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Date: 11/9/2023

Return Request: 11/19/2023

Project: UCA Snow – Fine Arts Center

Supplier: Coleman Industrial Construction

Manufacturer: Various

Submittal: HVAC Piping Insulation

Submittal Number: 23 07 19-01

Drawing # and Installation: Mechanical Drawings

ARCHITECT

H+N Architects
1009 Main Street
Conway, AR 72032
501-327-7525

ENGINEER

Pettit & Pettit
201 E. Markham St. #400
Little Rock, AR 72201
501-374-3731

GENERAL CONTRACTOR

Wagner General Contractors
600 W. Race Ave.
Searcy, AR 72143
501-203-0704

MECHANICAL SUBCONTRACTOR

Comfort Systems USA (Arkansas), Inc.
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N. Little Rock, AR 72117
501-834-3320

Notes:

CSUSA PROJECT NO.

23-2020

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64116



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Oct 27, 2023

Comfort Systems USA
9924 Landers Rd
North Little Rock, AR 72117

Mr. Casey Howell

Re: Mechanical Insulation Submittals for **UCA Snow Fine Arts** in Conway, Arkansas.

Spec# 23 07 19

The following items will be insulated with Johns Manville pipe insulation with ASJ + vapor barrier jacket. All fittings will have an additional PVC fitting cover. Mechanical Room Piping will be jacketed with .020 White PVC.

Item #1: Heating and Chilled Water----- 1 ½” Pipe and Below ----- 1” Thick
----- 2” Pipe and Above ----- 2” Thick

Thank You,
Chad Bartlett

DESCRIPTION

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

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

USES

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

PHYSICAL PROPERTIES

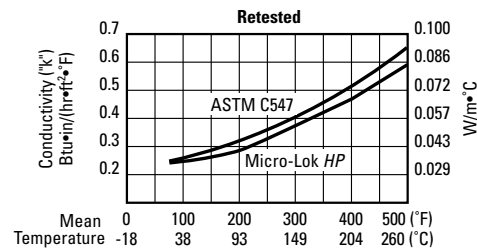
Service Temp. Range (ASTM C411)	0°F to 850°F (-18°C to 454°C)
Moisture Sorption	<5% by weight
Corrosivity (ASTM C1617)	<5 ppm chloride standard
Shrinkage (ASTM C356)	None
Microbial Growth (ASTM C1338)	Does not promote microbial growth
Surface Burning Characteristics	Composite FHC 25/50 per ASTM E84,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

SPECIFICATION COMPLIANCE

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

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

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


THERMAL CONDUCTIVITY ("K") *


Mean Temperature	°F	75	100	200	300	400	500
°C	24	38	93	149	204	260	
Btu•in/(hr•ft²•°F)		0.23	0.24	0.28	0.34	0.44	0.55
W/m•°C		0.034	0.035	0.040	0.049	0.063	0.079

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

SUSTAINABLE BUILDING ATTRIBUTES

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

SUSTAINABLE BUILDING CERTIFICATIONS

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



SIZE AVAILABILITY

Insulation Thickness		Iron Pipe Size Range		Copper Tubing Size Range		Notes:
in.	mm	in.	mm	in.	mm	
½	13	½-6	13-152	⅝-4½ [§]	16-105	*2½" and 23" IPS not available in this insulation thickness.
1	25	½-24	13-610	⅝-6⅞	16-156	**22" and 23" IPS not available in this insulation thickness.
1½	38	½-24	13-610	⅝-6⅞	16-156	†21", 22" and 23" IPS not available in this insulation thickness.
2	51	½-24	13-610	1⅞-6⅞	29-156	
2½	64	1-24	25-610	1⅞-6⅞	35-156	
3	76	1-24	25-610	1⅞-6⅞	35-156	
3½	89	1½-24*	38-610	-	-	††19" IPS not available in this insulation thickness.
4	102	3-24**	76-610	-	-	§3⅝" CTS not available in this insulation thickness.
4½	114	3-24†	76-610	-	-	
5	127	3-20††	76-508	-	-	

ACOUSTIC - INSERTION LOSS

Insertion loss data for Johns Manville pipe insulation acoustic treatments tested per ASTM E1222

Frequency	1-in Micro-Lok HP	1-in Micro-Lok HP with Zeston PVC (20 mil)	1-in Micro-Lok HP with MLV (1 psf)	2-in Micro-Lok HP	2-in Micro-Lok HP with Zeston PVC (20 mil)	2-in Micro-Lok HP with MLV (1 psf)
Hz	dB	dB	dB	dB	dB	dB
315	2	1	10	1	0	12
400	2	4	13	0	8	17
500	3	5	14	1	10	19
630	5	11	21	6	14	21
800	7	13	20	8	15	22
1000	9	19	25	13	20	29
1250	10	20	28	14	22	31
1600	13	24	33	17	26	37
2000	15	27	35	20	29	39
2500	17	29	36	21	30	38
3150	19	30	36	23	32	40
4000	20	29	36	26	34	41
5000	22	30	36	29	34	38

ACOUSTIC - TRANSMISSION LOSS

Transmission loss data and sound transmission class (STC) for Johns Manville pipe insulation acoustic treatments tested per ASTM E90

Frequency	1-in Micro-Lok HP	1-in Micro-Lok HP with Zeston PVC (20 mil)	1-in Micro-Lok HP with MLV (1 psf)	2-in Micro-Lok HP	2-in Micro-Lok HP with Zeston PVC (20 mil)	2-in Micro-Lok HP with MLV (1 psf)
Hz	dB	dB	dB	dB	dB	dB
125	4	7	15	6	8	15
250	4	7	18	6	8	20
500	4	11	23	7	15	29
1000	7	19	32	12	25	38
2000	14	25	38	20	32	45
4000	21	29	44	30	38	51
STC	8	16	28	12	19	31

QUALIFICATIONS FOR USE

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

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

CHILLED WATER SYSTEMS

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

APPLICATION RECOMMENDATIONS***MICRO-LOK HP PIPE INSULATION AND BUTT STRIPS**

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

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

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

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

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

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



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800-334-2399
Fax: 419-784-7866

Western Region

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Denver, CO 80217
800-368-4431
Fax: 303-978-4661

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

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



Technical Data Sheet

3M™ Venture Tape™ Facing Tape 1540CW

Product Description

3M™ Venture Tape™ 1540CW is a kraft/scrim/foil (ASJ) laminate coated with a cold weather acrylic pressure sensitive adhesive.

