 1", 1-1/2", 2" (10 mm, 13 mm, 19 mm, 25 mm, 38 mm, 50 mm)
Inside Diameter, Tubular Form	3/8"ID to 6" (10 mm to 153 mm)
Length of Sections, Tubular Form	6' (1.8m)

Outdoor Use	Painting with WB Finish or other protective jacketing is required to prevent damage to the insulation in exterior applications and to comply with the insulation protection sections of the International Energy Conservation Code (IECC) and ASHRAE 90.1.

[1] At temperatures below -20°F (-29°C), elastomeric insulation starts to become less flexible. However, this characteristic does not affect thermal efficiency and resistance to water vapor permeability of Armaflex insulation.

[2] For applications of -40°F to -297°F (-40°C to -183°C), contact Armacell.

ARMACELL LLC
TEL: 800.866.5638
FAX: 919.304.3847

info.us@armacell.com
www.armacell.us
7600 Oakwood Street Extension, Mebane, NC 27302

armacell®

Armaflex®
520 Adhesive

Fiber Free

An air-drying contact adhesive that is excellent for joining seams and butt joints of Armaflex Pipe and Sheet Insulations

- Formulated for Armaflex Insulations
- Air-drying contact adhesive
- Years of on-the-job performance
- Meets MIL-A-24179A and Amend-2

armacell®

U.S. GREEN BUILDING COUNCIL MEMBER

Technical Data: Armaflex 520 Adhesive

Description:
An air-drying contact adhesive that is excellent for joining seams and butt joints of Armaflex Pipe and Sheet Insulations

Specifications Compliance:	
MIL-A-24179A	Amend-2, Type II, Class 1

Approvals, Certifications, Compliances:
• All Armacell facilities in North America are ISO 9001:2008 certified.

Typical Properties		
Specifications:	**Values**	
Color:	Light Tan	
Net Weight:	6.9 pounds per gallon (828 g/l)	
Composition:	Synthetic rubber base with synthetic resins and fillers added; hydrocarbon- and ketone-type solvents.	
Volatile Organic Compounds (VOC) Content:	596 g/l	
Solids Content	Approximately 22% by weight	
Coverage	200 sq ft (5m2/l) per gallon max, single coat (depending upon porosity of materials bonded and air temperature)	
Shelf Life	1-1/2 years in original sealed container; storage temperature 60°F to 80°F (16°C to 27°C)	
Temperature Limits	250°F (120°C) — Armaflex Pipe Insulation seams and joints 180°F (82°C) — Full bonding sheet insulation	
Tack Time	1–5 minutes depending on ambient conditions	
Bond Time	Immediate	
Full Cure Time	36 hours	
Container Sizes	Half-pint and pint brush-top cans and pint, quart, and gallon containers	
Wet Flash Point	Below 20°F (-7°C) (TOC)	
Flame Spread and Smoke Developed Index:	25/50 rated	ASTM E 84
Minimum Application Temperature:	40°F (4°C)	

ARMACELL LLC
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February 27, 2024

Comfort Systems USA, Inc.
P.O. Box 16620
Little Rock, AR 72231

Mr. Daniel Pierce

Re: Mechanical Insulation Submittals for Stone Bank Headquarters Renovations, Little Rock, Arkansas.

Spec Section 23 07 19.

The following items will be insulated with Knauf Earthwool pipe insulation with ASJ + vapor barrier jacket. All fittings will have an additional PVC fitting cover.

Item #1 Interior Water Source at Heat Pump---------- ½" Thick

Item #2 Exterior Heating Water at Boiler---------- 1 ½" Thick

- Will receive an additional .016 Aluminum Jacket

Thank You,

Mike Galatzer

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.

CONTRACTOR: _____

JOB: _____

DATE: _____

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)

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.

with ECOSE® TECHNOLOGY

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" – 6⅛" (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 flim 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

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.

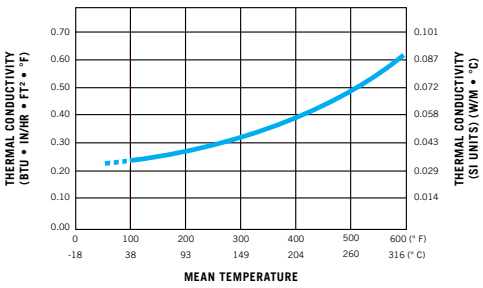
b. These thicknesses are based on energy efficiency considerations only.

