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: 2/21/2024
Return Request: 3/28/2024
Project: Little Rock West High School
Supplier: Core Insulation
Manufacturer: Various
Submittal: HVAC Insulation
Submittal Number: 23 07 00-01
Drawing # and Installation: Mechanical Drawings

ARCHITECT
Lewis Architects Engineers
11225 Huron Lane, Suite 104
Little Rock, AR 72211
501-223-9302

ENGINEER
Lewis Architects Engineers
11225 Huron Lane, Suite 104
Little Rock, AR 72211
501-223-9302

GENERAL CONTRACTOR
Baldwin & Shell
1000 W. Capitol Ave.
Little Rock, AR 72201
501-374-8677

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

Notes:

chowell@comfortar.com

Core Insulation Contractors, LLC
102 W Washington St
Kearney, MO 64060

December 22, 2023

To: Casey Howell
Comfort Systems USA (AR)
PO Box 16620
Little Rock, AR 72231

Project: Little Rock West High School

The following items will be insulated with Knauf Atmosphere 3/4# fiberglass duct insulation. All joints and seams will be sealed with 3M FSK tape.

#1 – Concealed Round Supply/Return/OSA……2-3/16" Thick
#2 – Concealed Noted Rectangle Supply/Return/OSA……2-3/16" Thick
#3 – Supply grills……2-3/16" Thick

Thank you,

Scott Martin

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)

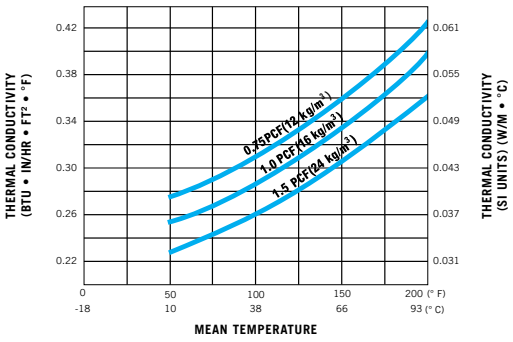
		Duct Wrap		Insertion Loss, dB/LF of Duct						
Duct Dimensions	Sheet Metal	Nominal Thickness	Nominal Density	63Hz	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz
12" x 12" (305 mm x 305 mm)	24 GA	1½" (38 mm)	0.75 PCF (12 kg/m³)	0.6	0.6	0.6	0.7	7.4	14.2	20.9
24" x 12" (610 mm x 305 mm)	24 GA	1½" (38 mm)		0.6	0.6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

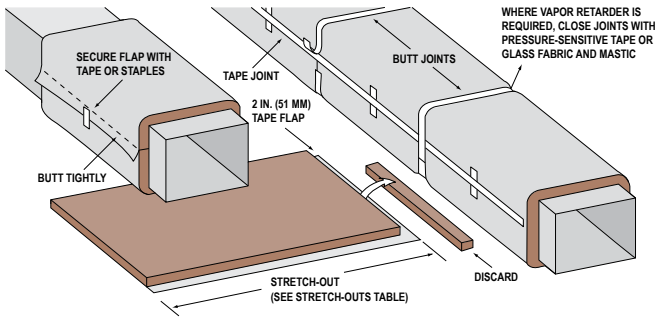
Application

- 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.

KNAUF INSULATION, INC.
One Knauf Drive
Shelbyville, IN 46176

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

02-20

3M Venture Tape™ FSK Facing Tape 1525CW/1528CW

Technical Data October 2017

Product Description

3M™ Venture Tape™ FSK Facing Tape 1525CW is a foil/scrim/kraft (FSK) lamination coated with a cold weather solvent acrylic pressure sensitive adhesive. 3M™ Venture Tape™ 1528CW is a FSK 2.5" disc version of 1525CW.

Product Construction

Backing	Adhesive	Color	Liner	Standard Roll Length
FSK	Acrylic	Natural Aluminum	Release Liner	50 yds (45.7 m)

Features

- Bonds and seals at temperatures as low as -10°F (-23°C).
- Cold weather adhesive performs well over a wide temperature range.
- Excellent performance in demanding heat and humidity conditions.
- Conforms well to irregular surfaces and curves.

Typical Physical Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Test	Typical Value	Typical Value (Metric)	Test Method
Total Tape Thickness	5.5 mils	0.14 mm	ASTM-D3652
Backing Thickness	4.0	0.10 mm	ASTM-D3652
Peel Adhesion	66 oz/in	18.3 N/25 mm	ASTM-D3330
Tensile Strength	39 lb/in	173.5 N/25 mm	ASTM-D3759
Elongation	2%	2%	ASTM-D3759
Service Temperature	-40° to 240°F	-40° to 116°C	

Application Ideas

- Sealing applications for fibrous ductboard, FSK-faced duct wrap and sheet metal ducts.
- Vapor seal for reinforced aluminum faced fiberglass or mineral wool thermal insulation.

Classifications

- UL723 Classified (10/10 Flame/Smoke Rating) [UL file #R10984]
- CAN/ULC S102 (10/10 Flame/Smoke Rating) [UL file #R10984]
- Facing meets ASTM C1136, type II and IV

3M™ Venture Tape™ FSK Facing Tape
1525CW/1528CW

Storage	Store in a clean, dry place. Temperature of 40-80°F (4-26°C) and 40 to 50% relative humidity are recommended.
Shelf Life	To obtain best performance, use this product within 24 months from date of manufacture
Technical Information	The technical information, guidance, and other statements contained in this document or otherwise provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.
Product Use	Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (*e.g.*, OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.
Warranty, Limited Remedy, and Disclaimer	Unless a different warranty is specifically stated on the applicable 3M product packaging or product literature (in which case such warranty governs), 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ARISING OUT OF A COURSE OF DEALING, CUSTOM, OR USAGE OF TRADE. If a 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.
Limitation of Liability	Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.

ISO 9001

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001 standards.

3M

Industrial Adhesives and Tapes Division

3M Center, Building 225-3S-06
St. Paul, MN 55144-1000
800-362-3550 • 877-369-2923 (Fax)
www.3M.com/construction

Core Insulation Contractors, LLC
102 W Washington St
Kearney, MO 64060

December 22, 2023

To: Casey Howell
Comfort Systems USA (AR)
PO Box 16620
Little Rock, AR 72231

Project: Little Rock West High School

The following items will be insulated with 3M Fire Barrier Duct Wrap 615+. All joints and seams will be sealed with 3" wide 3M FSK tape.

#1 – Grease Ducts (2 layers)…….1-1/2" Thick

Thank you,

Scott Martin

3M™ Fire Barrier Duct Wrap 615+

Product Data Sheet

FIRE BARRIER UP TO 2 HOUR Fire Protection

FLEXIBLE WRAP GREASE & AIR DUCT Fire Protection

ICC ES™ ICC-ES ESR-1255

NFPA 96

LISTED OMEGA POINT LABORATORIES US Intertek FIRE RESISTANT DUCT SEE INTERTEK DIRECTORY

LISTED C US Intertek FIRE RESISTANT DUCT SEE INTERTEK DIRECTORY

CLASSIFIED UL

BATTS AND BLANKETS
FOR USE IN FIRE RESISTIVE DUCT ASSEMBLIES
SEE UL FIRE RESISTANCE DIRECTORY
90G9

LISTING STATE OF CALIFORNIA STATE FIRE MARSHAL SERVICE

CSFM
LISTING No.
2440-0941:112

1. Product Description

3M™ Fire Barrier Duct Wrap 615+ is a flexible fire-resistant wrap consisting of an inorganic fiber blanket encapsulated with a scrim-reinforced foil. The product is 1-1/2 in. thick, 6pcf density.[1] It is used to fire rate commercial kitchen grease ducts as well as ventilation ducts. 3M™ Fire Barrier Duct Wrap 615+ is a proven alternative to 1- or 2-hour fire-resistant rated shaft enclosures for grease ducts (ICC-ES ESR-1255). With its excellent insulating capabilities, low weight and thin profile, it is an ideal choice for a duct enclosure system. This non-asbestos[2] wrap installs easily due to its high flexibility and strength.