Product Features

- Cold weather adhesive performs well over a wide temperature range
- Mold inhibitor helps maintain adhesive strength and effectiveness
- High puncture and tear resistance ensures long life and durability.
- Conforms well to curved and irregular surfaces



Technical Information Note

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





Typical Physical Properties

Property	Values	Additional Information
Backing	ASJ	
Adhesive Type	Acrylic	
Liner	Release Liner	
Color	White	
Backing Thickness (mm)	0.16 mm	View
Test Method: ASTM D3652		
Total Tape Thickness (mil)	7.5 mil	View
Test Method: ASTM D3652		
Total Tape Thickness (mm)	0.19 mm	View

Test Method: ASTM D3652

Backing Thickness	6.5 mil	View 
Test Method: ASTM D3652		
Water Vapor Transmission	0.02 Perms	View 
Test Method: ASTM E96		

Typical Performance Characteristics

Property	Values	Additional Information
Tensile Strength	70.1 N/cm	View 
Test Method: ASTM D3759		
180° Peel Adhesion	Exceeds the strength of tape backing oz/in	View 
Test Method: ASTM D3330		
Notes: 12 in/min (300 mm/min)		
Tensile Strength (lb/in)	40 lb/in	View 
Test Method: ASTM D3759		
Elongation at Break (%)	2 %	View 
Test Method: ASTM D3759		
Long Term Temperature Resistance	116 °C	
Minimum Long Term Temperature Resistance	-40 °C	
Long Term Temperature Resistance	240 °F	
Minimum Long Term Temperature Resistance	-40 °F	

Certifications/Standards

Property	Values	Additional Information
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Certifications

- UL723 Classified (15/10 Flame/Smoke Rating) [UL file #R10984]
- CAN/ULC Classified (15/10 Flame/Smoke Rating) [UL file #R10984]

Codes & Test Standards

Meets ASTM C1136, Type 1, II, III, IV. *ASTM C1136 testing based in part on third party test data of the product backing

Storage and Shelf Life

Store in a clean, dry place. Temperature of 40-80°F (4-26°C) and 40 to 50% relative humidity are recommended. To obtain best performance, use this product within 24 months from date of manufacture.

Bottom Matter

3M
Industrial Adhesives and Tapes Division
3M Center, Building 225-3S-06
St. Paul, MN 55144-1000
800-362-3550

Trademarks

3M and Venture Tape are trademarks of 3M Company.

Handling/Application Information

Application Examples

- Closure system on ASJ faced duct piping systems
- Vapor seal on ASJ faced ductboard and pipe insulation

References

Property	Values
3m.com Product Page	https://www.3m.com/3M/en_US/p/d/b40067987/
Safety Data Sheet SDS	https://www.3m.com/3M/en_US/company-us/SDS-search/results/?gsaAction=msdsSRA&msdsLocale=en_US&co=ptn&q=1540CW

Family Group

Link Tags:

- 1540CW

Products	Adhesive Type	Liner	Color	Backing Thickness (mm)	Tensile Strength	Long Term Temperature Resistance	Minimum Long Term Temperature Resistance
1540CW	Acrylic	Release Liner	White	0.16 mm	70.1 N/cm	240 °F	-40 °C

ISO Statement

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

Information

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.

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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/m²)

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.

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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

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/m²). 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/m²) 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

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ADEQUATE TESTS: The information contained herein we believe is correct to the best of our knowledge and tests. The recommendations and suggestions herein are made without guarantee or representation as to results. We recommend that adequate tests be performed by you to determine if this product meets all of your requirements. The warranted shelf life of our products is twelve months from date of shipment to the original purchaser or as otherwise provided on the certificate of analysis.

**For professional use only. Keep out of reach of children.
Consult Safety Data Sheet and container label for further information.**

DESCRIPTION

Made from the same PVC material as the fitting covers, Zeston® jacketing is designed to fit seamlessly over the Zeston fitting covers.

AVAILABLE SHAPES AND SIZES

Zeston PVC Roll Jacketing is available in standard thicknesses of 10, 15, 20 and 30 mil (0.3, 0.4, 0.5 and 0.8 mm), and in standard widths of 35½ and 48 inches (902 and 1219 mm). Zeston roll jacketing is made from high impact UV-resistant (white only) polyvinyl chloride material designed to provide an inherent vapor retarder and protection to insulated pipes. Color roll jacketing is not recommended for outdoor applications.

Zeston PVC Cut & Curled™ Jacketing is available in thicknesses of 20 and 30 mil (0.5 and 0.8 mm). It is available in factory-cut sizes to fit up to 30 inches (762 mm) O.D. All sections of the Zeston PVC Cut & Curled jacketing are 48 inches (1219 mm) in length and are factory curled to the insulation size to fit snugly over longitudinal pipe. Cut & Curled jacketing is available with or without self-sealing lap tape (SSL) on the longitudinal seam. White only Zeston Cut & Curled jacketing contains a UV inhibitor. The 30 mil (0.8mm) thickness is recommended for outdoor applications. Color Cut & Curled jacketing is not recommended for outdoor applications.

ADVANTAGES

Exceptional Durability. The tough, durable Zeston PVC Jacketing resists damage from impact and will withstand humidity, salt water, adverse weather conditions and most industrial fumes. In addition, the jacketing will not support combustion.

ACOUSTIC PERFORMANCE

When paired with Johns Manville Micro-Lok HP and Micro-Lok HP Ultra pipe insulation, Johns Manville Zeston jacketing provides superior acoustical performance. See page 2 for more details.



Operating Temperature Limits:

PVC: up to 150°F (66°C)

Flame Spread: 25 or less

Smoke Developed: 50 or less

Grade: weatherable

Color: white and colors (color for indoor use only)

Finish: gloss

Corrosion Resistance. Unlike aluminum or most stainless steel jacketing materials, Zeston PVC Jacketing is immune to galvanic or electrolytic corrosion.

Ease of Maintenance. The jacketing is easily washed down with soap and water and most commercial cleaners. The ability to be easily cleaned, combined with the nontoxic, odorless and tasteless properties of the material and its attractive appearance, make it especially suitable for food, beverage and pharmaceutical applications.

SPECIFICATION COMPLIANCE

USDA, Agriculture Canada
New York City MEA #7-87

L-P-535E,* Composition A, Type II, Grade GU

ICBO
SBCCI

L-P-1035A,* Composition A, Type II, Grade GU

BOCA

Canada: CAN S102-M88

ASTM D1784, Class 16354-C

CGSB 51-GP-53M

*Impact strength determined by Gardner—SPI test method rather than Izod, since Gardner is more appropriate for PVC sheeting materials.