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 | 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



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

01-20

FASSON® 0838

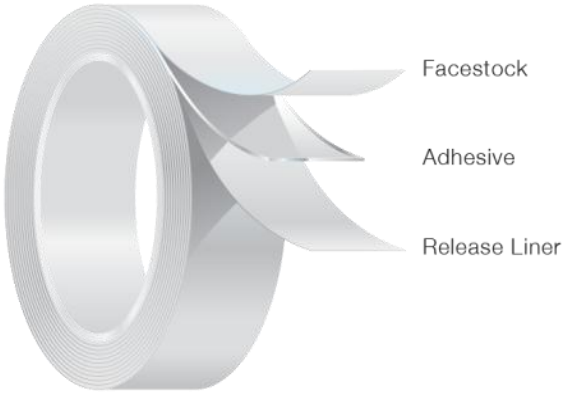
Closure system tape with Lamtec ASJ 30J insulation facing

FEATURES:

- Specially formulated antimicrobial, extreme weather, COLD TOUGH™ acrylic adhesive
- Excellent adhesion and quick stick
- High strength reinforced facestock.
- Meets ASTM C-1136 Type I, Type II, Type III and Type IV
- PSA complies with South Coast Air Quality Management District's (SCAQMD) Rule 1168.
- UL 723 Recognition under File No. BVYS.R7078
- UL ULC S102 Recognition under File No. BVYS7.R7078

BENEFITS:

- Excellent bond to Lamtec ASJ 30J insulation facing
- Excellent initial tack and long-term adhesion
- All weather acrylic insulation sealant tape
- Foil laminate facing (30J) is decaBDE free
- Application temperature as low as 0º F
- Made in the USA



CONSTRUCTION:

Carrier:
Foil Laminate
Adhesive:
COLD TOUGH™ Acrylic
Liner:
Densified Kraft

CLASSIFIED C UL US

General Use Tape Surface Burning Characteristcs to

UL 723	Flame Spread	20
	Smoke Developed	10

722S

LEED® Point Contributor

* Contributes to Energy Atmosphere (SA) Credit 1
* Contributes to Indoor Environmental Quality (IEC) Credit 4.1

FASSON® 0838

Adhesive Properties:		Typical Values		
Thickness	Test Method(s): PSTC-133	**US Mils**	**MM's**	**Microns (µm)**
Liner:		3.6	0.09	91
Adhesive:		1.7	0.04	43
Carrier:		9.0	0.23	228
Total Caliper:		14.3	0.36	363

PEEL ADHESION	Test Method(s): PSTC-101, ASTM D-3330, STD-10			
Product 180º 12" min				
Substrate		**Lbf / In**	**US Oz / In**	**N / Meter**
SS	Initial	4.8	77	840

LOOP TACK	Test Method(s): PSTC-16, STD-7			
Product 180º 20" / min				
Substrate		**Lbf / In**	**US Oz / In**	**N / Meter**
SS	Initial	6.0	96	1051

TENSILE	Test Method(s): PSTC-131, ASTM D-882, STD-3A,B,C			
Product				
Substrate		**Lbf / In**	**US Oz / In**	**N / Meter**
Product	MD	55.0	880	9631
	CD	50.0	800	8755

ELONGATION	Test Method(s): PSTC-131, ASTM D-882, STD-3A,B,C			
Product				
Substrate		**%**		
Product	MD	1		
	CD	1		

TLMI RELEASE	Test Method(s): PSTC-4, STD-8			
Product 90º 300" / min				
Substrate		**Gf / 2 In w**		
	Initial	50.0		

VOC CONTENT				
Product				
Substrate		**g / L**		
Product		< 15		

TEMPERATURES	**º F**	**º C**
Min Application Temp	0 º F	-17 º C
Max Continuous Operating Temp	200 º F	93 º C
Max Intermittent Operating Temp	275 º F	135 º C

THE LISTED VALUES ARE TYPICAL AND NOT INTENDED TO SERVE AS PRODUCT SPECIFICATIONS

APPLICATION TECHNIQUES

- It is essential, as with all pressure-sensitive tapes, that the surface to which the tape is applied be clean, dry, and free of grease or oil
- Bond strength is dependent upon the amount of adhesive-to-surface contact developed
- Note that different pressure, time and temperature on different (film / rigid) surface achieves different performance

STORAGE / SHELF LIFE

- One year when stored at 64-72ºF (18-22ºC) / 30-70% relative humidity, out of direct sunlight and in original packaging.

Please refer to Tapes.AveryDennison.com for complete terms and conditions, including warranty terms, relating to this product. You should periodically review the site as terms and conditions are subject to change without notice.

AVERY DENNISON Performance Tapes

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250 Chester Street
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44077 USA
Phone: +1 866-462-8379
Fax: +1 888-358-4469

25/50 Smoke-Safe™ PVC

specification data

The Speedline® Smoke Safe™ PVC Insulated Fitting Covering System consists of preformed gloss white outdoor weatherable and gloss colored insulated covers for piping fittings. Their unique shapes fit screwed, Victaulic®, welded and flanged elbows, tees, valves, couplings, laterals, reducers and endcaps.

The Speedline® Smoke Safe™ PVC Jacketing System consists of gloss white outdoor weatherable and colored PVC sheet in either bulk rolls or precurled cut-to-fit pipe sizes. The White Jacketing is available in .010", .015", .020", and .030" thicknesses.