[1] In accordance with the tolerances in ASTM C 892 Standard Specification for High-Temperature Fiber Blanket Thermal Insulation.
[2] Has been demonstrated to be soluble in the lungs according to EU guideline 97/69/EG, for biopersistence.

Flexible and lightweight with a thin profile for easier application and reduced space requirements

Product Features

- Two-layer wrap for grease ducts rated as a shaft alternative per ASTM E 2336
- Zero clearance to combustible throughout the entire enclosure system for congested spaces
- Butted inner layer in 2-layer Grease Duct Applications
- One-layer wrap for fire-resistive ventilation ducts per ISO 6944
- High flexibility for installation ease
- Foil encapsulated for blanket protection, less dust, and high wrap strength
- Widest range of penetration seal systems
- Available in 24 in. x 25 ft. (609.6 mm x 7.62 m) and 48 in. x 25 ft. (1219.2 mm x 7.62 m) rolls
- Blanket adhered to foil scrim

2. Applications

3M™ Fire Barrier Duct Wrap 615+ is an ideal fire resistive enclosure for commercial kitchen grease ducts and ventilation air ducts. It is a proven performance alternative to a 1- or 2-hour fire-resistant rated shaft enclosures for grease ducts and provides zero clearance to combustible construction throughout the entire enclosure system. 3M™ Fire Barrier Water Tight Sealant 1000 NS, 3M™ Fire Barrier Water Tight Sealant 1003 SL or 3M™ Fire Barrier Silicone Sealant 2000+ is used in combination with 3M™ Fire Barrier Duct Wrap 615+ to firestop the duct when the duct penetrates fire-rated floor or wall assemblies. 3M™ Fire Barrier Duct Wrap 615+ also provides a firestop solution where a T-rating is required for penetrations located outside wall cavities or outside fire-resistance rated shaft enclosures.

Two-layer grease duct applications: 3M™ Fire Barrier Duct Wrap 615+ meets the criteria of ASTM E 2336 Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems.

Single-layer air duct applications: 3M™ Fire Barrier Duct Wrap 615+ has passed ISO 6944-1985 Fire Resistance Tests – Ventilation Ducts.

T-rating for metallic through-penetrating items: 3M™ Fire Barrier Duct Wrap 615+ is used in conjunction with 3M Fire Barrier sealants to achieve up to 2-hour equal F & T-ratings in ASTM E 814 (Ul 1479) tested through-penetrations.

3. Specifications

Installation shall be in strict accordance with manufacture's written instructions, as shown on the approved shop drawings. 3M™ Fire Barrier Duct Wrap 615+ shall be a high-temperature fiber blanket thermal insulation encapsulated in a fiberglass-reinforced aluminized polyester foil. Duct Wrap density shall be nominal 6 pcf (96 kg/m^3) and have a nominal 1-1/2 in. (38.1 mm) thickness. The fiber blanket shall have a continuous use limit of 1000 °C (1832 °F). The blanket thermal resistance (R-value) at ambient temperature shall be minimum $6.3 \frac{°F \cdot ft^2 \cdot hr}{Btu}$.

Smoke Developed Index and Flame Spread Index of the bare blanket, and of the foil encapsulated blanket shall be 0/0. The foil encapsulation shall be bonded to the core blanket material.

Typically Specified Division or Section
Division 7 – Thermal and Moisture Protection
Section 23 07 13 – Duct Insulation

Related Sections
Section 07 21 00 – Thermal Protection
Section 07 21 16 – Blanket Insulation
Section 07 84 00 – Firestopping
Section 23 00 00 – Heating, Ventilation and Air-Conditioning (HVAC)
Section 23 31 13 – Metal Ducts

4. Performance & Typical Physical Properties

Scrim Color:	Aluminum with Black Text
Blanket Color:	White
Blanket Weight:	0.9 lbs/ft.^{2} (4.38 kg/m^2)
Surface Burning:	Foil Encapsulated Blanket (ASTM E 84) Flame Spread 0, Smoke Development 0

Thermal Conductivity:

Temp.	$\frac{Btu - in.}{hr - ft^2 - °F}$	$\frac{W}{m^2 - K}$
500°F (260°C)	0.60	0.09
1000°F (537°C)	1.15	0.17
1500°F (815°C)	1.93	0.28
1800°F (982°C)	2.51	0.36
2000°F (1093°C)	2.94	0.43

Single layer R-Value of 3M™ Fire Barrier Duct Wrap 615+ at 77°F (25°C):

$$6.38 \ \frac{°F - ft^2 - hr}{Btu}$$

Linear Shrinkage (24 Hr@ 2012°F (1000°C)): 1.2%

5. Design Listings

Grease Duct Listings – ASTM E 2336 / ICC-ES AC101

Fire Resistive Rating	Enclosure System	Third-Party Testing Services Design Listing	Description
1- and 2-hour	2 layers of 3M™ Fire Barrier Duct Wrap 615+	ICC-ES ESR-1255 Intertek 3MU/FRD 120-18 Intertek 3MU/FRD 120-19	Rectangular Rectangular Round

Ventilation Duct Listings – ISO 6944

Fire Resistive Rating	Enclosure System	Third-Party Testing Services Design Listing	Description
1- and 2-hour	1 layer of 3M™ Fire Barrier Duct Wrap 615+	Intertek 3MU/DI 60-01 Underwriters Laboratories HNLJ.V-27 Intertek 3MU/DI 120-01	Rectangular/Round (1 Hour) Rectangular (2 Hour) Rectangular/Round (2 Hour)

This document only contains a partial list of Design Listings. For the latest information go to www.3M.com/firestop or speak to your authorized 3M distributor or sales representative at (800) 328-1687.

6. Codes & Test Standards

3M™ Fire Barrier Duct Wrap 615+ has been tested in accordance with the following:

ICC-ES AC101 **ASTM E 2336** **ASTM E 119** **ASTM E 814** **ASTM E 84**
ASTM E 136 **ASTM C 518** **ISO 6944-85**

3M™ Fire Barrier Duct Wrap 615+, when installed per ASTM E 2336 tested Grease Duct Design Listings, meets the following code requirements:

NFPA 96 2008 Edition **International Mechanical Code®** 2003/2006/2009 **Uniform Mechanical Code** 2003/2006/2009

3M™ Fire Barrier Duct Wrap 615+, when installed per ISO 6944 tested Ventilation Duct Design Listings, can help to satisfy the following code requirements:

NFPA 92A 2009 Edition – Section 6.6.2 **NFPA 92B** 2009 Edition – Section 7.5.2
International Mechanical Code® 2006/2009 Editions – Section 513.10.2 **International Building Code®** 2006/2009 Editions – Section 909.10.2

7. Packaging, Storage, Shelf Life

3M™ Fire Barrier Duct Wrap 615+ rolls are packaged in corrugated cardboard boxes. Product is stable under normal storage conditions. Normal stock and stock rotation practices are recommended. 3M™ Fire Barrier Duct Wrap 615+ shelf life is indefinite when stored in original unopened packaging in a dry warehouse environment. Pallets should not be stacked. 3M™ Fire Barrier Water Tight Sealant 1000 NS or 1003 SL or 3M™ Fire Barrier Silicone Sealant 2000+ must be also stored in a dry warehouse environment.

8. Safe Handling Information

Consult country-of-use Material Safety Data Sheet (MSDS) prior to handling and disposal.

