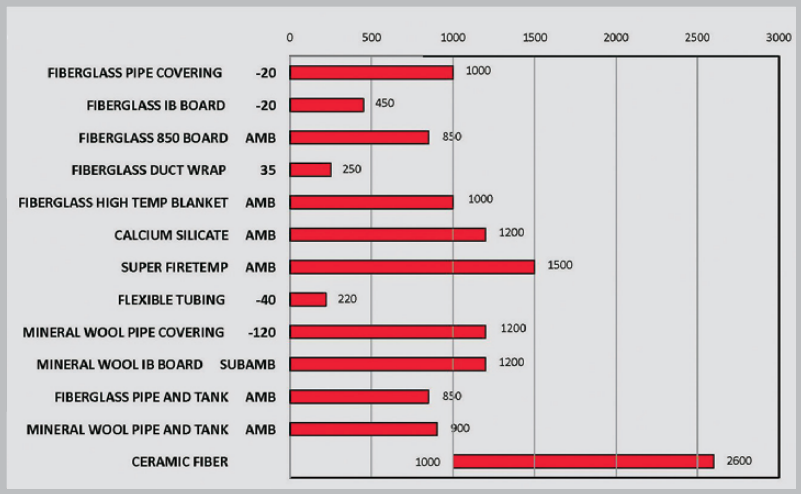
Brauer Supply Company

IN BUSINESS TO SERVE YOU

SPECIALTY INSULATION PRODUCTS CATALOG

TEMP RANGES FOR INSULATIONS

DEGREES F. SEE NOTES BELOW!



1-800-392-8776

NOTES. THIS CHART IS FOR QUICK REFERENCE ONLY. TEMPERATURE RANGE MAY VARY BY MANUFACTURER, FACING REQUIREMENTS, AND OTHER FACTORS. ADDITIONALLY, RELATED PRODUCTS MAY BE AVAILABLE WITH VARYING TEMPERATURE RANGES.

MATERIAL SELECTION WILL BE AFFECTED BY TYPE OF SURFACE INSULATED, AMBIENT CONDITIONS, AND OTHER FACTORS!! CONTACT BRAUER SUPPLY FOR ADDITIONAL INFO!!

Brauer Supply Co.

HEATING, COOLING, INSULATION, FASTENERS and AIR FILTRATION
WHOLESALERS AND DISTRIBUTORS
ESTABLISHED 1881

For more than 135 years, The people of Brauer Supply Company have been working to help their customers succeed. Headquartered in St. Louis, Missouri, we provide quality products and services to the construction industry as well as commercial and industrial businesses throughout the regions we service. With 11 locations, we proudly serve customers throughout Missouri, North Central and Southern Illinois, and adjoining areas in Kansas, Oklahoma, Arkansas, Kentucky, and Iowa.

Brauer Supply Company is your single source for commercial and industrial thermal insulation products, HVAC equipment and associated supplies, complete air and liquid filtration products, and specialty fasteners for dealers, contractors, industrial, and manufacturing firms of all sizes.

At Brauer, we provide our customers with state-of-the-art warehousing facilities for immediate product delivery and the convenience of purchase order consolidation. We maintain a staff of product experts to assure you will always receive the latest in product availability and technical expertise. As an additional service we can also provide on-site consultation at the job location or plant in order to properly identify your requirements.

Brauer Supply's market coverage and reputation in the industry assure that we can provide you with the quality products, competitive prices, and product availability necessary to reduce your stress and increase your profits.

Today, Brauer Supply Company, directed by the fourth generation of the Brauer Family, is still guided by the traditional values of integrity and dedication to service established over a century ago. We look forward to the opportunity to serve you.

Bob Brauer
Vice President

Brauer INSULATING PRODUCTS FASTENERS

mica

Brauer HEATING COOLING FILTERS

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Brauer Supply is the complete insulation center serving Missouri, Illinois and Kansas. We represent only the finest quality established names in the industry.

Our eleven locations are conveniently located near your place of business with our fleet of modern delivery trucks ready to bring material directly to you from an extensive inventory of industrial commercial and HVAC insulation products and more. Additionally, our application specialists are available for on-site visits to help you find solutions to your filter problem.

Our state-of-the-art warehousing facility can meet your needs for “Just-In-Time” delivery. We provide the convenience of purchase order consolidation as well as fast turn around in our on site filter fab shop. Our 130+ year history provides buying power with manufacturers to insure that you receive competitive pricing and can obtain filters even in times of product shortage.