The Jacketing and Fitting Covering Systems include solvent weld adhesives, stainless steel tack fasteners, silicone caulking and adhesive tapes. A die-cut multi-temperature fiberglass insulation insert is available and sized for a full insulation over the exposed pipe fitting and under the overlay of the PVC Fitting Cover.

Specification Compliance

ASTM D 1784, Cell Class 16354,
Federal Specification HH-I-558, Form B,
Type 1 Class B (Insert Insulation)
USDA and FDA for use in food processing,
beverage, and pharmaceutical facilities
Military Spec LP-1035A, Type II Grade GU
Military Spec LP-535E, Type II Grade GU
New York City MEA 402-07-M,
Agriculture Canada, Canada: CGSB 51.53-95

Applications

Speedline® Smoke Safe™ PVC Insulated Fitting Covers and Jacketing are designed for indoor and outdoor* applications in commercial, institutional and industrial facilities.

- Speedline® Smoke Safe™ PVC Fitting Covers are designed to cover pipe fittings and other mechanical equipment with an outside diameter of 1-5/8" up to 24" in accordance with ASTM C-585. For outdoor use and in high abuse areas, .030 is recommended. For straight runs of piping, expansion joints should always be used to prevent product failure.
- Speedline® Smoke Safe™ PVC jacketing is suitable for covering all flat and round surfaces such as ductwork, tanks and other mechanical equipment. On vessels larger than 24" OD a minimum of .040 Jacketing should be used. For OD's larger than 48", Speedline flat jacketing is not recommended. Due to the expansion and contraction of tanks and vessels, expansion joints should always be used to prevent product failure.
- The Speedline® Smoke Safe™ PVC Jacketing System has an application temperature range of -35°F to 500°F (-37°C to 260°C). The PVC surface should remain below 150°F (66°C) through the installation of sufficient insulation on higher temperature applications.

- **Easy Installation - the unique shapes make an easy seal over an entire mechanical system**
- **Clean, neat and attractive appearance due to the high gloss PVC surface**
- **Low maintenance**
- **Corrosion resistance**
- **Outdoor weatherability* (UV stable)**
- **The 25/50 fire class of all Speedline® Smoke Safe™ products provides greater universal building code acceptance**
- **Provides a natural barrier to moisture, bacteria and mold**

**** Colored fitting covers and jacketing are NOT recommended for outdoor use.***

SPEEDLINE

Cleveland: 1 800 551 9759 | Greensboro: 1 800 551 9760
Stockton: 1 800 833 4500 | La Porte: 713 670 9700
www.speedlinepvc.com

25/50 Smoke-Safe™ PVC

specification data

Physical Properties

Property	Test Method	Value
Speedline® Smoke Safe™ PVC		
Flame Spread	ASTM E84	25 or less
Smoke Developed	ASTM E84	50 or less
Specific Gravity	ASTM 792	1.46
Tensile Strength @ yield lb./in.^{2}	ASTM D638	7,000
Tensile Modulus PSI	ASTM D638	400,000
Izod Impact- ft.lb./in.	ASTM D256	15.0
Permeance @ .030"	ASTM E96	.03
WVTR @ .030"	ASTM E96	.014
Permeance @ .020"	ASTM E96	.05
WVTR @ .020"	ASTM E96	.021
Electrical Conductance	ASTM D257	None
Fiberglass Insulation		
Flame Spread	ASTM E84	25 or less
Smoke Developed	ASTM E84	50 or less
Thermal Conductivity (75°F/24°C)	ASTM C177	0.26

Specification Data

Hot Systems

All piping fittings shall be insulated by filling the total void over all fittings, between straight runs of pipe insulation, with Speedline® die-cut fiberglass insulation, forming a uniform insulation thickness equal to or exceeding the adjacent pipe insulation. Finish all insulated pipe fittings by applying Speedline® Smoke Safe™ PVC Fitting Covers overlapping the adjacent pipe insulation outer covering. Secure the Speedline® Fitting Covers with Speedline® Stainless Steel Tack Fasteners, Speedline® PVC Tape or by welding PVC overlaps with Speedline® Solvent Weld Adhesive. Caution should be exercised to be sure that the insulation surface temperature is maintained below 150°F (66°C) through the application of sufficient insulation under all PVC Covering.

Cold Systems

All piping fittings shall be insulated by filling the total void over all pipe fittings between straight runs of pipe insulation with Speedline® die-cut fiberglass insulation, forming a uniform insulation thickness equal to, or exceeding, the adjacent pipe insulation. Finish all insulated pipe fittings by applying Speedline® Smoke Safe™ PVC Fitting Covers overlapping the adjacent pipe insulation outer covering. The overlap of the throat of the PVC Fitting Cover and the ends of the Fitting Cover overlapping the adjacent pipe insulation vapor barrier jacketing shall be vapor sealed with compatible vapor barrier mastic. The ends of the PVC Fitting Cover overlapping the adjacent pipe insulation shall be further sealed by an outer wrapping of Speedline® PVC Tape extending over the adjacent pipe insulation vapor barrier jacketing and overlapping its own circumferential juncture by at least two inches in the downward direction on the downward side.