9. Availability

Description	Size	Unit	Billing UPC Number	Units/Case	Price Unit
Space-saving, flexible duct wrap with up to 2-HR protection	24" x 25' Roll	Roll	00051115-54905-2	1	EA
Space-saving, flexible duct wrap with up to 2-HR protection	48" x 25' Roll	Roll	00051115-54906-9	1	EA
Collar for butted joint installations	6" x 25' Roll	Roll	00051115-18804-6	4	EA

For additional technical and purchasing information regarding 3M Fire Protection Products, please call: 1-800-328-1687 or visit www.3m.com/firestop.
3M™ Fire Barrier Duct Wrap 615+ is available from 3M Authorized Fire Protection Products Distributors and Dealers.

3M

Building and Commercial Services Division
3M Center, Building 223-2N-21
St. Paul, MN 55144-1000 USA
1-800-328-1687
www.3M.com/firestop

3M Venture Tape™ FSK Facing Tape 1525CW/1528CW

Technical Data October 2017

Product Description

3M™ Venture Tape™ FSK Facing Tape 1525CW is a foil/scrim/kraft (FSK) lamination coated with a cold weather solvent acrylic pressure sensitive adhesive. 3M™ Venture Tape™ 1528CW is a FSK 2.5" disc version of 1525CW.

Product Construction

Backing	Adhesive	Color	Liner	Standard Roll Length
FSK	Acrylic	Natural Aluminum	Release Liner	50 yds (45.7 m)

Features

- Bonds and seals at temperatures as low as -10°F (-23°C).
- Cold weather adhesive performs well over a wide temperature range.
- Excellent performance in demanding heat and humidity conditions.
- Conforms well to irregular surfaces and curves.

Typical Physical Properties

Note: The following technical information and data should be considered representative or typical only and should not be used for specification purposes.

Test	Typical Value	Typical Value (Metric)	Test Method
Total Tape Thickness	5.5 mils	0.14 mm	ASTM-D3652
Backing Thickness	4.0	0.10 mm	ASTM-D3652
Peel Adhesion	66 oz/in	18.3 N/25 mm	ASTM-D3330
Tensile Strength	39 lb/in	173.5 N/25 mm	ASTM-D3759
Elongation	2%	2%	ASTM-D3759
Service Temperature	-40° to 240°F	-40° to 116°C	

Application Ideas

- Sealing applications for fibrous ductboard, FSK-faced duct wrap and sheet metal ducts.
- Vapor seal for reinforced aluminum faced fiberglass or mineral wool thermal insulation.

Classifications

- UL723 Classified (10/10 Flame/Smoke Rating) [UL file #R10984]
- CAN/ULC S102 (10/10 Flame/Smoke Rating) [UL file #R10984]
- Facing meets ASTM C1136, type II and IV

3M™ Venture Tape™ FSK Facing Tape
1525CW/1528CW

Storage	Store in a clean, dry place. Temperature of 40-80°F (4-26°C) and 40 to 50% relative humidity are recommended.
Shelf Life	To obtain best performance, use this product within 24 months from date of manufacture
Technical Information	The technical information, guidance, and other statements contained in this document or otherwise provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.
Product Use	Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. As a result, customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment and reviewing all applicable regulations and standards (*e.g.*, OSHA, ANSI, etc.). Failure to properly evaluate, select, and use a 3M product and appropriate safety products, or to meet all applicable safety regulations, may result in injury, sickness, death, and/or harm to property.
Warranty, Limited Remedy, and Disclaimer	Unless a different warranty is specifically stated on the applicable 3M product packaging or product literature (in which case such warranty governs), 3M warrants that each 3M product meets the applicable 3M product specification at the time 3M ships the product. 3M MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ARISING OUT OF A COURSE OF DEALING, CUSTOM, OR USAGE OF TRADE. If a 3M product does not conform to this warranty, then the sole and exclusive remedy is, at 3M's option, replacement of the 3M product or refund of the purchase price.
Limitation of Liability	Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.

ISO 9001

This Industrial Adhesives and Tapes Division product was manufactured under a 3M quality system registered to ISO 9001 standards.

3M

Industrial Adhesives and Tapes Division

3M Center, Building 225-3S-06
St. Paul, MN 55144-1000
800-362-3550 • 877-369-2923 (Fax)
www.3M.com/construction

Core Insulation Contractors, LLC
102 W Washington St
Kearney, MO 64060

December 22, 2023

To: Casey Howell
Comfort Systems USA (AR)
PO Box 16620
Little Rock, AR 72231

Project: Little Rock West High School

The following items will be insulated with Armaflex Black LapSeal. Fittings will be mitered sections of pipe insulation. All joints and seams will be sealed with Armaflex 520 Adhesive.

#1 – Interior Refrigerant Piping……1/2" Thick
#2 – Condensate Drains……1/2" Thick

The following items will be insulated with Aerocel SSPT. Fittings will be mitered sections of pipe insulation. All joints and seams will be sealed with Armaflex 520 Adhesive.

#1 – Exterior Refrigerant Piping……1/2" Thick

Thank you,

Scott Martin

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

Specification Compliance

ASTM C 534, Type I – Grade 1	UL 723	ASTM G21/C1338	
ASTM E 84	NFPA 90A, 90B	ASTM G22	
NFPA 255	UL 181	ASTM D 1056, 2C1	

Approvals, Certifications, Compliances

- 3rd party certified by FM Approvals through 1-1/2" wall thickness
- 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.
- Plenum Rated

Typical Properties

Specifications	Values		Test Method
	3/8" through 1" Wall	**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 or ASTM C1763
Mold Growth: **Fungi Resistance:** **Bacterial Resistance:**	Passed	Passed	UL181 ASTM G21/C1338 ASTM G22
Upper Use Limit:	220°F (105°C)	300°F (149°C)	ASTM C534
Lower Use Limit: ①	-297°F (-183°C) ②	-297°F (-183°C) ②	ASTM C534

Sizes

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

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

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. Microban International, Ltd. makes neither direct nor implied health claims for the products containing Microban® antimicrobial product protection. Data, photomicrographs and information presented are based on standard laboratory tests and are provided for comparative purposes to substantiate antimicrobial activity for non-public health uses. Microban is a registered trademark of Microban International, Ltd.

AP ArmaFlex BLACK LAPSEAL TUBE INSULATION - R VALUES

3/8 " Walls

IPBST05838	1/2" Copper	2.6
IPBST03438	5/8" Copper	2.4
IPBST07838	3/4" Copper	2.4
IPBST11838	1" Copper	2.3
IPBST13838	1-1/4" Copper	2.2
IPBST15838	1-1/2" Copper	2.5
IPBST11038	1-1/2" IPS	2.4
IPBST21838	2" Copper	2.4

1/2 " WALLS

IPBST03812	1/4" Copper	3.3
IPBST01212	3/8" Copper	3.3
IPBST05812	1/2" Copper	3.4
IPBST03412	5/8" Copper	3.3
IPBST07812	3/4" Copper	3.3
IPBST11812	1" Copper	3.3
IPBST13812	1-1/4" Copper	3.2
IPBST15812	1-1/2" Copper	3.2
IPBST11012	1-1/2" IPS	3.1
IPBST21812	2" Copper	3.2
IPBST20012	2" IPS	3.2
IPBST25812	2-1/2" Copper	3.2
IPBST21012	2-1/2" IPS	3.2
IPBST31812	3" Copper	3.2
IPBST30012	3" IPS	3.1
IPBST35812	3-1/2" Copper	3.1
IPBST41812	4" Copper	3.1
IPBST40012	4" IPS	3.0

3/4 " WALLS

IPBST03834	1/4" Copper	5.9
IPBST01234	3/8" Copper	5.5
IPBST05834	1/2" Copper	5.6
IPBST03434	5/8" Copper	5.5
IPBST07834	3/4" Copper	5.4
IPBST11834	1" Copper	5.4
IPBST13834	1-1/4" Copper	5.3
IPBST15834	1-1/2" Copper	5.1
IPBST11034	1 1/2" IPS	4.9
IPBST21834	2" Copper	4.8
IPBST20034	2" IPS	5.2
IPBST25834	2-1/2" Copper	4.7
IPBST21034	2-1/2" IPS	5.0
IPBST31834	3 " Copper	4.6
IPBST30034	3" IPS	4.9
IPBST35834	3-1/2" Copper	4.5
IPBST41834	4" Copper	4.5
IPBST40034	4" IPS	4.8