Brauer Supply is an acknowledged source for a wide range of industrial products in addition to insulation. For a complete listing of lines we carry, visit www.brauersupply.com or call one of our product specialists.

We invite you to review the pages that follow to see how we can help your bottom line.

Give us a call at 314-534-7150 or 1-800-392-8776 to talk to your customer service specialist today.

We look forward to working with you!

Brauer Supply Company
IN BUSINESS TO SERVE YOU

Brauer has Many Accredited LEED GREEN Associates on staff!

The LEED (Leadership in Energy and Environmental Design) is a ratings system that certifies buildings as meeting established standards of energy sustainability and environmental friendliness, both in their interior environments and in their effect on the surrounding ecology. It was created by the United States Green Building Council (USGBC), a nonprofit organization founded in 1993 to promote sustainable, environmentally friendly building design. A building or construction project that receives a sufficiently high score on the USBGC's LEED checklist is awarded a certificate signifying its level of compliance with the LEED standards. Depending on the degree to which a building project meets the standards, it can be awarded anything from a simple certificate for a minimum level of compliance to a platinum certificate for meeting the highest possible standards.

Brauer Supply History

Since 1881, the Brauer Supply Company has served the midwest marketplace. The company's story is one that parallels the development of the region itself and the emergence of the heating and cooling and related industries through many technical innovations. Yet, the same factors which originally caused the company to prosper…service, dependability, and a fair price…are the same which help to place Brauer Supply Company in a position of leadership today.

The story of Brauer Supply Company begins in 1881. The City of St. Louis was entering one of its most exciting periods as its location on the Mississippi River turned into a national center of commerce. Riverboats in great numbers were bringing people and goods from the East via the Ohio River and to and from New Orleans to the South. The frontier was still very much alive and St. Louis served as a supply point for adventurers and settlers heading West. Also, at the time, the country was in the midst of the Industrial Revolution and the idea of standardized replacement parts for manufactured goods was becoming widely accepted.

A major industry of the period was manufacturing of cast iron heating stoves of all varieties. Quite a number of makes and types of these stoves were produced in the East for shipment to dealers in the western and rural regions of the country. When inevitably, repair parts were needed, the dealer in each locality had to leaf through many different catalogs and send several different orders for the various parts. There were often long time delays and expensive shipping charges which had to be paid.

The Brauer staff is here shown in 1884 in front of the Company's second location. A.G. Brauer is the third man from the right

The need for a central source of supply which could furnish all parts for all stoves at a savings of time and money to the dealer was recognized by the young August G. Brauer.

Mr. Brauer had worked as a salesman for a local manufacturer of coal and wood burning stoves, eventually becoming manager of that business. When one of the owners passed away and the firm was about to fold, Mr. Brauer, feeling an obligation to his customers to provide the replacement parts they needed, found himself at the head of his own business supplying these parts.

August Brauer was surprised as anyone else that his little enterprise began to flourish in the small shop on St. Ann's Street, East of Broadway. In fact, he soon was doing so well at this business of servicing the heating stoves of the St. Louis area with repairs and replacement parts that he began to expand. In 1884, he purchased the St. Louis Stove Repair Works on Franklin Avenue, and moved into a new and larger location at 217 to 219 Locust where he made arrangements to become the representative for parts and repairs for The Charter Oak Stove & Range Company, Bridge and Beach Manufacturing Company, and Bucks Stove and Range Company

The general growth and expansion in the field continued until about 1923 when the Company decided to make an important change with the times. That change was taking on the repair parts of warm air furnaces as well as the heating stoves which were then beginning to dwindle as central heating became the new thing.
It was in 1907 that the firm was incorporated as the A.G. Brauer Supply Company with August Brauer as president; John Schuricht as secretary and treasurer; and Julius Hartig as manager.

By 1930, a filter had been developed for hot-air furnaces to keep the dust of the basement heating unit from penetrating into other sections of the house. Brauer became the first distributor in the nation for this new development in heating systems. Some of their competitors laughed at them for taking on such a novelty which they said would never amount to anything - yet - without the filter, today's air conditioning systems would be unable to operate.

The year 1932 marked the passing of the founder of the company, August G. Brauer. He died of pneumonia on September 23. One month later his son, Oscar P. Brauer, assumed the presidency of the firm.

The Company made great strides during the period of Oscar Brauer's leadership, expanding both its products and its markets. Brauer Supply also assumed a position of leadership in the industry nationally as Oscar P. Brauer was a founder and president of the North American Heating and Air Conditioning Wholesalers Association and a member of the Board of Trustees of the National Association of Wholesalers.