Chemical Resistance

Inorganic Acids	
Sulfuric, nitric, hydrochloric, hydrofluoric (diluted or concentrated):	Excellent
Organic Acids	
Formic, acetic and propionic	Poor
Alkalies	
Sodium and potassium hydroxides	Excellent
Ammonium hydroxide	Excellent
Caustic Soda	Excellent
Soda Ash	Excellent
Miscellaneous Corrosive Chemicals	
Phenol, resorcinol and creosol	Poor
Iodine, crystals	Fair
Iodine, tincture	Excellent
Chlorine and bromine water	Excellent
Potassium dichromate	Excellent
Silver nitrate	Excellent
Tannic acid	Excellent
Solvent and Dilutents	
Alcohol and polyalcohols, including ethyl methanol, butanol and isopropyl alcohol	Excellent
Ketones	
Lower boiling ketones	Dissolves
Higher boiling ketones	Swells
Ethers	
Ethyl	Softens
Dichlorethyl ether	Swells
Diethyl cellosolve	Swells
Dioxane	Dissolves
Propylene oxide	Dissolves
Hydrocarbons	
Aromatics as gasoline, kerosene and petroleum oils	Excellent
Oils, Fats and Waxes	
Animal, mineral and vegetable	Excellent

ITW INSULATION SYSTEMS

ALUMINUM ROLL JACKETING (cladding)

DESCRIPTION

ITW Pabco/Childers Aluminum Jacketing is the premier protective outer surface for mechanical insulation systems including pipe, vessels, and equipment. It protects the insulation and underlying pipe/vessel from physical damage, UV exposure, corrosive atmospheres, and water.

ITW Aluminum jacketing (also called cladding) is available in smooth, stucco embossed, and 3/16 corrugated (cross-crimped) finishes. For larger surfaces, box-rib and deep corrugated sheets are also available.

ITW Aluminum Jacketing has a bare outer surface and comes standard with a 3-mil thick polyfilm moisture barrier heat-laminated to the interior surface to help prevent corrosion of the jacketing and the underlying metal pipe, vessel, or equipment.

COMPOSITION

Commercially pure aluminum is relatively soft and less suited for use in this application. Its strength can be greatly improved by alloying with small percentages of one or more other elements such as manganese, silicon, copper, zinc, and magnesium. Additional strength can be achieved by cold working. ITW Insulation Systems carefully screens all potential aluminum coil suppliers to assure our products have the highest quality, are corrosion resistant, and comply with all relevant standards.

ITW Aluminum Jacketing is typically manufactured using alloys 3105 or 3003 which have very similar composition and performance and are considered interchangeable for use as insulation jacketing. ITW reserves the right to ship whichever alloy is in stock at the time of order placement. One of these two specific alloys or an alternative alloy can be specified by purchaser at time of order placement but this may affect minimum quantity, lead-time, and price.

Composition Differences in Aluminum Alloys (%)

Alloy	Cu	Mn	Mg	Zn
3105	≤ 0.3	0.3-0.8	0.2-0.8	≤ 0.4
3003	0.05-0.2	1-1.5	---	≤ 0.1

COMPLIANCE TO STANDARDS

All bare and polyfilm lined Aluminum Jacketing from ITW Insulation Systems complies with the requirements of ASTM C1729 (Aluminum Jacketing Material Standard) which includes the strength and chemical composition requirements for compliance to ASTM B209 (Aluminum Alloy Standard).

RECOMMENDED USES

Aluminum Jacketing is recommended for use in all of the following insulation system applications:

- Standard outdoor use on all pipe, vertical tank insulation systems up to 8 ft outer diameter, and all horizontal tanks
- Indoor insulation system applications up to 8 ft outer diameter where increased damage resistance is desired

LIMITATIONS ON USE

Aluminum Jacketing is not appropriate for the following applications:

- For vertical tank insulation system applications where the outer diameter is larger than 8 ft, ITW deep corrugated aluminum sheets should be used
- Where increased emissivity is desired, painted aluminum jacketing should be considered
- For applications where a maximum resistance to fire is required, stainless steel jacketing should be used
- For applications where additional resistance to corrosion from the external environment is required, ITW painted aluminum jacketing may be used. Where maximum resistance to corrosion is required, ITW stainless steel jacketing (T304 or T316) should be used.

POLYFILM MOISTURE BARRIER

Polyfilm Moisture Barrier (PFMB) is an engineered three layer coextruded film of polyethylene and Surlyn* polymers with a total film thickness of 3 mils (76 µm) that is heat laminated in the factory to the interior surface of aluminum jacketing. ITW recommends the use of PFMB on all aluminum jacketing to help prevent pitting, crevice, and galvanic corrosion of the interior surface of the metal jacketing and the insulated pipe, tank, or equipment.