PHYSICAL PROPERTIES

Property	Value	ASTM Test Method
Specific Gravity	1.48	D792
Tensile Strength at Yield, psi (kPa)	6,000 (41370)	D638
Elongation at Yield (MD), %	3.0	D638
Tensile Modulus, psi (kPa)	470,000 (3,240,650)	D638
Flexural Strength, psi (kPa)	11,600 (79,982)	D638*
Flexural Modulus, psi (kPa)	460,000 (3,171,700)	D790
Flame Spread	25 or less	E84
Smoke Developed	50 or less	E84
Electrical Conductance	Non-Conductor	D257
Gardner - SPI Impact, in. lb/mil by Ductile Failure	10 mil (0.3mm) 1.3 15 mil (0.4mm) 1.4 20 mil (0.5mm) 1.5 30 mil (0.8mm) 1.6	D3679**

Note: Chemical resistance data available on request.

* min 0.125" (3mm) thick specimen

** 4 lb. [1.8 kg] weight, 8 lb. [3.6 kg] for 30 mil [0.8 mm]

ACOUSTIC - INSERTION LOSS

Insertion loss data for Johns Manville pipe insulation acoustic treatments tested per ASTM E1222

Frequency	1-in Micro-Lok HP with Zeston PVC (20 mil)	2-in Micro-Lok HP with Zeston PVC (20 mil)
Hz	dB	dB
315	1	0
400	4	8
500	5	10
630	11	14
800	13	15
1000	19	20
1250	20	22
1600	24	26
2000	27	29
2500	29	30
3150	30	32
4000	29	34
5000	30	34

ACOUSTIC - TRANSMISSION LOSS

Transmission loss data and sound transmission class (STC) for Johns Manville pipe insulation acoustic treatments tested per ASTM E90

Frequency	1-in Micro-Lok HP with Zeston PVC (20 mil)	2-in Micro-Lok HP with Zeston PVC (20 mil)	1-in Micro-Lok HP with Zeston PVC (30 mil)	2-in Micro-Lok HP with Zeston PVC (30 mil)
Hz	dB	dB	dB	dB
125	7	8	8	8
250	7	8	9	10
500	11	15	13	18
1000	19	25	22	27
2000	25	32	28	35
4000	29	38	32	40
STC	16	19	19	21



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FEATURES

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

APPLICATIONS

Commercial, institutional and industrial applications

CONSTRUCTION

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

APPLICATION RECOMMENDATIONS

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

QUALIFICATIONS FOR USE

Hot Systems

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

Cold Systems

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



Refrigerant Systems and Cold Systems In Severe Ambient Conditioning

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

Totally Sealed Systems (USDA Approval)

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

ZESTON 2000® SERIES WHITE PVC

INSULATED FITTING COVERS AND JACKETING

PERFORMANCE SPECIFICATIONS

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

SPECIFICATION COMPLIANCE

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

COMPRESSED THERMAL CONDUCTIVITY ZESTON HI-LO TEMP INSULATION INSERTS

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



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DESCRIPTION

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

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

USES

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

PHYSICAL PROPERTIES

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



COMPRESSED THERMAL CONDUCTIVITY

Mean Temperature		K	
°F	°C	BTU • in/(hr • ft ² • °F)	W/m•°C
75	24	.23	.033
150	66	.27	.039
300	149	.40	.058

SPECIFICATION COMPLIANCE

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

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

SUSTAINABLE BUILDING ATTRIBUTES

Recycled Content: 20%



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ZESTON® Perma-Weld® White Adhesive

Version 2.1

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SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Trade name : ZESTON® Perma-Weld® White Adhesive

Manufacturer or supplier's details

 Company : Johns Manville
 Address : P.O. Box 5108
 Denver, CO USA 80127
 Telephone : +1-303-978-2000
 Emergency telephone : 24-Hour Number: +1-800-424-9300 (CHEMTREC)
 number

 Company : Johns Manville Canada Inc.
 Address : 5301 42 Avenue
 Innisfail, AB Canada T4G 1A2
 Telephone : +1-303-978-2000
 Emergency telephone : 24-Hour Number: +1-800-424-9300 (CHEMTREC)
 number

Recommended use of the chemical and restrictions on use

 Recommended use : Adhesives
 Restrictions on use : For professional users only.
 Prepared by : productsafety@jm.com

SECTION 2. HAZARDS IDENTIFICATION
GHS classification in accordance with 29 CFR 1910.1200 (OSHA HCS 2012) and the Hazardous Products Regulations (WHMIS 2015)

 Flammable liquids : Category 2
 Serious eye damage : Category 1
 Carcinogenicity : Category 2
 Specific target organ toxicity : Category 3 (Respiratory system, Central nervous system)
 - single exposure

GHS label elements

 Hazard pictograms :
 

Signal word : Danger

 Hazard statements : H225 Highly flammable liquid and vapour.
 H318 Causes serious eye damage.
 H335 May cause respiratory irritation.
 H336 May cause drowsiness or dizziness.
 H351 Suspected of causing cancer if inhaled.

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Precautionary statements

:

Prevention:

P201 Obtain special instructions before use.
 P202 Do not handle until all safety precautions have been read and understood.
 P210 Keep away from heat/ sparks/ open flames/ hot surfaces. No smoking.
 P233 Keep container tightly closed.
 P240 Ground/bond container and receiving equipment.
 P241 Use explosion-proof electrical/ ventilating/ lighting equipment.
 P242 Use only non-sparking tools.
 P243 Take precautionary measures against static discharge.
 P261 Avoid breathing mist or vapours.
 P271 Use only outdoors or in a well-ventilated area.
 P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
 P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/ doctor if you feel unwell.
 P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
 P308 + P313 IF exposed or concerned: Get medical advice/ attention.
 P370 + P378 In case of fire: Use dry sand, dry chemical or alcohol-resistant foam to extinguish.

Storage:

P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
 P403 + P235 Store in a well-ventilated place. Keep cool.
 P405 Store locked up.