During the 1930's, the Company was forced out of its headquarters on Third Street by the Jefferson National Expansion Memorial Project, and it was in 1940 that it moved to a five-story building at 2100 Washington. There it occupied 65000sq ft of floor space crammed with an inventory of heating, air-conditioning, and hot-water equipment plus replacement parts for at least sixty different manufacturers' heating stoves. Water heaters and the fittings, pipes, and parts to make them work.

William H. Brauer, grandson of the founder, joined the firm in 1953 after five years in the sales department of Monsanto Chemical. A chemical engineering graduate of M.I.T., Bill Brauer developed the Company's insulation division which today features a complete line of industrial insulation materials covering a wide range of uses and conditions.

This was Brauer Supply in the early 1900's.

2100 Washington was home to Brauer Supply in the 40's, 50's, and 60's.

The insulation division was housed then in a separate facility located at 330 South Newstead with facilities for office space as well as customer pick-up and rail siding.

As the Company became identified as a long-established family-business, the Board of Directors decided in June of 1957 to drop the "A.G." from the name and it became simply, the "Brauer Supply Company."

In 1965 the firm opened its first branch office outside of the City of St. Louis in Sikeston, Missouri. Shortly thereafter it was moved to Cape Girardeau. Now located in Jackson, Missouri, this location provides coverage for the Southeast Missouri market area.

In 1968 Oscar Brauer passed the reins as president to William H. Brauer, assisted ably by long-tenured Vice-President Leonard H. Troeller. Oscar Brauer remained an active advisor to the business until his death in 1977.

A fourth division - fasteners - was expanded in 1970 to complement the already strong heating, filters, and insulation departments. Brauer soon became a major supplier of rivets, twist drills, self-drilling screws and other specialty fasteners. Maintaining a staff with a high level of technical expertise, Brauer Supply is a source of information and advice to the customer with fastening needs.

In 1972 continued growth forced the Company to expand its headquarters once again, moving to 4260 Forest Park. There, a large, modern warehouse with fully-mechanized materials handling equipment helped to ensure speedy order filling and prompt shipment to customers. A fleet of delivery trucks is available for daily runs in the St. Louis, Columbia, Jackson, Joplin, and Springfield, Missouri and Illinois areas.

In 1978, James Truesdell, representing the fourth generation of Brauer family, joined the company.

Brauer's centennial year, 1981, saw the installation of a modern, computer-based accounting system which provided greater ability to stock those items customers need most and to provide clear and concise orders, invoices, and other information to increase service levels.

Growth accelerated in 1984 with the opening of a new branch office in Columbia, Missouri. That same year saw the acquisition of a large warehouse adjacent to the Brauer St. Louis headquarters to insure room for future expansion.

William D. Brauer, great-grandson of the founder, joined the firm in 1985 after serving as a pilot in the United States Navy.

In the Fall of 1989, the company added 23,000 square feet of warehouse space and multiple docks for shipping and receiving at its main location. At the same time, James Truesdell was named the company's fourth President, and William D. Brauer assumed the duties of Vice President. Shortly after this, an enhanced computer system was installed, and branches were added in Swansea, Illinois, and St. Peters, Washington, and Festus, Missouri.

In 1996, Robert G. Brauer, second son of William H. Brauer, joined the Company after serving in marketing positions with the Sherwin-Williams Company. Continued growth followed with the opening of a branch office in Joplin, Missouri. Two years later a store was opened in Springfield, Missouri.

In 2002, Brauer Supply took a leading role as James Truesdell chaired the industry group founding the Heating, Air Conditioning, and Refrigeration Distributors International (HARDI) which is today the HVAC distribution industry's leading voice.

In 2005, the St. Louis headquarters was expanded, and the Company's eleventh location, in Springfield, Illinois, opened its doors.

Finally , in early 2010, the headquarters was moved to a modern, single story distribution center at 1218 South Vandeventer. Here all products are distributed throughout the company's network of service centers, including a large facility opened at the same time to serve the Kansas City metro area.

In its third century, Brauer Supply is no longer a company geared to one segment of industry. Brauer is a broad-based industrial supplier with products needed by almost all areas of the business community. The family tradition of service and customer satisfaction remains the prime focus. The Company motto, "In Business to Serve You!", is a constant reminder that the customer is the reason for our success and even our very existence.

August G. Brauer, founder and president from 1881-1932

Oscar P. Brauer, son of the founder and second president

Currently active Brauer Family members include: President James L. Truesdell and Chairman William H. Brauer (seated) and Vice President Robert G. Brauer and Vice President William D. Brauer (standing).