Due to its superior performance characteristics, PFMB replaces the old moisture barrier technology of 1 to 3 mil thick polykraft

*Trademark of DuPont

ALUMINUM ROLL JACKETING (cladding)

RECOMMENDED THICKNESS

ITW recommends that the thickness of aluminum jacketing used vary based on the outer diameter of the insulation system per the requirements of ASTM C1729. This recommended thickness is shown in the table below.

EMITTANCE

ITW Aluminum Jacketing has an outer surface emittance per ASTM C1371 and specified by ASTM C1729 of:

- Bare aluminum (oxidized in service) = 0.1

SURFACE FINISHES

Each of the three surface finishes available for ITW Aluminum Jacketing (smooth, stucco embossed, and 3/16" corrugated has applications where it is recommended. All of these can be supplied with a painted exterior. For more information on this, consult the ITW data sheet on painted aluminum jacketing.

Smooth (Plain Mill) Finish
This is a very popular finish and is the "default" for the many end-users/specifiers who prefer the clean look of this finish. This finish sheds rain water the best. However, this smooth surface readily shows damage such as from hail or other physical abuse. It is also shows the dirt more than the other finishes due to its smoothness. Lastly, it is highly reflective of sunlight and when located near roadways, some specifiers see this reflection as a possible safety hazard.

Stucco Embossed Finish
This is another popular finish used for aluminum jacketing. The stucco-like surface texture hides small imperfections and scratches caused by physical damage during or after installation. This finish also reduces reflectivity while still looking very professional. Lastly, the use of stucco embossed finish provides a small increase to the rigidity and strength of the aluminum jacketing.

3/16" Corrugated (Cross-Crimped) Finish
This finish consists of parallel grooves or crimps about 3/16" apart running in the length direction of the pipe. This finish also hides small damage and scratches to the jacketing and reduces sunlight reflection. In addition, the nature of this finish gives the aluminum jacket more ability to expand and contract to adapt to insulation movement caused by pipe or ambient temperature changes. Lastly, the rigidity and strength of 3/16" corrugated finish is substantially increased making it ideal for use as jacketing on large diameter pipe and vessels up to 8 ft diameter. This finish is available in a maximum thickness of 0.024 inches.

FLAMMABILITY

ITW Aluminum Jacketing with a 3 mil polysurlyn moisture barrier has been tested for flammability using the industry standard ASTM E84 test method. The results were:

ASTM E84 Flame Spread Index = 0
ASTM E84 Smoke Developed Index = 5

(Tested with exterior metal surface exposed to the flame)

Outer Insulation Diameter (in)	Minimum Aluminum Jacket Thickness, inches (mm)	
	Rigid Insulation	Non-Rigid Insulation
≤ 8	0.016 (0.41)	0.016 (0.41)
Over 8 thru 11	0.016 (0.41)	0.020 (0.51)
Over 11 thru 24	0.016 (0.41)	0.024 (0.61)
Over 24 thru 36	0.020 (0.51)	0.032 (0.81)
>36	0.024 (0.61)	0.040 (1.01)

ELL-JACS™ PLUS POLYFILM LINED ALUMINUM ELBOW COVERS

DESCRIPTION

ITW Insulation Systems' Polyfilm lined Aluminum Elbow Covers are made in two precision formed matching halves to cover and weatherproof insulated 45° and 90° pipe elbows. These elbow covers are called Ell-Jacs™ Plus by ITW Insulation Systems.

Like ITW Aluminum Jacketing, Ell-Jacs™ Plus are a premier protective outer surface for insulation systems on pipe and are an excellent performing and critical accessory to complement the aluminum jacketing. Ell-Jacs™ Plus protect the insulation and underlying pipe from physical damage, UV exposure, corrosive atmospheres, and water. They also reduce the time and labor needed to install the metal jacketing system.

Ell-Jacs™ Plus have a 3 mil (76 micron) three-layer Polyfilm Moisture Barrier (PFMB) that is factory heat laminated to the interior surface. When coupled with the ultrapure 1100 alloy used in these elbows, this moisture barrier reduces pitting/crevice and galvanic corrosion potential of the interior surface of the elbow cover and the underlying pipe.

Ell-Jacs™ Plus have a factory applied and baked on finish of highly durable hard film clear acrylic or polyester paint on the exterior surface to help resist external corrosion and to raise the emittance. The special paint used on the exterior surface of Ell-Jacs™ Plus is chalk and fade resistant. It exhibits better resistance to oxidation and to the effects of various corrosive environments than bare aluminum jacketing. This painted surface also resists water, scratching, and fingerprint staining.

See the **ITW Polyfilm Technical Data Sheet** for more information on this material.