Disposal:

P501 Dispose of contents/container to an approved facility in accordance with local, regional, national and international regulations.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS
Chemical nature

Mixture

Hazardous components

Chemical name	CAS-No.	Concentration (% w/w)
acetone; 2-propanone	67-64-1	>= 30 - < 60
tetrahydrofuran	109-99-9	>= 10 - < 30
titanium dioxide	13463-67-7	>= 1 - < 5

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2-butanone	78-93-3	>= 1 - < 5
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Actual concentration or concentration range is withheld as a trade secret

SECTION 4. FIRST AID MEASURES

- | | | |
|---|---|---|
| General advice | : | Handle in accordance with good industrial hygiene and safety practice.
Show this safety data sheet to the doctor in attendance.
Move out of dangerous area.
Do not leave the victim unattended. |
| If inhaled | : | Remove to fresh air immediately. Get medical attention immediately.
If breathing is irregular or stopped, administer artificial respiration. |
| In case of skin contact | : | In case of contact, flush skin with plenty of water for at least 5 minutes.
Call a physician if irritation develops or persists. |
| In case of eye contact | : | In case of contact, immediately flush eyes with plenty of water for at least 30 minutes.
If easy to do, remove contact lens, if worn.
Protect unharmed eye.
Continue rinsing eyes during transport to hospital. |
| If swallowed | : | DO NOT induce vomiting unless directed to do so by a physician or poison control center.
Gently wipe or rinse the inside of the mouth with water.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician or Poison Control Centre immediately. |
| Most important symptoms and effects, both acute and delayed | : | Causes serious eye damage.
May cause respiratory irritation.
May cause drowsiness or dizziness.
Suspected of causing cancer if inhaled.
Repeated exposure may cause skin dryness or cracking. |
| Protection of first-aiders | : | If potential for exposure exists refer to Section 8 for specific personal protective equipment. |

SECTION 5. FIREFIGHTING MEASURES

- | | | |
|--------------------------------|---|--|
| Suitable extinguishing media | : | Carbon dioxide (CO2)
Dry chemical
Foam
Water spray |
| Unsuitable extinguishing media | : | High volume water jet |
| Hazardous combustion products | : | carbon oxides
Hydrogen chloride gas
chlorine compounds
titanium/titanium oxides |
| Specific extinguishing methods | : | Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. |
| Further information | : | Ground and bond container and receiving equipment.
Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Keep container tightly closed. |

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Take action to prevent static discharges.
 Use explosion-proof electrical/ ventilating/ lighting equipment.
 Use non-sparking tools.
 In the event of fire, cool tanks with water spray.
 Prevent fire extinguishing water from contaminating surface water or the ground water system.
 Special protective equipment for firefighters : In the event of fire, wear self-contained breathing apparatus.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures : Evacuate personnel to safe areas.
 Keep people away from and upwind of spill/leak.
 Use personal protective equipment.
 Ensure adequate ventilation.
 Remove all sources of ignition.
 Pay attention to flashback.
 Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.
 Refer to protective measures listed in sections 7 and 8.

Environmental precautions : Should not be released into the environment.

Methods and materials for containment and cleaning up : Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations (see section 13).
 Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

Advice on protection against fire and explosion : Use explosion-proof equipment.
 Electrical equipment should be protected to the appropriate standard.
 Take measures to prevent the build up of electrostatic charge.
 Use only in area provided with appropriate exhaust ventilation.
 Keep away from open flames, hot surfaces and sources of ignition.
 Vapours are heavier than air and may spread along floors.
 Prevent the creation of flammable or explosive concentrations of vapour in air and avoid vapour concentration higher than the occupational exposure limits.

Advice on safe handling : For personal protection see section 8.
 Smoking, eating and drinking should be prohibited in the application area.

Conditions for safe storage : Keep containers tightly closed in a dry, cool and well-ventilated place.
 To maintain product quality, do not store in heat or direct sunlight.
 Use explosion-proof equipment.

Materials to avoid : Keep away from sources of ignition - No smoking.
 Keep away from oxidizing agents and strongly acid or alkaline materials.

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Recommended storage temperature : < 99.9 °F / < 37.7 °C
 Storage period : 12 Months
 Further information on storage stability : Keep containers tightly closed in a dry, cool and well-ventilated place.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
Components with workplace control parameters

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
acetone; 2-propanone	67-64-1	TWA	250 ppm	ACGIH
		STEL	500 ppm	ACGIH
		TWA	250 ppm 590 mg/m ³	NIOSH REL
tetrahydrofuran	109-99-9	TWA	1,000 ppm 2,400 mg/m ³	OSHA
		TWA	50 ppm	ACGIH
		STEL	100 ppm	ACGIH
		TWA	200 ppm 590 mg/m ³	NIOSH REL
titanium dioxide	13463-67-7	ST	250 ppm 735 mg/m ³	NIOSH REL
		TWA	200 ppm 590 mg/m ³	OSHA
		TWA (total dust)	15 mg/m ³	OSHA
2-butanone	78-93-3	TWA	10 mg/m ³ (Titanium dioxide)	ACGIH
		TWA	200 ppm	ACGIH
		STEL	300 ppm	ACGIH
		TWA	200 ppm 590 mg/m ³	NIOSH REL
		ST	300 ppm 885 mg/m ³	NIOSH REL
		TWA	200 ppm 590 mg/m ³	OSHA

Biological occupational exposure limits

Components	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
acetone; 2-propanone	67-64-1	Acetone	Urine	End of shift (As soon as possible after exposure ceases)	25 mg/l	ACGIH BEI
tetrahydrofuran	109-99-9	Tetrahydrofuran	Urine	End of shift (As soon as possible)	2 mg/l	ACGIH BEI

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				after exposure ceases)		
2-butanone	78-93-3	methyl ethyl ketone	Urine	End of shift (As soon as possible after exposure ceases)	2 mg/l	ACGIH BEI

Engineering measures : Use only in an area equipped with explosion proof exhaust ventilation.
 Provide exhaust ventilation close to floor level.
 Maintain air concentrations below occupational exposure standards.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection
Material

: Solvent-resistant gloves

Remarks

: Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time.

Eye protection

: Wear safety glasses with side shields or goggles.
 Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection

: Wear protective clothing, such as long-sleeved shirts and pants.
 Remove and wash contaminated clothing before re-use.