Brauer Supply Company General Terms, Conditions, Freight Policies, and Return Policies

(This document is for Reference only. For the latest guidelines, visit www.brauersupply.com)

PRICE:

- All orders subject to the prices in effect on the date of shipment or specific quotation.
- All prices and specifications subject to change without notice.

TERMS:

- 10TH Prox / Net 30 Days from Date of Invoice.
- Payment Discounts, if any, will be shown on the invoice.
- Customer agrees to pay service charges of 1 ½ % per month on all past due accounts.
- Customer agrees to pay a $30.00 service charge on any and all returned checks.
- Customer agrees to pay any and all costs involved in the recovery of monies owed due to returned checks, past due accounts, or other causes resulting in money owed to Brauer Supply Company. These monies include, but are not limited to the original amounts owed along with collection fees, attorney fees, court costs, and any other fees and/or charges related to the collection of amounts owed.

MINIMUM BILLING AND SPECIAL ORDERS:

- $10.00 minimum on all cash and/or check purchases.
- $20.00 minimum on all charge, CBD, or COD purchases.
- A minimum of 25% deposit will be required on orders for special material.

SHORTAGES DUE TO BRAUER SUPPLY COMPANY ERROR:

- All claims of shortages, errors, or defective goods must be filed within fifteen (15) days after receipt of material (See below for Return Goods policies related to errors or defective goods).

WARRANTIES:

- All statements, warranties, and product representations relating to products sold by Brauer Supply Company are those stated on the most current literature from our manufacturers/suppliers. Brauer Supply Company makes no warranties of its own, either expressed or implied.

LIMITATION OF LIABILITY:

- Brauer Supply Company will not be liable for failure to deliver product to purchaser in a timely fashion for any reason, including, but not limited to, market conditions, product scarcity, failure of manufacturer to meet production schedules, credit decisions, or any other circumstances whether or not under the direct control of Brauer Supply Company, nor will Brauer Supply Company be held liable for any actual, consequential, or liquidated damages resulting from the above conditions. Any provisions, statements, or conditions in purchaser's request-to-quote or purchase order, either written or oral, are hereby specifically rejected.
- Brauer Supply's failure to perform any term or condition of sales agreements as a result of conditions beyond its control, such as, but not limited to, war, strikes, fires, floods, acts of terrorism, civil unrest, acts of God, governmental restrictions, power failures, or damage, failure, or destruction of computer/network systems/facilities/servers, shall not be deemed a breach of those agreements.

RETURN OF GOODS:

- No goods or materials will be accepted for return without our written consent in the form of an RGA (Return Goods Authorization). This can be expedited by supplying us, via telephone, email, or in writing, with the following information -
  1. Date and number of the invoice on which the material was billed. If material not yet invoiced, the date and number of work order and/or packing list.
  2. Description and quantity of the material being returned.
  3. Reason for the return.
- No material will be accepted for return unless the following conditions are met -
  1. Stock items must have been purchased within 120 calendar days preceding the date of return. If material was defective or shipped incorrectly, Brauer Supply Company must be notified within 15 days of the date on which the material shipped.

BRAUER SUPPLY COMPANY FREIGHT POLICIES

2. Special items or Brauer Supply non-stock items will not be accepted for return unless our suppliers agree to accept the returned material.
3. Material must be returned in original cartons and in a resalable condition as determined solely by Brauer Supply Company.
4. The customer agrees to pay all transportation charges for the return to Brauer Supply Company and/or the manufacturer.

- Once Brauer Supply Company agrees to accept the return, you will receive a written Return Goods Authorization. Upon receipt of the material at Brauer Supply Company or at our supplier as applicable, Brauer Supply Company will credit your account subject to the following terms –
  1. All packing slips and paperwork originating with the customer must reference the Return Goods Authorization number and the date and invoice number (or date and work order / packing slip number if not yet invoiced) on which the material was originally billed (or shipped if not yet invoiced).
  2. Material which can be put back into Brauer Supply Company stock will be credited back at invoice price, less 10% for material returned in full cartons or less 25% for broken cartons.
  3. Special items and Brauer Supply non-stock items for which our suppliers have agreed to accept the return will be credited at invoice price less a pre-agreed restocking charge.
  4. If the return is due to an error by Brauer Supply Company or our supplier, Brauer Supply will either pick up the material, or request that you ship the material to Brauer Supply Company or our Supplier as applicable. Replacement material will be shipped or delivered promptly. Brauer Supply Company or our supplier will pay all freight charges related to the return of defective or incorrect material and the replacement of same with proper material. Replacement material will then be billed in the usual manner.
  5. Any credits due will be applied to open balances for future orders. Cash customers will receive a check or credit card credit issued from our accounting office.
  6. Brauer Supply reserves the right to apply any refund to any outstanding balance that may exist on a customer's account.