ADVANTAGES

Ell-Jacs™ Plus provide key advantages over aluminum elbows with a painted moisture barrier:

- PFMB on the interior surface reduces corrosion propensity – three layers of film in the PFMB eliminate pinholes
- Allows for the presence of PFMB on all parts of the metal jacketing system
- Increased spacing between fingers/ribs, for easier banding in the middle of the elbow
- PFMB has a very low water vapor transmission rate, further reducing corrosion potential
- Tough and strong PFMB film to resist damage during handling and installation. Painted moisture barrier is more easily scratched
- Clear exterior coating helps resist unsightly metal scratches

INNOVATIVE PRODUCT

Using ITW's innovation process, our team has developed an improved product that will enhance the performance of the overall insulation system.

Ell-Jacs™ Plus will benefit the facility owner and specifier, as the optimum performing PFMB is now available for the first time as a complete system without having to utilize gore sections on the elbows.

COMPOSITION

Ell-Jacs™ Plus are made from the commercially pure (>99% aluminum) and highly corrosion resistant 1100 aluminum alloy.

The performance of even commercially pure aluminum can be improved by alloying with small percentages of one or more other elements such as silicon, iron, copper, manganese, and zinc. ITW Insulation Systems carefully screens all potential aluminum coil suppliers to assure our products have the highest quality, are corrosion resistant, and comply with all relevant standards.

Composition of Aluminum 1100 Alloy (max %)

Alloy	Si + Fe	Cu	Mn	Zn
1100	0.95	0.05-0.20	0.05	0.1

See the **ITW PFMB vs. Polykraft or Paint Data Sheet** for more detailed information regarding key benefits of PFMB compared to painted moisture barrier.

ITW INSULATION SYSTEMS

ELL-JACS™ PLUS POLYFILM LINED ALUMINUM ELBOW COVERS

SIZE SELECTION AND INSTALLATION

For details on Ell-Jacs™ Plus sizes, their fit on insulation, and installation, see the ITW data sheet on Aluminum Elbow Sizes and Installation.

FIT

Ell-Jacs™ Plus are available to fit:

- 45° and 90° pipe elbows
- Long and short radius pipe elbows
- Butt weld, socket weld, and screwed elbows
- Insulated pipe from ½" to 12" NPS[1]

[1]Ell-Jacs™ Plus are available as quad sections for some insulation thicknesses at NPS > 12". Not all combinations of NPS and insulation thickness are available. See your ITW sales representative for details.

THICKNESS

Ell-Jacs™ Plus are 0.024" (0.6 mm) in thickness to allow the elbows to be formed in the press. This thickness has proven acceptable in a vast number of installations and is adequate since elbows do not get the same abuse as straight jacketing and do not get walked on or ladders leaned on them.

RECOMMENDED USES

Ell-Jacs™ Plus are recommended for use anywhere aluminum jacketing is used on the associated straight sections of pipe but are especially critical when the straight pipe aluminum jacketing uses PFMB.

LIMITATIONS ON USE

Ell-Jacs™ Plus are not appropriate for the following applications:

- For applications where a maximum resistance to fire is required, ITW stainless steel elbow covers should be used
- Where maximum resistance to exterior surface corrosion is required, ITW stainless steel elbow covers should be used

EMITTANCE OF ALUMINUM ELBOWS

Ell-Jacs™ Plus have an outer surface emittance as measured by ASTM C1371 and specified by ASTM C1729 of:

- Standard clear coated = 0.5
- Bare aluminum (oxidized in service) for comparison = 0.1

FLAMMABILITY

Ell-Jacs™ Plus have been tested for flammability via the commonly used ASTM E84 test method. The results are shown below.

ASTM E84 Flame Spread Index = 0
ASTM E84 Smoke Developed Index = 5
(Tested with exterior metal surface exposed to the flame)

SURFACE FINISHES

Due to the pressing process during elbow formation, Ell-Jacs™ Plus have a smooth (mill) finish.

COMPLIANCE TO STANDARDS

Ell-Jacs™ Plus from ITW Insulation Systems comply with the applicable requirements of ASTM C1729 (Aluminum Jacketing Material Standard), Type III, Grade 3, Class A, which includes the strength and chemical composition requirements for compliance to ASTM B209 (Aluminum Alloy Standard).

SEALING OF JOINTS

For best insulation system performance and resistance to water infiltration, ITW recommends that all joints in Ell-Jacs™ Plus be sealed with an appropriate joint sealant. This should be applied between the overlapping pieces of metal in the joint and not as a caulking bead on the exterior lip of the joint.

Pro Insulation

4414 South 16th Street
Ft. Smith, AR 72901
Ph. 479-646-5644
Fax 479-646-5654

February 27, 2024

Comfort Systems USA, Inc.
P.O. Box 16620
Little Rock, AR 72231

Mr. Daniel Pierce

Re: Mechanical Insulation Submittals for Stone Bank Headquarters Renovations, Little Rock, Arkansas.