1" WALLS

IPBST03810	1/4" Copper	7.3
IPBST01210	3/8" Copper	7.2
IPBST05810	1/2" Copper	7.2
IPBST03410	5/8" Copper	7.0
IPBST07810	3/4" Copper	7.0
IPBST11810	1" Copper	7.2
IPBST13810	1-1/4" Copper	7.2
IPBST15810	1-1/2" Copper	7.2
IPBST11010	1-1/2" IPS	6.9
IPBST21810	2" Copper	6.8
IPBST20010	2" IPS	7.1
IPBST25810	2-1/2" Copper	6.5
IPBST21010	2-1/2" IPS	6.8
IPBST31810	3" Copper	6.3
IPBST30010	3" IPS	6.6
IPBST35810	3-1/2" Copper	6.2
IPBST41810	4" Copper	6.1
IPBST40010	4" IPS	6.4
IPBST50010	5 " IPS	6.2
IPBST40010	6 " IPS	6.1

1-1/2" WALLS

IPBST03815	1/4" Copper	13.7
IPBST01215	3/8" Copper	12.7
IPBST05815	1/2" Copper	12.0
IPBST03415	5/8" Copper	11.3
IPBST07815	3/4" Copper	10.8
IPBST11815	1" Copper	10.1
IPBST13815	1-1/4" Copper	9.6
IPBST15815	1-1/2" Copper	9.2
IPBST11015	1-1/2" IPS	8.7
IPBST21815	2" Copper	8.6
IPBST20015	2" IPS	8.8
IPBST25815	2-1/2" Copper	8.2
IPBST21015	2-1/2" IPS	8.4
IPBST31815	3" Copper	7.9
IPBST30015	3" IPS	8.1
IPBST35815	3-1/2" Copper	7.7
IPBST41815	4" Copper	7.5
IPBST40015	4" IPS	7.8
IPBST50015	5" IPS	7.5
IPBST60015	6" IPS	7.3

2" WALLS

IPBST03820	1/4" Copper	19.7
IPBST01220	3/8" Copper	18.2
IPBST05820	1/2" Copper	17.2
IPBST03420	5/8" Copper	16.2
IPBST07820	3/4" Copper	15.5
IPBST11820	1" Copper	14.5
IPBST13820	1-1/4" Copper	13.7
IPBST15820	1-1/2" Copper	13.1
IPBST11020	1-1/2" IPS	12.4
IPBST21820	2" Copper	12.2
IPBST20020	2" IPS	12.3
IPBST25820	2-1/2" Copper	11.6
IPBST21020	2-1/2" IPS	11.7
IPBST31820	3" Copper	11.1
IPBST30020	3" IPS	11.2
IPBST35820	3-1/2" Copper	10.7
IPBST41820	4" Copper	10.5
IPBST40020	4" IPS	10.7
IPBST50020	5" IPS	10.2
IPBST60020	6" IPS	9.9

* These specifications are based on the measurement methods employed by Armacell. Other methods may not result in the same values and cannot be used to determine if the product is within the given tolerance.

AEROCEL-SSPT®

Closed Cell Elastomeric Thermal Insulation for HVAC & R

General

AEROCEL® Tube Insulation is a highly flexible, closed-cell and lightweight EPDM-rubber based elastomeric product. Aerocel-SSPT® Tube Insulation is designed for insulating warm or cold piping, duct, or equipment. Aerocel-SSPT® EPDM Elastomeric Tube Insulation is supplied in 1/4", 3/8", 1/2", 3/4", 1", 1-1/4",1-1/2" ", 2", 2-1/2" and 3" thicknesses, in popular I.D. sizes up to 8" IPS. Please check for specific size combinations. The tightly formed, closed-cell structure of Aerocel-SSPT® Tube Insulation makes it an efficient insulation, providing superior insulating capacity to many materials, including other elastomeric insulations. Aerocel is manufactured to consistently provide actual values on these key performance criteria for mechanical system insulation:

Self-Seal with Protape (SSPT) affords the most secure self-seal, dual-tape closure available. Avoids call-backs or failures. Maintains its seal in harsh conditions.

Thermal Conductivity: 0.245
Water Vapor Transmission, Perms: 0.03
UV Resistance: Minimal change, ASTM G 7 and ASTM G 90
Fire Rating: Will not contribute significantly to fire (simulated end-use testing).

Aerocel-SSPT® Tube Insulation, in 1/4" through 2" thickness, has a flame spread rating of 25 or less and a smoke developed rating of 50 or less as tested by ASTM E 84 "Surface Burning Characteristics of Building Materials." Aerocel EPDM Pipe Insulation is acceptable for use in air distribution systems including ducts, plenums, air handling equipment and air terminal devices.

Uses

Aerocel-SSPT® Pipe Insulation is used to retard heat gain or loss, and to control condensation formation on cold-water plumbing, chilled water, and refrigeration lines. The material also efficiently reduces heat flow on hot water plumbing, liquid heating and dual-temperature piping systems. Aerocel® sheet is used to insulate large OD pipes, chillers, vessels and tanks, and can be used as a duct liner or duct wrap. The recommended service temperature range for Aerocel Insulation is -297°F to +257°F. ***Aerocel® is designed for installation above and below ground, indoors and outdoors. No protective finish is required.***

Aerocel-SSPT® Pipe Insulation is uniquely suited, over many other cellular or fibrous insulation materials, to dual-temperature HVAC piping systems. This unique fit results from Aerocel's proprietary combination of very low moisture vapor flow for times of cooling-mode operation, higher temperature usage properties during times of heating-mode operation, and superior insulating capacity in either operating mode.

Aerocel-SSPT® Pipe Insulation is uniquely suited to Solar piping systems because of its proprietary combination of UV Resistance, greater thermal efficiency, non-corrosiveness to copper or stainless steel, and availability as single layer product in greater thicknesses.

Resistance to Moisture Vapor Flow

The unique cell structure of Aerocel® EPDM Insulation effectively retards the flow of moisture vapor. Aerocel is considered a low transmittance vapor retarder. In normal service conditions, Aerocel requires no supplemental vapor retarder protection. When used in extremely low-temperature or extremely high-humidity conditions, an additional vapor barrier maybe required.

Key Features

- UV Resistant – Added Weather Protection Not Required, Saves on First Cost and Maintenance
- Lower Thermal Conductivity – Saves Additional Energy Costs
- 257° Upper Use Limit – Greater Application Range – Cryogenic to Low Pressure Steam
- E 84 25/50 to 2" Thickness – Lowers Installation Costs with Fewer Layers
- Versatile for Heating, AC, Refrigeration, Solar, Plumbing – Single Product for All Systems
- Easy to install – Lowers Installation Costs, Keeps Job Cost as Estimated

c UL us

Application

AEROCEL-SSPT® Aerocel-SSPT® utilizes a unique 2 step sealing system to insure a permanent seal. Step 1 is an acrylic adhesive seam seal on the inside of the longitudinal joint. Step 2 is an EPDM flap that utilizes a cellular fusion adhesive that closes across the top of the longitudinal seam. This adhesive chemistry bonds the EPDM to the tube ensuring a seal for the life of the system. Butt joints and other seams are to be sealed with contact adhesive. Fittings can be fabricated from straight tubing or sheet. Larger diameter, curved, or flat surfaces can be insulated by adhering properly fabricated sheet sections to them. Consult the Aeroflex Installation Handbook for more complete installation details and instructions.

Aerocel® is designed for installation above and below ground, indoors and outdoors. No protective finish is required.