Hygiene measures

: Handle in accordance with good industrial hygiene and safety practice.
 Written instructions for handling must be available at the work place.
 Contaminated work clothing should not be allowed out of the workplace.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid
Colour : white
Odour : acetone-like
Odour Threshold : No data available

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pH	: No data available
Melting point/freezing point	: -108 - -87 °C
Initial boiling point and boiling range	: 56.1 °C
Flash point	: -21 - -7 °C
Evaporation rate	: No data available
Flammability (solid, gas)	: Not applicable
Upper explosion limit	: 12.8 %(V)
Lower explosion limit	: 1.4 %(V)
Vapour pressure	: 2.41 hPa
Relative vapour density	: No data available
Relative density	: No data available
Density	: 0.929 g/cm ³
Solubility(ies)	
Water solubility	: immiscible
Solubility in other solvents	: No data available
Partition coefficient: n-octanol/water	: No data available
Auto-ignition temperature	: 230 °C
Thermal decomposition	: No data available
Viscosity	
Viscosity, dynamic	: 900 - 1,100 mPa.s
Viscosity, kinematic	: No data available

SECTION 10. STABILITY AND REACTIVITY

Reactivity	: No dangerous reaction known under conditions of normal use.
Chemical stability	: Stable under normal conditions.
Possibility of hazardous reactions	: May form peroxides in the presence of air.
Conditions to avoid	: Heat, flames and sparks. Electrostatic discharge
Incompatible materials	: Oxidizing agents Strong acids and strong bases Strong reducing agents

SECTION 11. TOXICOLOGICAL INFORMATION**Acute toxicity****Product:**

Acute oral toxicity	: Acute toxicity estimate : > 5,000 mg/kg Method: Calculation method
Acute inhalation toxicity	: Acute toxicity estimate : > 10 mg/l Exposure time: 4 h

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 Test atmosphere: dust/mist
 Method: Calculation method

 Acute dermal toxicity : Acute toxicity estimate : > 5,000 mg/kg
 Method: Calculation method

Components:
acetone; 2-propanone:

 Acute oral toxicity : LD50 (Rat, female): 5,800 mg/kg
 GLP: no

 Acute inhalation toxicity : LC50 (Rat, female): 76.0 mg/l
 Exposure time: 4 h
 Test atmosphere: vapour
 GLP: no

 Acute dermal toxicity : LD50 (Guinea pig, male and female): > 7,426 mg/kg
 GLP: no

tetrahydrofuran:

Acute oral toxicity : LD50 (Rat, male and female): 1,650 mg/kg

 Acute inhalation toxicity : LC50 (Rat, male and female): > 14.7 mg/l
 Exposure time: 6 h
 Test atmosphere: vapour
 Assessment: The substance or mixture has no acute inhalation toxicity
 Remarks: No mortality was observed.

 Acute dermal toxicity : LD50 (Rat, male and female): > 2,000 mg/kg
 Method: OECD Test Guideline 402
 GLP: yes

titanium dioxide:

Acute oral toxicity : LD50 (Rat, male and female): > 2,000 mg/kg

 Acute inhalation toxicity : LC50 (Rat, male and female): > 5.09 mg/l
 Exposure time: 4 h
 Test atmosphere: dust/mist
 Method: OECD Test Guideline 403

 Acute dermal toxicity : Method: Expert judgement
 Assessment: The substance or mixture has no acute dermal toxicity

2-butanone:

 Acute oral toxicity : LD50 (Rat, male and female): 2,193 mg/kg
 Method: OECD Test Guideline 423

Acute inhalation toxicity : Assessment: The substance or mixture has no acute inhalation toxicity

 Acute dermal toxicity : LD50 (Rabbit, male): > 8,054 mg/kg
 Method: OECD Test Guideline 402
 GLP: no

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Serious eye damage/eye irritation**Components:****acetone; 2-propanone:**

Species: Rabbit

Result: Eye irritation

Exposure time: 24 h

Assessment: Irritating to eyes.

Method: Draize Test

Serious eye damage/eye irritation**tetrahydrofuran:**

Species: Rabbit

Result: Irreversible effects on the eye

Method: Draize Test

GLP: no

Serious eye damage/eye irritation**2-butanone:**

Species: Rabbit

Result: irritating

Method: OECD Test Guideline 405

Respiratory or skin sensitisation**Components:****tetrahydrofuran:****IARC**

Group 2B: Possibly carcinogenic to humans

tetrahydrofuran

109-99-9

titanium dioxide

13463-67-7

OSHA

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA (29 CFR 1910 Subpart Z, Toxic and Hazardous Substances).

NTP

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

STOT - single exposure**Components:****acetone; 2-propanone:**

Exposure routes: inhalation (vapour)

Target Organs: Nervous system

Assessment: May cause drowsiness or dizziness.

STOT - single exposure**tetrahydrofuran:**

Exposure routes: Inhalation

Target Organs: Respiratory system

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Assessment: May cause respiratory irritation.

STOT - single exposure**2-butanone:**

Exposure routes: Inhalation

Target Organs: Central nervous system

Assessment: May cause drowsiness or dizziness.

Further information**Product:**

Remarks: Repeated exposure may cause skin dryness or cracking.

SECTION 12. ECOLOGICAL INFORMATION**Ecotoxicity****Components:****tetrahydrofuran:**

Toxicity to fish : LC50 (Pimephales promelas (fathead minnow)): 2,160 mg/l
End point: mortality
Exposure time: 96 h
Test Type: flow-through test
Method: OECD Test Guideline 203
GLP: no

Toxicity to daphnia and other : LC50 (Daphnia magna (Water flea)): 3,485 mg/l
aquatic invertebrates : End point: mortality
Exposure time: 48 h
Test Type: static test
Analytical monitoring: no
Method: OECD Test Guideline 202
GLP: No information available.

Toxicity to algae/aquatic : ECx (Scenedesmus quadricauda (Green algae)): 3,700 mg/l
plants : Exposure time: 8 d
Test Type: static test
Analytical monitoring: no

Toxicity to fish (Chronic : NOEC (Pimephales promelas (fathead minnow)): 216 mg/l
toxicity) : Exposure time: 33 d
Test Type: flow-through test
Analytical monitoring: yes
GLP: No information available.

2-butanone:

Toxicity to fish : LC50 (Pimephales promelas (fathead minnow)): 2,993 mg/l
End point: mortality
Exposure time: 96 h
Test Type: static test
Method: OECD Test Guideline 203

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Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 308 mg/l
End point: Immobilization
Exposure time: 48 h
Test Type: static test
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants : EC50 (Pseudokirchneriella subcapitata (green algae)): 2,029 mg/l
Exposure time: 96 h
Test Type: static test
Method: OECD Test Guideline 201

Persistence and degradability**Components:****acetone; 2-propanone:**

Biodegradability : Result: Readily biodegradable.
Biodegradation: 100 %

Bioaccumulative potential**Components:****acetone; 2-propanone:**

Partition coefficient: n-octanol/water : log Pow: -0.24 (68 °F / 20 °C)

tetrahydrofuran:

Partition coefficient: n-octanol/water : log Pow: 0.45 (77 °F / 25 °C)
pH: 7

2-butanone:

Partition coefficient: n-octanol/water : log Pow: 0.3 (104 °F / 40 °C)
Method: OECD Test Guideline 117

Mobility in soil

No data available

Other adverse effects**Product:**

Ozone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82
Protection of Stratospheric Ozone - CAA Section 602 Class I
Substances
Remarks: This product neither contains, nor was
manufactured with a Class I or Class II ODS as defined by the
U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A +
B).