Spec Section 23 07 19.

The following items will be insulated with ¾ lb Knauf Atmosphere Duct Wrap with a foil skrim kraft vapor barrier jacket. All joints and seams will be sealed FSK Tape.

Item #1 Concealed Supply Duct---------- 2 3/16" Thick

Item #2 Concealed Return Duct---------- 2 3/16" Thick

Thank You,

Mike Galatzer

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 C1139 - unfaced; Type I, Type II,
  - Grade 1 - 0.75 PCF
  - Grade 2 - 1.0 PCF
  - Grade 3 - 1.5 PCF
- ASTM C553
  - Type I, Type II - 0.75 PCF
  - Type I, Type II - 1.0 PCF
  - Type I, II, III - 1.5 PCF
- ASTM C1136; Type II
- ASTM C1290
- 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.

with ECOSE® TECHNOLOGY

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.

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)
	2 3/16" (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)
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)

STRETCH-OUTS				
Labeled Thickness	**Installed Compressed Thickness**	**Round**	**Square**	**Rectangular**
1½" (38 mm)	1⅛" (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)
2 3/16" (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)

P = Perimeter of duct to be installed.

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

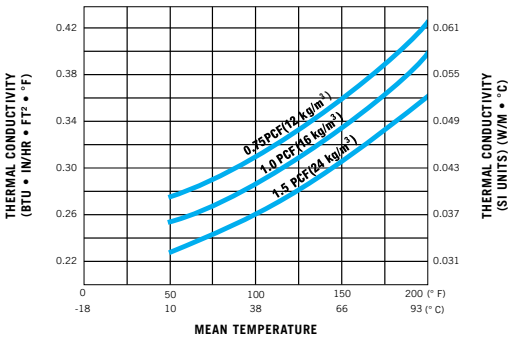
		Duct Wrap		Insertion Loss, dB/LF of Duct						
Duct Dimensions	Sheet Metal	Nominal Thickness	Nominal Density	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz
12" x 12" (305 mm x 305 mm)	24 GA	1½" (38 mm)	0.75 PCF (12 kg/m³)	0.6	0.6	0.6	0.7	7.4	14.2	20.9
24" x 12" (610 mm x 305 mm)	24 GA	1½" (38 mm)		0.6	0.6	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

CONDENSATION CONTROL | RECOMMENDED MIN. INSTALL R-VALUES FOR CONDENSATION CONTROL ON FLAT SURFACES.
SURFACE EMITTANCE: 0.2 (AGED ALUMINUM FOIL OR GALVANIZED SHEET METAL)

RH	Operating Temperature														
	45° F (7° C) Ambient Temperature (° F)					55° F (13° C) Ambient Temperature (° F)					60° F (18° C) Ambient Temperature (° F)				
%	70	80	90	100	110	70	80	90	100	110	70	80	90	100	110
60	2.2[1]	3.3[1]	4.3[2]	4.3[2]	5.4[3]	1.1[1]	2.2[1]	3.3[1]	3.3[1]	4.3[2]	1.1[1]	1.1[1]	2.2[1]	3.3[1]	4.3[2]
70	3.3[1]	5.4[3]	6.5[4]	7.6[5]	—	1.1[1]	3.3[1]	4.3[2]	6.5[4]	6.5[4]	1.1[1]	1.1[1]	3.3[1]	5.4[3]	6.5[4]
80	7.0[4]	—	—	—	—	3.3[1]	6.5[4]	—	—	—	2.2[1]	3.3[1]	6.5[4]	—	—
90	—	—	—	—	—	—	—	—	—	—	6.5[4]	—	—	—	—

[1]All Duct Wrap products
[2]0.75 PCF, 2" and greater; 1.0 PCF, 1½" and greater; 1.5 PCF, 1½" and greater
[3]0.75 PCF, 2" and greater; 1.0 PCF, 2"; 1.5 PCF, 2"
[4]0.75 PCF
[5]0.75 PCF, 3"

THERMAL EFFICIENCY | ASTM C177



Mean Temperature	0.75 PCF		1.0 PCF		1.5 PCF	
	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

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.

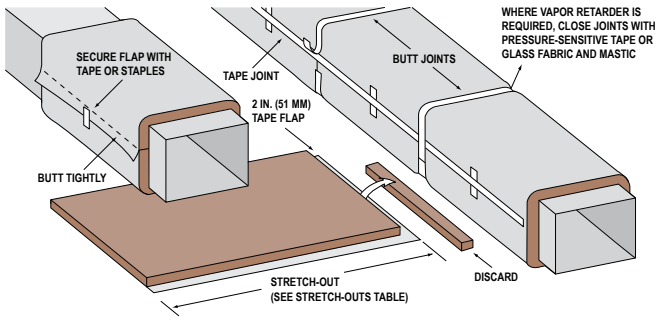
Application

- 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.
- It is neither necessary nor desirable to adhere duct wrap to duct surfaces with adhesive.
- 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



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.