In addition to the specifications listed below, Aerocel also is approved by or conforms to the requirements of the following: ASTM C 534 Type I and II, NY City MEA #171-04-M, City of LA RR-8413, UL 181 Section 13 Mold Growth/Humidity, ASTM G 21 Fungal Resistance Test, UL181 Section 18 Air Erosion, NFPA 90A & 90B, MIL15280J, CAN/ULC-S102-07.

Aerocel Sheet and Tube insulations meet the energy code requirements of International Energy Conservation Code(IECC) and ASHRAE for R-4 for Refrigeration Piping at 1" wall thickness.

PHYSICAL PROPERTIES		RESULT				TEST METHOD
Cell Structure			Closed Cell			
Thermal Conductivity	Mean temp.	-4˚F (-20˚C)	32˚F (0˚C)	75˚F (24˚C)	90˚F (32˚C)	ASTM C 518 / C 177 104˚F (40˚C)
BTU.in/ft.²hr. ˚F	K-value	0.22	0.23	0.245	0.25	0.265
Service Temperature, CONTINUOUS		-297°F to +257°F -57°C to +125°C				ASTM C 411 AEROCEL loses flexibility at -70°F. This does not affect the insulating properties of the material.
U.V. Resistance		PASS				ASTM G 7 / G 90
Ozone Resistance		No cracking				ASTM D 1171
Water Vapor Permeability		.03 perm (4.38 x 10^{-11})				ASTM E 96
Water Absorption (weight %)		.2%				ASTM C 209
Fire Safety Characteristics Through 2" thickness		UL-94 5 V-A, V-O				File E228536
		25/50				ASTM E84
		Self extinguishing				ASTM D 635
Corrosion of Stainless Steel		Non corrosive				ASTM C 692, DIN 1988
Nitrosamine Content		None detected				U.S. FDA CPG No. 7117.11 BSEN 12868
Flexibility		PASS				ASTM C 534

ASHRAE 90.1-2007 ENERGY EFFICIENCY INSULATION THICKNESS

	Pipe Sizes				
	<1" ID	1" ID to <1-1/2" ID	1-1/2" ID to < 4" ID	4" ID to < 8" ID	≥ 8" ID
Operating Temperature	**Space Heating (*Insulation Thickness, Inches*)**				
201 Deg. F - 250 Deg. F	1-1/2"	1-1/2"	2"	2"	2"
141 Deg. F - 200 Deg. F	1"	1"	1"	1-1/2"	1-1/2"
105 Deg. F - 140 Deg. F	1/2"	1/2"	1"	1"	1"
Operating Temperature	**Service Water Heating (*Insulation Thickness, Inches*)**				
105 Deg. F+	1/2"	1/2"	1"	1"	1"
Operating Temperature	**Cooling Systems (*Insulation Thickness, Inches*)**				
40 Deg. F - 60 Deg. F	1/2"	1/2"	1"	1"	1"
≤40 Deg. F	1/2"	1"	1"	1"	1-1/2"

MINIMUM THICKNESS OF AEROCEL REQUIRED TO PREVENT CONDENSATION

	Pipe Operating Temperature			
	50 Deg.	38 Deg. F	0 Deg. F	-20 Deg. F
Insulation Thickness	**Pipe Outside Diameters**			
Design Conditions — 85 Deg. F, 70% RH, Low Air Movement				
1/4"	3/8" - 1"	-	-	-
3/8"	3/4" - 6"	3/8" - 3/4"	-	-
1/2"	-	7/8" - 6"	-	-
3/4"	-	-	3/8" - 1-1/2"	3/8" - 1/2"
1"	-	-	1-5/8" - 6"	3/4" - 2-1/2"
1-1/4"	-	-	-	2-5/8" - 6"
Design Conditions — 80 Deg. F, 50% RH, Low Air Movement				
1/4"	3/8" - 6"	3/8" - 6"	-	-
3/8"	-	-	3/8" - 3/4"	-
1/2"	-	-	7/8" - 6"	3/8" - 1"
3/4"	-	-	-	1-1/8" - 6"
Design Conditions — 90 Deg. F, 80% RH, Low Air Movement				
1/2"	3/8" - 7"	-	-	-
3/4"	1" - 6"	3/8" - 2"	-	-
1"	-	2-1/8" - 6"	3/8" - 1/2"	-
1-1/4"	-	-	3/4" - 2"	3/8" - 7/8"
1-1/2"	-	-	2-1/8" - 6"	1" - 2-1/8"
2"	-	-	-	2-1/4" - 6"

* Although in some areas of the country, 1/4" and 3/8" wall thicknesses are recommended, Aeroflex USA recommends 1/2" minimum wall thickness for optimum performance.

AEROFLEX USA, INC.
282 Industrial Park Road • Sweetwater, TN 37874
Tel: (423) 337-2493 • Fax: (423) 337-7675
Toll Free: (866) AEROCEL
Website: www.aeroflexusa.com

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

Specification Compliance

MIL-A-24179A	ASTM G21/C1338

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	615 g/l	
Solids Content	Approximately 22% by weight	
Coverage	200 sq ft (5 m^2/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)	

ABOUT ARMACELL

As the inventors of flexible foam for equipment insulation and a leading provider of engineered foams, Armacell develops innovative and safe thermal, acoustic and mechanical solutions that create sustainable value for its customers. Armacell's products significantly contribute to global energy efficiency making a difference around the world every day. With 3,000 employees and 26 production plants in 17 countries, the company operates two main businesses, Advanced Insulation and Engineered Foams. Armacell focuses on insulation materials for technical equipment, high-performance foams for high-tech and lightweight applications and next generation aerogel blanket technology.

For more information, please visit:
www.armacell.us
800-866-5638

armacell®
ArmaFlex®

Core Insulation Contractors, LLC
102 W Washington St
Kearney, MO 64060

December 22, 2023

To: Casey Howell
Comfort Systems USA (AR)
PO Box 16620
Little Rock, AR 72231

Project: Little Rock West High School

The following items will be insulated with Knauf Earthwool pipe insulation. All joints and seams will be sealed with 3" wide 3M ASJ+ tape. Fittings will be mitered sections of fiberglass pipe cover.

#1 – Heating Water (1" and smaller).....1" Thick
(1-1/4" thru 4").....1-1/2" Thick
(6" and larger).....2" Thick
#2 – Chilled Water – Interior (1" and smaller).....1" Thick
(1-1/4" thru 2").....1-1/2" Thick
(2-1/2" and larger).....2" Thick

Thank you,

Scott Martin

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.

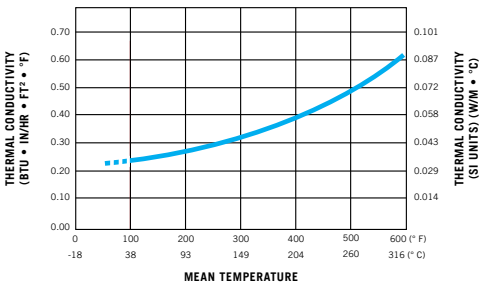
b. These thicknesses are based on energy efficiency considerations only.

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

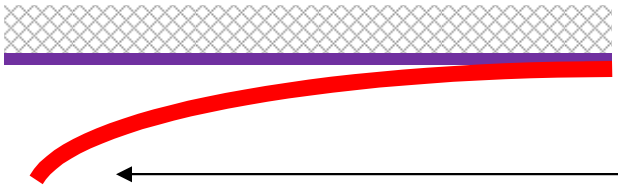
01-20

106FXP

NEXT GENERATION ASJ BUTTSTRIP TAPE

Product 106FXP NEXT GENERATION ASJ is a flexible white polypropylene/core/scrim/foil lamination coated with a cold weather solvent acrylic pressure sensitive adhesive. Specifically designed for use as a vapor seal on NEXT GENERATION ASJ faced duct board and pipe insulation, 106FXP applies easily and excels in demanding temperature and humidity applications, providing superior performance and durability over a wide range of conditions.