SECTION 13. DISPOSAL CONSIDERATIONS

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Disposal methods

- Waste from residues : Dispose of contents/container to an approved facility in accordance with local, regional, national and international regulations.
 The hazard and precautionary statements displayed on the label also apply to any residues left in the container.
- Contaminated packaging : Empty remaining contents.
 Dispose of as unused product.
 Do not re-use empty containers.
 Do not burn, or use a cutting torch on, the empty drum.

SECTION 14. TRANSPORT INFORMATION
International transport regulations

Land transport

USDOT (Special Provision 149): UN1133, Adhesives, 3, II

TDG: UN1133, Adhesives, 3, II

LIMITED QUANTITY if shipped in inner packagings not over 5.0 L (1.3 gallons) net capacity each, packed in a strong outer packaging.

Sea transport

IMDG: UN1133, Adhesives, 3, II

Air transport

IATA/ICAO: UN1133, Adhesives, 3, II

SECTION 15. REGULATORY INFORMATION
TSCA list

TSCA - 5(a) Significant New Use Rule List of Chemicals : No substances are subject to a Significant New Use Rule.

U.S. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpart D) : No substances are subject to TSCA 12(b) export notification requirements.

EPCRA - Emergency Planning and Community Right-to-Know Act
CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
tetrahydrofuran	109-99-9	1000	3333

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 311/312 Hazards : Flammable (gases, aerosols, liquids, or solids)
 Carcinogenicity
 Serious eye damage or eye irritation
 Specific target organ toxicity (single or repeated exposure)

ZESTON® Perma-Weld® White Adhesive

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SARA 302 : This material does not contain any components with a section 302 EHS TPQ.

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Clean Air Act

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

This product does not contain any chemicals listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F).

The following chemical(s) are listed under the U.S. Clean Air Act Section 111 SOCM1 Intermediate or Final VOC's (40 CFR 60.489):

acetone; 2-propanone	67-64-1	30 - 60 %
2-butanone	78-93-3	1 - 5 %

California Prop. 65

⚠️ WARNING: This product can expose you to chemicals including tetrahydrofuran, which is/are known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

The components of this product are reported in the following inventories:

TSCA : All chemical substances in this product are either listed as active on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.

DSL : On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION
Further information

Revision Date : 03/22/2022

Full text of other abbreviations

ACGIH : USA. ACGIH Threshold Limit Values (TLV)
 ACGIH BEI : ACGIH - Biological Exposure Indices (BEI)
 NIOSH REL : USA. NIOSH Recommended Exposure Limits
 OSHA : USA. Occupational Exposure Limits (OSHA) - Table Z-1
 Limits for Air Contaminants
 ACGIH / TWA : 8-hour, time-weighted average
 ACGIH / STEL : Short-term exposure limit
 NIOSH REL / TWA : Time-weighted average concentration for up to a 10-hour
 workday during a 40-hour workweek
 NIOSH REL / ST : STEL - 15-minute TWA exposure that should not be exceeded
 at any time during a workday
 OSHA / TWA : 8-hour time weighted average

AIIC - Australian Inventory of Industrial Chemicals; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS -

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Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TECI - Thailand Existing Chemicals Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

1001 Swift Ave
North Kansas City MO.
64116



Phone: (816)741-8383
Fax: (816)741-0542
Email: office@cickc.com

Oct 27, 2023

Comfort Systems USA
9924 Landers Rd
North Little Rock, AR 72117

Mr. Casey Howell

Re: Mechanical Insulation Submittals for **UCA Snow Fine Arts**, Conway, Arkansas.

Spec# 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 Condensate -----1/2" Thick

Item #2 Refrigerant -----1" Thick

Thank You,
Chad Bartlett

SOLUTIONS FOR ENERGY SAVINGS

AP ArmaFlex[®]

Black Lap Seal

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

- // 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

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 **armacell**[®]
ArmaFlex[®]

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. For use in commercial, industrial, and residential applications.

Specification Compliance

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

- 3rd party certified by FM Approvals through 1-1/2" wall thickness per FM 4924
- 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 certified.
- Plenum Rated
- Conforms to ASHRAE 90.1 Energy Standards
- Conforms to building codes: International Mechanical Code, IMC, International Energy Conservation Code, IECC, International Residential Code, IRC, Title 24 California Building Energy Efficiency Standards.

Typical Properties

Specifications	Values		Test Method
	3/8" through 1" Wall (NBR/PVC based)	1-1/2" and 2" Walls (EPDM based)	
Thermal Conductivity: Btu • in/h • ft ² • °F (W/mK)			
50°F Mean Temperature (10°C)	0.235 (0.034)	0.278 (0.040)	ASTM C 177 or C 518
75°F Mean Temperature (24°C)	0.245 (0.0353)	0.28 (0.040)	
100°F Mean Temperature (38°C)	0.257 (0.037)	0.289 (0.041)	
125°F Mean Temperature (52°C)	0.268 (0.039)	0.300 (0.043)	
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, UL 723
Water Absorption, % by Volume:	0.2 %	0.2 %	ASTM C 209 or ASTM C1763
Mold Growth: Fungi Resistance:	Passed	Passed	UL181 ASTM G21/C1338
Maximum Service Temperature	220°F (105°C) ①	300°F (149°C) ②	ASTM C534
Minimum Service Temperature ③	-297°F (-183°C) ④	-297°F (-183°C) ④	ASTM C534

Sizes

Wall Thickness (nominal) Form	3/8", 1/2", 3/4" 1", 1-1/2", 2" (10, 13, 19, 25, 38, 50 mm)
Inside Diameter, Tubular Form	3/8" ID to 6" ID (10 mm to 153 mm) [3/8" and 1/2" IDs not offered in 3/8" wall thickness]
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 AP ArmaFlex BST Pipe Insulation can withstand temperatures as high as 250°F for 96 hour time periods when tested according to ASTM C411 - Standard Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- ② 1-1/2" and 2" AP ArmaFlex tubes are formulated with EPDM rubber giving them a higher upper use temperature than AP ArmaFlex tubes less than 1-1/2" wall thickness.
- ③ 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.
- ④ 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
IPBST60010	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.