FREIGHT POLICIES AS OF JAN 1, 2016

- All shipments of $150.00 or more will be shipped freight allowed via our trucks on regularly scheduled days in our regular delivery areas.
- Invoices of less than $150.00 shipped via Brauer Supply Company vehicles on regularly scheduled days in our regular delivery areas will be subject to a $25.00 delivery fee.
- Any fuel surcharges in effect will apply to all shipments made via Brauer Supply Company vehicles regardless of order size.
- Contact our office for details on regular delivery schedules and areas.
- Short shipped or backordered items regardless of order size may qualify for freight allowed shipping.
- All orders shipped via UPS or other third party carriers will be sent prepaid, no freight allowed and be subject to an $8.00 handling charge.
- Orders may be sent 3rd party freight allowed when shipped for Brauer Supply Company's convenience or to fulfill back orders.
- All LTL (less than full truckload) shipped via common carrier will be shipped prepaid, no freight allowed. Freight charges will be billed to customer. Large orders or specifically quoted material may qualify for allowed freight.
- Material shipped direct from one of our manufacturers/suppliers to a customer will be shipped according to their freight policies. Freight charges may be billed to the customer according to such policies.
- Certain material is always shipped no freight allowed. Contact your salesperson or our inside customer service personnel for details.
- When Brauer Supply Company incurs the freight cost, Brauer reserves the right to select the carrier.
- When the customer specifies a carrier or requests expedited delivery/special handling, the customer will be responsible for all freight charges.

FOAMGLAS®

Pittsburgh Corning

FOAMGLAS® ONE™ Insulation

ASTM C552 Grade 6

FOAMGLAS® ONE™ insulation is a lightweight, rigid material composed of millions of completely sealed glass cells. It is manufactured by Pittsburgh Corning in a block form and then fabricated into a wide range of shapes and sizes to satisfy industrial and commercial insulation requirements.

Applications

- Cryogenic systems
- 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
- Steam and chilled water piping
- Commercial piping and ductwork
- Direct burial / underground

FOAMGLAS® ONE™ Block Insulation is manufactured in a full range of standard thicknesses and it is available in standard SI and English formats.

TYPE I BLOCK DIMENSIONS			
FORMATS	STANDARD		LARGE
	SI	ENGLISH	ENGLISH
WIDTH & LENGTH	450 x 600 mm	18 x 24 in	18 x 36 in
THICKNESSES	40-180 mm 10 mm increments	2-7 in 1/2 in increments	3-8 in 1/2 in increments

Contact a representative for regional availability.

Benefits

- Constant insulating efficiency
- Noncombustible
- Non-absorbant
- Impermeable to water and water vapor
- Corrosion/chemical resistant
- Long term dimensional stability
- Vermin resistance
- High compressive strength
- Ecologically friendly, sustainable

STANDARDS, CERTIFICATIONS[1] AND APPROVALS

FOAMGLAS® ONE™ Insulation can be certified to conform to the requirements of:

- ASTM C552 "Standard Specification for Cellular Glass Thermal Insulation" (Grade 6)
- ASTM C1639 "Standard Specification for Fabrication of Cellular Glass Piping and Tubing Insulation"
- Military Specification MIL-DLT-24244D (SH), with Special Corrosion and Chloride Requirement"
- Nuclear Regulatory Guide 1.36, ASTM C795, C692, C871
- Flame Spread Index 0, Smoke Developed Index 0 (UL 723, ASTM E 84), UL R2844; also classified by UL of Canada
- UL 1709, Rapid Rise Fire Tests of Protection Materials for Structural Steel
- UL Through Penetration Fire Stop Approved Systems UL1479/ASTM E814, please search the UL Database at www.ul.com. Click on ONLINE CERTIFICATION DIRECTORY under RESOURCES in the bottom right corner of the page. Under BEGIN A BASIC SEARCH, type R15207 in UL FILE NUMBER and then click SEARCH.
- Board of Steamship Inspection (Canada) Certificate of Approval No. 100 / FI-98
- General Services Administration, PBS (PCD; 15250, Public Building Services Guide Specification, "Thermal Insulation (Mechanical)"
- New York City Department of Buildings, MEA #138-81-M FOAMGLAS® insulation for piping, equipment, walls and ceilings
- New York State Uniform Fire Prevention and Building Code Department of state (DOS) 07200-890201-2013
- City of Los Angeles General Approval RR22534
- USGS Approval for Non-combustible Inspections
- GreenSpec® Listed. www.greenspec.com
- EC-114.456 USCG 164.109/EC0736/114.456 Approval for marine use
- FOAMGLAS® ONE™ insulation is identified by Federal Supply code for Manufacturers (FSCM 08869)
- Living Building Challenge RED LIST FREE product. Find our RED LIST FREE labels in the International Living Future Institute's database: FGL-0001 / FG-0002.