Product Construction



Features & Benefits

- *UL723 Classified (0/0 Flame/Smoke Rating)*
  UL file # R10984
- *Specifically designed for cold weather conditions*
- *High performance insulation tape is ideal for use as a vapor seal for on Next Generation ASJ (WMP-ASJ) faced fiberglass duct board and pipe insulation*
- *High tack acrylic adhesive performs well over a wide temperature range*
- *In stock product available for immediate delivery*

Test	Typical Value	Typical Value (Metric)	Test Method
Product Thickness Ω	10.0 mils	0.25 mm	PSTC-133
Peel Adhesion Δ	55 oz/in	15.3 N/25 mm	PSTC-101
Shear Adhesion	>24 hrs @ 2.2 psi	>24 hrs @ 15.2 kPa	PSTC-107
Tensile Strength	70 lb/in	333.2 N/25 mm	PSTC-131
Elongation	5 %	5 %	PSTC-131
Service Temperature	-40 to 240 ℉	-40 to 116 ℃	

Ω - excluding liner

Δ - 20 minute dwell

Typical values are not intended to be used for specification development. Technical data is believed to be true and accurate; Venture Tape recommends that the purchaser test for fitness of use in all applications.

Product Configurations

- *3" and 4" standard width*
- *Additional roll widths and lengths available, contact Venture Tape for information*

Contact Venture Tape today for a complete list of products or a free sample

Toll Free North America 800-343-1076
From United Kingdom 0-800-962-957
From Australia 1-800-122-797

VentureTape®

GTA - NHT, Inc.
Venture Tape
30 Commerce Rd., Rockland, MA 02370
Tel 781-331-5900; Fax 781-871-0065
800-343-1076 (U.S.A.), 800-544-1024 (Canada)
Toll Free Fax 877-264-5490
www.venturetape.com

GTA TAPES & ADHESIVES a 3M Company

Childers®

Mastics, Coatings, Adhesives, Sealants

CP-33 CHIL-OUT™ Vapor Retarder Coating

Product Data Sheet

INDOOR & OUTDOOR
WATER-BASED, VAPOR RETARDER COATING

DESCRIPTION

CP-33 is a water-based, vapor retarder coating for insulation on interior, exterior, low temperature, some dual temperature applications (such as chilled water and refrigerated pipe lines), HVAC ducts and low temperature equipment. It is fast drying and forms a tough, flexible dry film which protects insulated surfaces and helps retard the flow of vapor through an insulation system. It has a smooth, creamy consistency that spreads easily and can be applied in a relatively heavy coating or brushed out into a thin, smooth film.

USES

CP-33 can be used on most types of thermal insulations in both cold and dual temperature service. It is used to vapor seal the seams, overlaps and punctures from pins and staples in FSK, ASJ, white paper and polyester vapor retarder facings on insulation boards, duct wrap and pipe covering. It may also be used to seal cut ends of insulation to prevent moisture ingress and fiber release. It is compatible with fiber glass, mineral fiber, cellular glass, polyisocyanurate, polyurethane, polystyrene, phenolic, rubber foam and other insulations.

APPLICATION

CP-33 features easy application by trowel or brush. It may be applied with CHIL-GLAS® #10 Glass Fiber Reinforcing Mesh to increase film strength. See reverse side of product data sheet for application information.

ADVANTAGES

- Water-based for personal and environmental safety.
- Fast-drying contributes to maximum production rates.
- Non-flammable – safe for transport, storage and usage.
- Quick and efficient cleanup of tools and metal with warm water before coating completely dries.
- Outdoor rated and UV resistant.

CERTIFIED

- MAS Certified Green®
- California Dept. of Public Health Standard Method v1.2
- VOC Emissions and Content requirements to contribute to **LEED v4** EQ Credit: Low Emitting Materials – Paints and Coatings
- VOC Content: 49 g/l, less water and exempt solvents
- Collaborative for High Performance Schools EQ 7.1
- Meets NFPA Standard 90A and 90B 25/50 requirements as a closure mastic

COLOR

White

AVERAGE WET WEIGHT (ASTM D1475)

11.9 lbs./U.S. gal. (1.4 kg/liter)

AVERAGE NON-VOLATILE (ASTM D2369)

55% by volume (68.5% by weight)

SERVICE TEMPERATURE RANGE

Temperature to which dry film is subjected.
-20°F to 190°F (-29°C to 88°C)

APPLICATION & STORAGE TEMPERATURE RANGE

40°F to 100°F (4°C to 38°C)

DRYING TIME

Temperature, humidity and film thickness will affect drying time.
To Touch: 3 Hours
Through: 24 Hours

COVERAGE

Varies with substrate and membrane.
4 U.S. gal./100 sq. ft. (1.6 l/m^2)

CLEAN UP

Warm, soapy water while coating is still wet.

WATER VAPOR PERMEANCE (TYPICAL AVERAGE)

Tested with reinforcing mesh.

ASTM F1249: 0.15 perms (0.10 metric perms) at 28 – 53 mils (1.1 – 1.27 mm) dry film thickness. Tested at 73°F, 50% RH.

ASTM E96, PROCEDURE A: 0.15 perms (0.10 metric perms) at 50 mils (1.25 mm) dry film thickness.

Meets the permeance requirements of ASTM C755-19, Section 7.2.2 for below ambient vapor retarder coatings when used as a closure mastic in conjunction with ASJ and other vapor retarder membranes.

SURFACE BURNING CHARACTERISTICS (ASTM E84)

Flame Spread: 5
Smoke Developed: 15
Tested as applied in a 4 in. strip at a rate of 25 sq. ft./U.S. gallon to inorganic reinforced cement board.

Visit us on the web at www.fosterproducts.com

H.B. Fuller Construction Products Inc.

Customer Service
800-832-9002

1105 South Frontenac Street
Aurora, IL 60504

Fax
800-952-2368

Suggested Specifications Childers® CHIL-OUT™ CP-33

To seal seams, overlaps, punctures, penetrations and terminations of vapor retarder membrane jacketing:

CP-33 Vapor Retarder Coating shall be applied with a first tack coat applied at a coverage rate of 2 U.S. gals./100 sq. ft. (0.8 l/m^2). While still wet, a layer of CHIL-GLAS® #10 Glass Fiber Reinforcing Mesh shall be embedded, with all seams overlapped a minimum of 2" (5.08 cm). A finish coat at a coverage rate of 2 U.S. gals./100 sq. ft. (0.8 l/m^2) shall be applied so that the total wet film thickness is a minimum of 0.064". This will provide a minimum dry film thickness of 0.035".

NOTES TO SPECIFYING ENGINEER

1. CP-33 Vapor Retarder Coating, white, should be specified where white All Service Jacketing (ASJ), or other white coatings/finishes are specified on the adjoining pipe or equipment insulation.

2. CHIL-BYL® CP-76 or CHIL-JOINT® CP-70 Joint Sealant is recommended for use with CP-33 Vapor Retarder Coating. Confirm compatibility of joint sealant with insulation before choosing.

3. Do not use over copper clad wire.

4. All outdoor horizontal surfaces must be sloped at least 1/2 inch per foot to assure water run-off and prevent the ponding of rain water and melting snow or ice.

Application Guide and Suggested Procedures

1. USE OF MATERIAL

DO NOT THIN. Store the product in a warm and dry area. Protect from freezing until dry.

It is essential in applying vapor retarder sealing materials that the recommended film thickness be achieved. Therefore, do not try to spread the vapor retarder coating too thin.

2. THE CONDITION OF THE INSULATION TO BE COATED

Since CP-33 is a vapor retarder, it should never be applied over insulation containing moisture. Dusty or porous substrates should first be primed with CHIL-SEAL® CP-50A MV1, diluted 50% with water for proper bonding. Allow the primer to thoroughly dry before over-coating with CP-33 Vapor Retarder Coating.