All data and technical information are based on results achieved under the specific conditions defined according to the testing standards referenced. Despite taking every precaution to ensure that said data and technical information are up to date, Armacell does not make any representation or warranty, express or implied, as to the accuracy, content or completeness of said data and technical information. Armacell also does not assume any liability towards any person resulting from the use of said data or technical information. Armacell reserves the right to revoke, modify or amend this document at any moment. It is the customer's responsibility to verify if the product is suitable for the intended application. The responsibility for professional and correct installation and compliance with relevant building regulations lies with the customer. This document does not constitute nor is part of a legal offer to sell or to contract.

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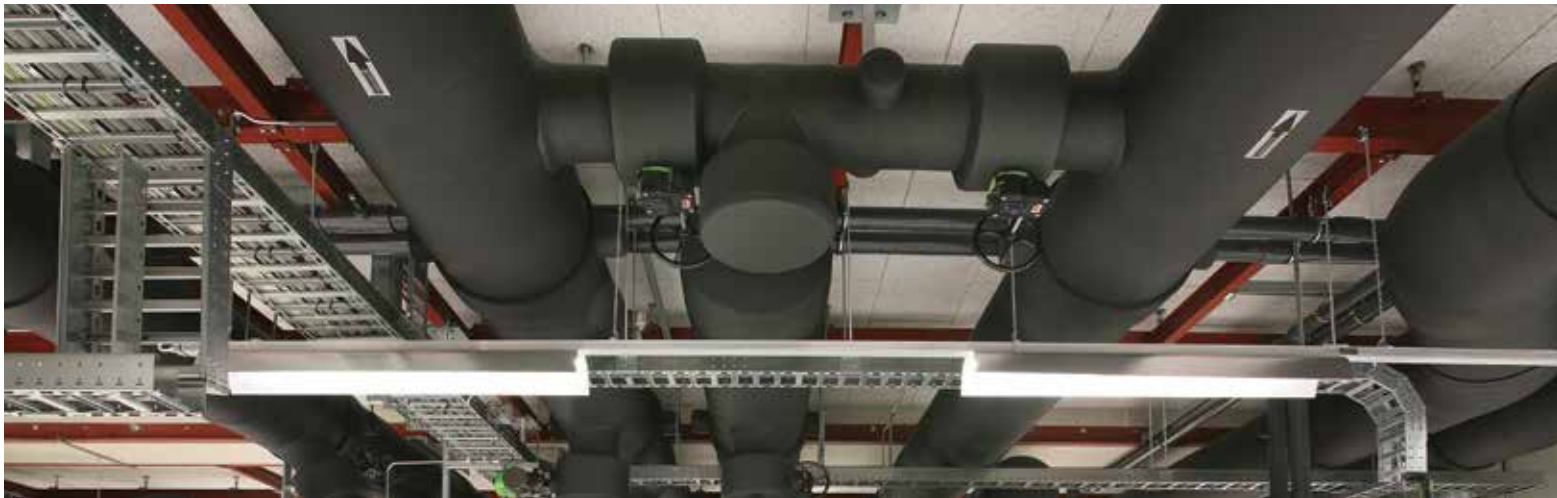
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AP ArmaFlex | Black LapSeal Tube TDS | 112021 | NA | EN-A | 020

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 23 production plants in 15 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





ENERGY SAVING SOLUTIONS

AP ArmaFlex AP ArmaFlex FS

Sheet and Roll Insulation

The original, fiber-free, flexible elastomeric pipe, valve and duct insulation for reliable protection against condensation, mold and energy loss. AP ArmaFlex® FS is PVC free.

- // Closed-cell structure provides excellent condensation control
- // Built-in vapor barrier eliminates need for additional vapor retarder
- // 25/50 rated for use in air plenums up to:
 - 1" thickness in AP ArmaFlex
 - 1-1/2" and 2" thickness in AP ArmaFlex FS
- // Thickness up to 2" with R-value up to R-8

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 **armacell**[®]
ArmaFlex[®]

TECHNICAL DATA – AP ARMAFLEX® AND AP ARMAFLEX® FS SHEET AND ROLL INSULATION

Description

Black flexible closed-cell elastomeric thermal insulation in sheet and roll form

Specification Compliance

ASTM C 534, Type II — Sheet Grade 1 ASTM C 1534	ASTM G21/C1338 CAN/ULC-S102 ①	MIL-C-3133C (MIL STD 670B) Grade SBE 3 ②	UL 94 5V-A, V-0, File E55798
ASTM D 1056, 2C1 ASTM E 84, UL723	City of New York Approval MEA 107-89M MIL-P-15280J, FORM S ②	NFPA 90A, 90B UL 181	

Approvals, Certifications, Compliances

- 3rd party certified by FM Approvals through 1" thickness per FM 4924.
- 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 certified.
- Conforms to ASHRAE 90.1 Energy Standards
- Conforms to building codes: International Mechanical Code, IMC, International Energy Conservation Code, IECC, International Residential Code, IRC, Title 24 California Building Energy Efficiency Standards.
- AP ArmaFlex FS meets the living building challenge requirements. Red list compliant.

Typical Properties

Specifications	Values			Test Method
	AP ArmaFlex Through 1" (NBR/PVC based)	AP ArmaFlex FS 1-1/2" and 2" (EPDM based)	AP ArmaFlex 1-1/2" and 2" (NBR/PVC based)	
Thermal Conductivity: Btu • in/h • ft ² • °F (W/mK)				
75°F Mean Temperature [24°C]	0.245 [0.0353]	0.28 [0.040]	0.245 [0.0353]	ASTM C 177 or C 518
100°F Mean Temperature [38°C]	0.257 [0.037]	0.289 [0.041]	0.257 [0.037]	
Water Vapor Permeability: Perm-in. [Kg/[s • m • Pa]]	0.05 [0.725 x 10 ⁻¹³]	0.08 [1.16 x 10 ⁻¹³]	0.05 [0.725 x 10 ⁻¹³]	ASTM E 96, Procedure A
Flame Spread and Smoke Developed Index:	25/50 rated	25/50 rated	Does not pass	ASTM E 84, UL 723 CAN/ULC-S102 ①
Water Absorption, % by Volume:	0.2 %	0.2 %	0.2 %	ASTM C 209 or ASTM C 1763
Mold Growth:	Passed	Passed	Passed	UL181
Fungi Resistance:				ASTM G21/C1338
Maximum Use Temperature	220°F [105°C] ③	300°F [149°C] ④	220°F [105°C] ③	ASTM C534
Minimum Use Temperature ⑤	-297°F [-183°C] ⑥	-297°F [-183°C] ⑥	-297°F [-183°C] ⑥	ASTM C534
Ozone Resistance:	GOOD	GOOD	GOOD	Ozone Chamber Test

① AP ArmaFlex meets CAN/ULC-S102 through 1" thickness.