[1]Request for certification shall be included with valid order for FOAMGLAS® ONE™ Insulation.

INDUSTRIAL PIPE & EQUIPMENT INSULATION

FOAMGLAS®

Pittsburgh Corning

PHYSICAL AND THERMAL PROPERTIES[2,3]			
PROPERTY	ASTM METHOD	SI	ENGLISH
ABSORPTION OF MOISTURE	C240	< 0.2% by Vol	< 0.2% by Vol
CAPILLARITY		None	
CHEMICAL RESISTANCE		Impervious to common acids and their fumes.	
COEFFICIENT OF LINEAR THERMAL EXPANSION	E228	25 to 300 °C , 9.0 x 10^{-6} / K -170 to 25 °C , 6.6 x 10^{-6} / K	75 to 575 °F , 5.0 x 10^{-6} / °F -274 to 75 °F , 3.7 x 10^{-6} / °F
COMBUSTIBILITY	E136	Noncombustible	
COMPOSITION		Soda lime glass. Inorganic. No fibers or binders.	
COMPRESSIVE STRENGTH[5]	C165 / C240 / C552	AVG = 620 kPA LSL = 414 kPA	AVG = 90 lb / in^2 LSL = 60 lb / in^2
CORROSION, WATER SOLUABLE IONS AND PH	C871 C692 C1617	Acceptable for use with stainless steel Pass (0 Coupon Cracked) < DI Water	
DENSITY (+/-10%)	C303	115 kg / m^3	7.18 lb / ft^3
DIMENSIONAL STABILITY		Excellent - does not shrink or swell.	
FLEXURAL STRENGTH	C203 / C240	AVG = 480 kPA LSL = 283 kPA	AVG = 70 lb / in^2 LSL = 41 lb / in^2
HYGROSCOPICITY		No increase in weight at 90% relative humidity.	
MODULUS OF ELASTICITY, APPROXIMATE (v= 0.25)	C623	900 MPa	1.3 x 10^5 lb·in^{-2}
SERVICE TEMPERATURE		-268 to 482 °C	-450 to 900 °F
SPECIFIC HEAT	E1461	0.77 kJ / kg·K @ 25°C	0.18 BTU / lb·°F @ 77°F
SURFACE BURNING CHARACTERISTICS	E84	Flame Spread Index 0 / Smoke Development Index 0	
WATER VAPOR PERMEABILITY	E96 Wet Cup	0.00 ng / Pa·s·m	0.00 perm·inch

THERMAL CONDUCTIVITY (λ) VALUES AT SELECT TEMPERATURES (ASTM C518, C177)														
TEMPERATURE	°C (°F)	204 (400)	149 (300)	93 (200)	38 (100)	24[5] (75)	10[5] (50)	-18 (0)	-46 (-50)	-73 (-100)	-101 (-150)	-129 (-200)	-157 (-250)	-165 (-265)
ASTM C552[3]	W/m K (BTU in/hr °F ft^2)	0.084 (0.58)	0.069 (0.48)	0.058 (0.40)	0.048 (0.33)	0.045 (0.31)	0.043 (0.30)	0.039 (0.27)	0.035 (0.24)	0.032 (0.22)	0.029 (0.20)	0.025 (0.17)	0.023 (0.16)	N/A
FOAMGLAS® ONE™ Insulation[4]	W/m K (BTU in/hr °F ft^2)	0.078 (0.54)	0.065 (0.45)	0.054 (0.38)	0.044 (0.31)	0.042 (0.29)	0.040 (0.28)	0.036 (0.25)	0.032 (0.22)	0.028 (0.20)	0.025 (0.18)	0.023 (0.16)	0.020 (0.14)	0.019 (0.13)

[2]Values represent typical physical and thermal properties.
[3]Type I Block (Grade 6) limit values, where applicable, are specified by *ASTM C552-15 Standard Specification for Cellular Glass Thermal Insulation.*
[4]The values represent "as manufactured" properties for FOAMGLAS® ONE™ Type I Block Insulation. Contact Pittsburgh Corning for assistance applying our design polynomials to your application.
[5]Sampled in accordance with ISO 3951
For additional information on FOAMGLAS® ONE™ insulation or systems, please contact Pittsburgh Corning at any of our worldwide offices or visit us at www.foamglas.com.