3. HINTS FOR SUCCESS

A vapor retarder system is no better than its weakest link. It is extremely important that where the finish terminates at an uninsulated point, the finish of CP-33 Vapor Retarder Coating and glass fiber reinforcing mesh be flashed over the uninsulated section for a minimum of 4" (10.16 cm).

Where there is a possibility of the temperature of the uninsulated section exceeding 190°F (88°C) due to steam-off or other heated application, the vapor sealing at this joint shall be accomplished by using CHIL-BYL® CP-76 Joint Sealant.

The surface of extruded polystyrene and polyisocyanurate board stock may contain water-soluble inks that may bleed through water-based mastics. Test before applying CP-33 Vapor Retarder Coating.

CUSTOMER SERVICE: (800) 832-9002

For professional use only. Keep out of reach of children.

Consult Safety Data Sheet and container label for further information.

Core Insulation Contractors, LLC
102 W Washington St
Kearney, MO 64060

December 22, 2023

To: Casey Howell
Comfort Systems USA (AR)
PO Box 16620
Little Rock, AR 72231

Project: Little Rock West High School

The following systems will be insulated with Pittsburg Corning Foamglas pipe insulation with Alumguard jacket.

#1 – Exterior Chilled Water……2” Thick

Thank you,

Scott Martin

FOAMGLAS®

Pittsburgh Corning

Protecting Companies and Their People Worldwide

INDUSTRIAL PIPING, DUCTS AND EQUIPMENT

FOAMGLAS® insulation is a lightweight, rigid material composed of millions of completely sealed glass cells. Each cell is an insulating entity. FOAMGLAS® insulation's all-glass, closed-cell structure provides the following benefits:

- Constant Insulating Efficiency
- Zero Water Vapor Permeability
- Moisture Resistance
- Fire Protection
- Corrosion Resistance
- Long-Term Dimensional Stability
- Vermin Resistance
- CFC and HCFC Free

These benefits result in FOAMGLAS® Insulation Systems that are long-lasting, require little maintenance and are ideal for:

- Low temperature pipe, equipment, tanks and vessels
- Medium and high temperature pipes and equipment
- Hot oil and hot asphalt storage tanks
- Heat transfer fluid systems
- Hydrocarbon processing systems
- Chemical processing systems
- Above ground and underground steam and chilled water piping
- Commercial piping and ductwork

Manufactured to comply with ASTM C 552

FOAMGLAS® insulation is manufactured by Pittsburgh Corning in a basic block form. Blocks are fabricated into a wide range of shapes, thicknesses and sizes to satisfy industrial insulation requirements.

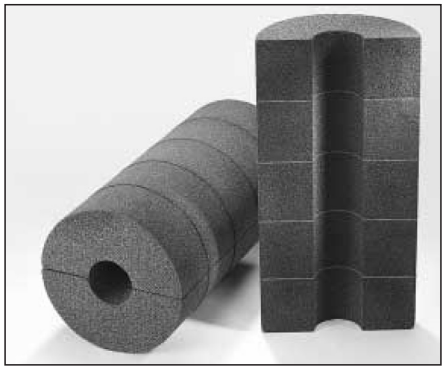
PHYSICAL AND THERMAL PROPERTIES OF FOAMGLAS® ONE™ INSULATION

PHYSICAL PROPERTIES	ASTM			EN ISO
	SI	ENGLISH	Method	Method
Absorption of Moisture (Water % by Volume)	0.2%	0.2%	C 240	EN 1609 EN 12087
	Only moisture retained is that adhering to surface cells after immersion			
Water-Vapor Permeability	0.00 perm-cm	0.00 perm-in	E96 Wet Cup Procedure B	EN 12086 EN ISO 10456
Acid Resistance	Impervious to common acids and their fumes except hydrofluoric acid			
Capillarity	None			
Combustibility & Reaction to Fire	Noncombustible - will not burn Flame Spread 0 Smoke Development 0		E 136 E84	EN ISO 1182 (Class A1)
Composition	Soda-lime silicate glass – inorganic with no fibers or binders			
Compressive Strength, Block	620 kPa	90 psi	C 165 C 240 C 552	EN 826 Method A
	Strength for flat surfaces capped with hot asphalt.			
Density	120 kg/m^3	7.5 lb/ft^3	C 303	EN 1602
Dimensional Stability	Excellent—does not shrink, swell or warp			EN 1604 (DS 70/90)
Flexural Strength, Block	480 kPa	70 psi	C 203 C 240	EN 12089 (BS450)
Hygroscopicity	No increase in weight at 90% relative humidity			
Linear Coefficient of Thermal Expansion	9.0 x 10^{-6}/K 25ºC to 300ºC	5.0 x 10^{-6}/ºF 75ºF to 575ºF	E 228	EN 13471
Maximum Service Temperature	482° C	900° F		
Modulus of Elasticity, Approx.	900 MPa	1.3 x 10^5 psi	C 623	EN 826 Method A1
Thermal Conductivity	W/mK 0.040 @ 10ºC 0.042 @ 24ºC	Btu-in/hr.ft^2.ºF 0.28 @ 50ºF 0.29 @ 75ºF	C 177 C 518	EN 12667 EN 12939 ($\lambda_{D\ (90/90)}$ ≤ 0.041 W/mK @ 10° C)
Specific Heat	0.84 kJ/kg.K	0.18 Btu/lb.ºF		
Thermal Diffusivity	4.2 x 10^{-7} m^2/sec	0.016 ft^2/hr		

Note: FOAMGLAS® ONE™ is manufactured to meet or exceed the minimum requirements of *ASTM C552-07 Standard Specification for Cellular Glass Insulation* (or most recent revision). Unless otherwise specified, measurements were collected using ASTM guidelines at 24ºC (75ºF) and are average or typical values recommended for design purposes and not intended as specification or limit values. Values under EN ISO are declared as limit values under the specific set of standard test conditions. Properties may vary with temperature. Where testing method or reporting values differ between ASTM and EN ISO methodologies, values are denoted within parentheses in the EN ISO column.

FOAMGLAS® ONE™ INSULATION SYSTEMS FOR INDUSTRIAL APPLICATIONS

Pittsburgh Corning has developed insulation systems for a wide range of piping and equipment applications—above ground or underground, indoors or outdoors—at operating temperatures from -450°F to +900°F (-268°C to +482°C).



With the patented StrataFab® System, blocks of FOAMGLAS® insulation are laminated into billets using a special high temperature adhesive. These billets are fabricated into the desired shapes and sizes for pipe, tank, vessels, flanges and valves—practically any industrial insulation application.

Totally Impermeable

Long Term Performance
Because it consists of closed glass cells, FOAMGLAS® insulation resists moisture in both liquid and vapor forms. When tested in accordance with ASTM E96, it has a permeability rating of 0.00 perm-in.

Noncombustible
FOAMGLAS® insulation is 100% glass and contains no binders or fillers—it cannot burn. FOAMGLAS® insulation will not absorb flammable liquids or vapors. If a fire does occur, FOAMGLAS® insulation can help to contain or supress it.

Corrosion-Resistant
All-glass FOAMGLAS® insulation is unaffected by common chemicals and by most corrosive plant atmospheres. It does not promote metal corrosion and its moisture resistance will help keep water from reaching equipment and piping.

Dimensionally Stable
FOAMGLAS® insulation is unaffected by temperature differentials and humidity. It will not swell, warp, shrink or otherwise distort. The insulation system's integrity remains intact.

High Compressive Strength
FOAMGLAS® insulation can withstand loads which crush most other insulating materials. In a properly designed piping system, FOAMGLAS® insulation eliminates the need for special treatment at pipe cradles. It also provides a firm base for roof membranes, jacketing or vapor retarders, prolonging their life.

Technical Service
Pittsburgh Corning's Technical Service Staff provides product, application and materials testing—standardized and customized specifications—on-site customer assistance and installation guidance.