② AP ArmaFlex meets MIL-P-15280J, FORM S and MIL-C-3133C (MIL STD 670B) Grade SBE through 1" thickness.

③ AP ArmaFlex and AP ArmaFlex FS Sheet and Roll Insulation withstand temperature of 250°F (121°C) when tested according to ASTM C 411. "Test Method for Surface Performance of High-Temperature Insulations." At this temperature, AP ArmaFlex Sheet and Roll Insulation shows no evidence of flaming, glowing, smoldering, delamination, melting or insulation collapse. Although this insulation will withstand high temperatures, continuous use temperature should be limited to 220°F (105°C).

④ AP ArmaFlex FS is formulated with EPDM rubber giving it a higher upper use temperature than AP ArmaFlex.

⑤ 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.

⑥ For applications of -40°F to -297°F (-40°C to -183°C), contact Armacell.



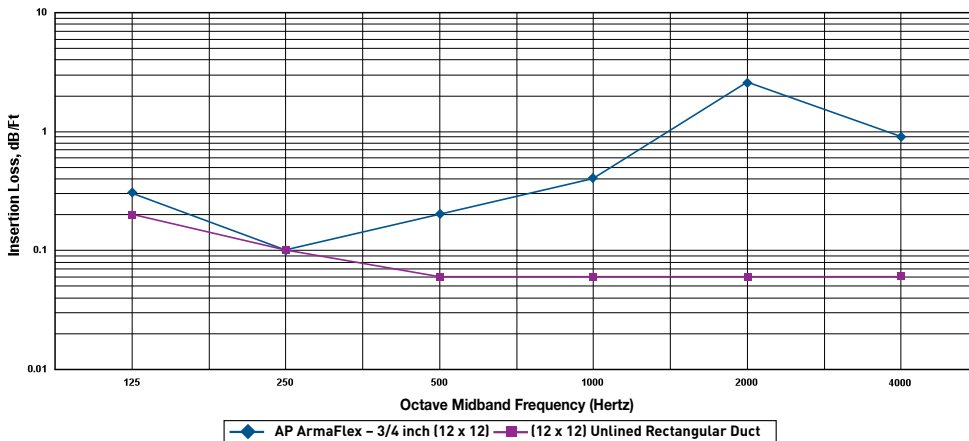
TECHNICAL DATA – AP ARMAFLEX® AND AP ARMAFLEX® FS SHEET AND ROLL INSULATION

R-Value	R-1.0	R-1.5	R-2.1	R-3.1	R-4.2	R-6	R-8		
Thickness:	1/4" (6 mm)	3/8" (10 mm)	1/2" (13 mm)	3/4" (19 mm)	1" (25 mm)	1-1/2" (38 mm)	2" (50 mm)		
Sound Absorption Coefficients Frequency	125Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	NRC	SAA	
Thickness Nom. 1" (25 mm)	0.01	0.13	0.39	0.69	0.29	0.26	0.40	0.38	
Thickness Nom. 1-1/2" (38 mm)	0.07	0.26	0.92	0.31	0.49	0.53	0.50	0.49	
Thickness Nom. 2" (50 mm)	0.14	0.62	0.44	0.43	0.51	0.45	0.50	0.51	
Sizes									
Sheet: Width x Length	36" x 48" (.915 m x 1.22 m)								
Thickness (nominal)	1/8", 1/4", 3/8", 1/2", 3/4", 1", 1-1/2" & 2" (3, 6, 10, 13, 19, 25, 38 & 50 mm)								
Roll: Width	48" wide (1.22m)								
Thickness (nominal) x Length	1/4" x 140' (6 mm x 42.6 mm)			1" x 35' (25mm x 10.7m)					
	3/8" x 100' (10mm x 30.5m)			1-1/2" x 25' (38mm x 7.6m)					
	1/2" x 70' (13mm x 21.4m)			2" x 18' (50mm x 5.4m)					
	3/4" x 50' (19mm x 15.2m)								
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.								

Sound Transmission Class (STC)

	Thickness	STC Class
AP ArmaFlex	Nom. 1/2" (13 mm)	25
AP ArmaFlex	Nom. 1" (25 mm)	25

Acoustics: Insertion Loss



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.

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AP ArmaFlex and AP ArmaFlex FS | Sheet and Roll Insulation TDS | 112020 | NA| EN-A | 015

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 3,135 employees and 24 production plants in 16 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:
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SOLUTIONS FOR ENERGY SAVINGS

ArmaFlex[®]

520 Adhesive

A air-drying contact adhesive specifically designed for use with ArmaFlex Insulation Products.

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

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 **armacell**[®]
ArmaFlex[®]

TECHNICAL DATA – ArmaFlex® 520 ADHESIVE

Description

A special air-drying contact adhesive that is required for joining the seams and butt joints of ArmaFlex Pipe and Sheet Insulations as well as adhering ArmaFlex to ducts, tanks, chillers and other equipment / vessels.

Specification Compliance

MIL-A-24179A Type II, Class 1 ASTM G21/C1338

Approvals, Certifications, Compliances

• All Armacell facilities in North America are ISO 9001 certified.

Typical Properties

Specifications	Values
Color	Greenish yellow
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 19% 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; Store in a well ventilated area with storage temperature 60° F to 80° F (16° C to 27° C).
Maximum Service Temperature	250°F (120°C) — ArmaFlex Pipe Insulation seams and joints 180°F (82°C) — Full bonding sheet insulation
Minimum Service Temperature ¹	-58° F (-50 °C)
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	-15 °F (-26 °C) [TOC]
Flame Spread and Smoke Developed Index	25/50 rated ASTM E 84

¹ For applications of below -58°F (-50°C), contact Armacell technical team.

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ArmaFlex | 520 Adhesive TDS | 112022 | NA| EN-A | 083

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