ITW Insulation Systems
TRYMER™
PIR insulation

TRYMER™ 2000 XP
Polyisocyanurate Insulation

TRYMER™ 2000 XP insulation is polyurethane modified polyisocyanurate cellular plastic. The rigid insulation is supplied in the form of bunstock for fabrication into sheets, pipe shells, tank and vessel coverings, and other shapes for a variety of thermal insulation applications.

TRYMER 2000 XP insulation features improved dimensional stability over a wider range of temperatures than standard polyurethane insulation.

TRYMER insulation is not a known nutrient source for mold and mildew.

Applications

TRYMER 2000 XP insulation is suitable for applications that require a Flame Spread Index of 25 or less and a Smoke Developed Index of 450 or less when tested as per ASTM E84. These are typical requirements for pipe insulation located in non-plenum locations so TRYMER 2000 XP Insulation is particularly ideal for use as pipe insulation in the non-plenum areas of commercial buildings. *For pipe insulation located inside plenums of commercial buildings, ITW recommends the use of our Trymer Supercel Phenolic Insulation.* TRYMER 2000 XP can be used within the service temperature range of -297°F to 300°F (-183°C to 149°C). Typical applications for TRYMER 2000 XP insulation include:

- industrial pipe insulation, including elbows and fittings
- commercial chilled water insulation
- tank and vessel insulation
- core material for architectural and structural panels
- insulation for shipping containers, trucks or railcars
- core material for factory built panellized constructions
- flat or tapered board stock for roof insulation

ITW can provide general guidelines and recommendations for TRYMER™2000 XP insulation. For additional information, visit www.itwinsulation.com, call 1-800-231-1024 or contact your regional ITW representative.

SIZE

Height:	24" (61 cm)
Width:	48" (122 cm)
Length:	36" (91 cm)
	96" (244 cm)
	108" (274 cm)

Custom lengths are also available. Contact your regional ITW representative for details.

PHYSICAL PROPERTIES

TRYMER 2000 XP insulation exhibits the properties and characteristics indicated in Table 1 when tested as represented. Consultation with local code officials and design engineers/specifiers is recommended before application.

As with all cellular polymers, TRYMER 2000 XP insulation will degrade upon prolonged exposure to sunlight. A covering to block ultra-violet radiation must be used to help prevent degradation. Other coverings to protect the insulation from the elements may be required.

ENVIRONMENTAL DATA

TRYMER 2000 XP insulation is specifically formulated to provide excellent thermal insulation properties without the use of chlorofluorocarbon (CFC) or hydrochlorofluorocarbon (HCFC) blowing agents. In compliance with the Montreal Protocol and the Clean Air Act, TRYMER 2000 XP insulation is manufactured with hydrocarbon blowing agents, which have no ozone depletion potential.

SAFETY CONSIDERATIONS

TRYMER 2000 XP insulation requires care in handling. All persons working with this material must know and follow the proper handling procedures. The current Material Safety Data Sheet (MSDS) and General Handling Recommendations for TRYMER contain information on the safe handling, storage and use of this material. For copies of these documents, visit the literature library at www.itwinsulation.com, call 1-800-231-1024 or contact your regional ITW representative.

Installation

TRYMER 2000 XP insulation is specifically formulated for easy fabrication into many shapes, such as pipe coverings, valve and fitting covers, and others to meet specific design needs. Because of the critical technical design aspects in many applications, ITW recommends contacting qualified designers to specify the total system. For more specific instructions, contact a regional ITW representative or access the literature library at www.itwinsulation.com.

Availability

TRYMER 2000 XP insulation is distributed through ITW's extensive Authorized Fabricator Network. For more information, call: 1-800-231-1024.