For complete data on FOAMGLAS® Insulation Systems, please visit our Web site at www.foamglas.com, or contact Pittsburgh Corning at any of the following locations:

Pittsburgh Corning USA
(Corporate Headquarters)
800 Presque Isle Drive
Pittsburgh, PA 15239
Tel: 1-724-327-6100
Fax: 1-724-387-3807

Pittsburgh Corning Corporation Asia
(Asia Headquarters)
Pittsburgh Corning Corporation
3-7-4-304 Hikarigaoka
Nerima-ku, Tokyo, Japan 179-0072
Tel & Fax: 011 81-3-5997-0248

Pittsburgh Corning Europe NV
(Europe / Middle East Africa
Headquarters)
Albertkade, 1
B-3980 Tessenderlo
Belgium
Tel: +32-13-66-17-21
Fax: +32-13-66-78-54

GreenSpec® LISTED
www.GreenSpec.com

ISO 9001:2000
KEMA CERTIFICATE
Accredited by ANSI-RAB NAP
Accredited by the Dutch Council for Accreditation (RvA)

BCCA ISO 9001:2008

Printed in U.S.A.

STANDARDS, CERTIFICATIONS* AND APPROVALS

FOAMGLAS® insulation can be certified to conform to the requirements of:

- ASTM C 552 "Specification for Cellular Glass Thermal Insulation"
- ASTM C 1639 "Standard Specification for Fabrication of Cellular Glass Piping and Tubing Insulation"
- Military Specification MIL-I-24244C, "Insulation Materials, Thermal, with Special Corrosion and Chloride Requirement"
- Nuclear Regulatory Guide 1.36, ASTM C 795, C 692, C 871
- Flame Spread 5, Smoke Developed 0 (UL 723, ASTM E 84), UL R2844; also classified by UL of Canada
- ISO 9001:2008
- UL 1709
- For a listing of UL Through Penetration Fire Stop Approved Systems please search the UL Database at http://www.ul.com/ Once on this page click on CERTIFICATIONS on the left hand side. Under General Search click on UL FILE NUMBER and type in R15207 and then SEARCH
- Board of Steamship Inspection (Canada) Certificate of Approval No. 100/F1-98
- General Services Administration,PBS (PCD): 15250, Public Building Service Guide Specification, "Thermal Insulation (Mechanical)"
- New York City Dept. of Bldgs., MEA #138-81-M FOAMGLAS® insulation for piping, equipment, walls and ceilings
- New York State Uniform Fire Prevention and Building Code Dept. of State (DOS) 07200-890201-2013
- City of Los Angeles General Approval RR22534

FOAMGLAS® insulation is identified by Federal Supply Code for Manufacturers (FSCM 08869)

***Written request for certificate of compliance must accompany order.**

FOAMGLAS®

ALUMAGUARD® All-Weather Flexible Weather-Proofing Jacket

Alumaguard® ***All-Weather*** weather-proofing cladding from ***Polyguard Products*** is the only flexible insulation cladding available in the market which combines the self-healing characteristics of rubberized asphalt with the ease of application and cold weather performance of acrylic adhesive-based products.

- Proven: Uses the same outer layer and rubberized asphalt compound as the original ***Alumaguard*** membrane which has been used successfully in the market for 12 years. True Zero Perm Performance
- Self-Healing: rubberized bituminous membrane seals small cuts and punctures; aluminum is UV stable.
- Acrylic adhesive allows installation down to 10ºF.
- No pinning or activator required
- Excellent emissivity
- Can be used year round
- Available in bright white ***Alumaguard® Cool Wrap*** finish which meets California Title 24, CRRC and Energy Star requirements.

Description

Alumaguard All-Weather is a composite membrane consisting of a multi-ply embossed UV-resistant aluminum foil/polymer laminate to which is applied a layer of rubberized asphalt specially formulated for use on insulated duct and piping applications. A metalized polyester film coated with a high quality low temperature acrylic adhesive is then applied to the rubberized asphalt. A heavy duty release liner gives ***Alumaguard All-Weather*** its peel and stick functionality.

Uses

Alumaguard® All-Weather is designed to be used outdoors to weather-proof exterior insulated ductwork, piping or other insulated tanks, vessels and equipment. ***Alumaguard All-Weather*** resists moisture, air and vapor intrusion.

Notes: Prior to the installation of *Alumaguard All-Weather*, ducts must be sealed in accordance with SMACNA HVAC Duct Construction Standards Metal and Flexible, 3rd Edition (2005), Seal Class A.

Installation

All roof-top ductwork to which *Alumaguard All-Weather* is to be applied must be designed with adequate slope (watershed) to prevent ponding water. Ponding water is defined as water that stays in place for greater than 24 hours.

P.O. Box 755
Ennis, TX 75120
PH: (214) 515-5000
FX: (972) 875-9425

***Alumaguard All-Weather* is typically applied to faced fiberglass board, rigid isocyanurate foam board with facing, or unfaced extruded polystyrene foam board.**

***Alumaguard All-Weather* products are most commonly applied over rigid insulation on outdoor piping and ductwork systems. However, *Alumaguard All-Weather* products may be applied to clean and dry bare metal ducts. Care must be taken at terminations and where ducts attach to supports to make sure water entry is not allowed. All published application recommendations must be followed.**

Applying *Alumaguard All-Weather* to light density duct wrap is not recommended. Round or oval duct should be insulated with 3# or 6# pipe and tank wrap with appropriate facing.

Alumaguard All-Weather is a "peel and stick" product which must be applied to a properly prepared substrate. In duct applications, ***Alumaguard All-Weather*** can be used for the underside of the duct and does not require pinning. Complete installation instructions are available on our website, www.polyguardproducts.com.

Packaging

Alumaguard All-Weather is available in 4" x 75' and 35" x 75' rolls packaged 12 and 1 to a carton respectively in an embossed foil finish.

Limited Warranty

Polyguard Products warrants material to be free from leaks caused by defects in materials or manufacturing for a period of ten (10) years from the date of installation when material is applied according to installation instructions in effect at the time of installation. Contact ***Polyguard*** for complete details on the Limited Warranty.

Limitations

Alumaguard®All-Weather should be installed on a properly prepared, clean and dry substrate. ***Alumaguard All-Weather*** must be protected from damaging chemicals including petroleum and/or coal tar solvents.

Alumaguard All-Weather should not be adhered directly to commercial roofing membranes. For specific information regarding ***Alumaguard All-Weather*** and commercial roofing, refer to Technical Bulletin, 2011-1.

Alumaguard All-Weather should be stored in a clean dry area with boxes laid horizontally and not on end. The product has a recommended shelf life of 12 months.

Note: Before installing *Alumaguard® All-Weather*, please obtain a full set of our most current installation instructions on our website, or call *Polyguard* at 214-515-5000.

Alumaguard® All-Weather Technical Properties and Testing		
Membrane Property	**Test Method**	**Results**
Product Thickness (w/o liner)	Micrometer	34 mils 37 (Cool Wrap)
Product Weight	Scale	0.2 lbs/sf
Water Vapor Transmission (grains/hr-ft²)	ASTM E96-00	.00
Permeance (US Perms)	ASTM E96-00	.00
Peel Adhesion (to primed steel)	ASTM D1000	>16 lbs/in
Tensile Strength (film only)	ASTM D882	35 lbs/in (MD) 45 lbs/in (XD)
Elongation (film only)	ASTM D882	18% (MD) 40% (XD)
Puncture Resistance (film only)	ASTM D1000	15 Lbf
Mold Resistance	ASTM C1338	Pass
Upper Temperature Limit	LAB	150ºF
Emissivity	ASTM C1371	.030
***Alumaguard® Cool Wrap* Properties and Test Results**	**Solar Reflectance**	**Thermal Emittance**
Cool Roof Rating Council(CRRC) Initial	0.86	0.82
Cool Roof Rating Council(CRRC) 3 Year	0.77	0.86
Energy Star 3 Year	0.84	0.78
California Title 24	Exceeds 0.75	Exceeds 0.75