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info.us@knaufinsulation.com

02-20

FASSON® 0828

Suitable for die-cut shapes, shielding, moisture and vapor barrier sealing components or lamination to insulation materials.

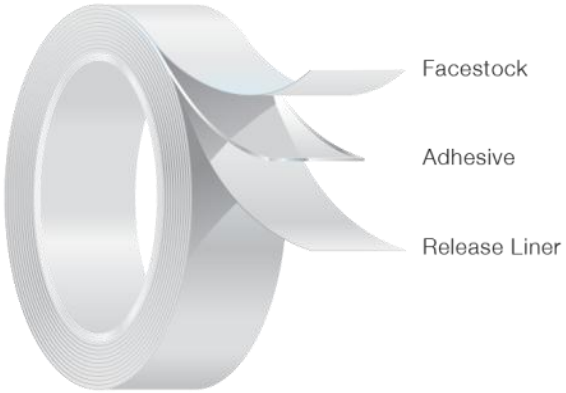
FEATURES:

- Specially formulated antimicrobial, extreme weather, COLD TOUGH™ acrylic adhesive
- High initial tack and quick stick
- Meets ASTM C-1136 Type II and Type IV
- PSA complies with South Coast Air Quality Management District's (SCAQMD) Rule 1168.
- UL 723 Recognition under File No. BVYS.R7078
- UL ULC S102 Recognition under File No. BVYS7.R7078

BENEFITS:

- Tri-directional 8.0 mil FSK facestock reinforces seal
- Strong bond to a variety of substrates
- High-strength reinforced FSK reinforces seal
- All weather acrylic insulation sealant tape
- Foil laminate facing (FSK) is decaBDE free
- Application temperature as low as 0ºF

Made in the USA



CONSTRUCTION:

Carrier:
Tri-directional FSK Foil Laminate
Adhesive:
COLD TOUGH™ Acrylic
Liner:
Densified Kraft

General Use Tape Surface Burning Characteristcs to

UL 723	Flame Spread	15
	Smoke Developed	10
		722S

LEED® Point Contributor

* Contributes to Energy Atmosphere (SA) Credit 1
* Contributes to Indoor Environmental Quality (IEC) Credit 4.1

FASSON® 0828

Adhesive Properties:		Typical Values		
Thickness	Test Method(s): PSTC-133	**US Mils**	**MM's**	**Microns (µm)**
Liner:		3.6	0.09	91
Adhesive:		1.7	0.04	43
Carrier:		8.0	0.20	203
Total Caliper:		13.3	0.34	338

PEEL ADHESION	Test Method(s): PSTC-101, ASTM D-3330, STD-10			
Product 180º 12" min				
Substrate		**Lbf / In**	**US Oz / In**	**N / Meter**
SS	Initial	6.5	104	1138

TLMI RELEASE	Test Method(s): PSTC-4, STD-8			
Product 90º 300" / min				
Substrate		**Gf / 2 In w**		
SS	Initial	40.0		

TENSILE	Test Method(s): PSTC-131, ASTM D-882, STD-3A,B,C			
Product 180º				
Substrate		**Lbf / In**	**US Oz / In**	**N / Meter**
Product	Initial MD	40.0	640	7004
	Initial CD	25.0	400	4378

ELONGATION	Test Method(s): PSTC-131, ASTM D-882, STD-3A,B,C			
Product 90º MD				
Substrate		**%**		
Product	Initial MD	< 1		
	Initial CD	< 1		

STATIC SHEAR	Test Method(s): PSTC-107, ASTM D 3654, STD-9			
Aluminum Foil 1" sq (6.5 cm2) 2500 g				
Substrate		**Min to Fail**		
SS		> 10,000		

VOC Content				
Product				
Substrate		**g / L**		
Product		< 15		

TEMPERATURES	**º F**	**º C**
Min Application Temp	0 º F	-17 º C
Max Continuous Operating Temp	200 º F	93 º C
Max Intermittent Operating Temp	250 º F	121 º C

THE LISTED VALUES ARE TYPICAL AND NOT INTENDED TO SERVE AS PRODUCT SPECIFICATIONS

APPLICATION TECHNIQUES

- It is essential, as with all pressure-sensitive tapes, that the surface to which the tape is applied be clean, dry, and free of grease or oil
- Bond strength is dependent upon the amount of adhesive-to-surface contact developed
- Note that different pressure, time and temperature on different (film / rigid) surface achieves different performance

STORAGE / SHELF LIFE

- One year when stored at 64-72ºF (18-22ºC) / 30-70% relative humidity, out of direct sunlight and in original packaging.

Please refer to Tapes.AveryDennison.com for complete terms and conditions, including warranty terms, relating to this product. You should periodically review the site as terms and conditions are subject to change without notice.

AVERY DENNISON Performance Tapes

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