Product Information

TRYMER™ 2000 XP complies with ASTM C591, Grade 2, Type IV

Table 1

Physical Properties of TRYMER™ 2000 XP Polyisocyanurate Foam[1,2]

Property and Test Method	Value
Density, ASTM D1622, lb/ft³ (kg/m³)	2.05 (32.8)
Compressive Strength, ASTM D1621, lb/in² (kPa),	
Parallel to rise	25 (172)
Perpendicular to rise - width	24 (165)
Perpendicular to rise - length	30 (207)
Compressive Modulus, ASTM D1621, lb/in² (kPa),	
Parallel to rise	650 (4,485)
Perpendicular to rise - width	475 (3,278)
Perpendicular to rise - length	600 (4,414)
Shear Strength, ASTM C273, lb/in² (kPa),	
Parallel and perpendicular, avg	15 (104)
Shear Modulus, ASTM C273, lb/in² (kPa),	
Parallel and perpendicular, avg	250 (1,725)
Tensile Strength, ASTM D1623, lb/in² (kPa),	
Parallel to rise - thickness	20 (138)
Flexural Modulus, ASTM C203, lb/in² (kPa),	
Parallel to rise	720 (4,968)
Flexural Strength, ASTM C203, lb/in² (kPa),	
Parallel to rise	33 (228)
k-Factor for comparison and product qualification[3], ASTM C518, Btu-in/hr·ft²·°F (W/m°C) @ 75°F (24° C)	0.168 (0.024)
R-Value per inch for comparison and product qualification[3], ASTM C518, hr·ft²·°F/Btu (m²·°C/W) @ 75°F (24°C)	6.0 (1.06)
k-Factor for thickness calculations[4], ASTM C518, Btu·in/hr·ft²·°F (W/m°C), Aged 180 days @ 75°F (24°C)	0.19 (0.027)
R-Value per inch for thickness calculations[4], ASTM C518, hr·ft²·°F/Btu (m²·°C/W) @ 75°F (24°C)	5.3 (0.93)

Property[1] and Test Method[2]	Value
Closed Cell Content, ASTM D6226, % min.	90
Water Absorption, ASTM C272, 24-hour immersion, % by volume	<0.7
Water Vapor Permeability, ASTM E96 perm-inch (ng/Pa•s•m)	4 (5.8)
Dimensional Stability[5], ASTM D2126	
At -40° F (-40°C), 7 days	
Length, % change	0.4
Volume, % change	0.6
At -10° F (-23°C), 7 days	
Length, % change	0.2
Volume, % change	0.2
At 158° F (70°C), 7 days	
Length, % change	1.5
Volume, % change	3.0
At 158° F (70°C), 97% R.H. 7 days	
Length, % change	1.6
Volume, % change	3.4
At 300° F (149°C), 7 days	
Length, % change	2.7
Volume, % change	4.5
Service Temperature[6], °F (°C)	-297 to +300 (-183 to +149)
Surface Burning Characteristics[7], ASTM E84,	
Flame Spread	≤25
Smoke Developed	≤450
Color	Tan

(1) All properties are measured at 74° (23°C), unless otherwise indicated.

(2) Unless otherwise indicated, data shown are typical values obtained from representative production samples. This data may be used as a guide for design purposes, but should not be construed as specifications. For property ranges and specifications, consult your ITW representative.

(3) Trymer 2000 XP has third party test results showing a 180 day aged k-Factor of 0.168 Btu-in/hr-ft²-°F at 75°F mean temperature. This value demonstrates the excellent performance of the product and can be used for comparison to other materials and to qualify Trymer 2000 XP to specification requirements.

(4) Thermal conductivity test results include no safety factor and are obtained in pristine lab conditions on samples with no joints and that have not been subjected to the vagaries of installation. For Trymer 2000XP, ITW recommends that a more conservative 180 days aged k-Factor curve represented by a value of 0.19 Btu-in/hr-ft²-°F at 75°F mean temperature be used for all system design and insulation thickness calculation purposes.

(5) Frequent and severe thermal cycling can produce dimensional changes significantly greater than those stated here. Special design consideration must be made in systems that cycle frequently.

(6) Above 300°F, discoloration and charring will occur, resulting in an increased k-factor in the discolored area.

(7) This numerical flame spread data is not intended to reflect hazards presented by this or any other material under actual fire conditions.

ITW Insulation Systems

ITW Insulation Systems

XPS pipe insulation

XPS PIB

Extruded Polystyrene Pipe Insulation Billet

XPS PIB (e**X**truded **P**oly**S**tyrene **P**ipe **I**nsulation **B**illet) is a rigid thermoplastic foam manufactured by a proprietary extrusion process that forms a uniform, void-free, closed cell structure. This structure, along with the naturally water-repellent nature of the polystyrene resin, gives XPS PIB products high compressive strength, low friability and excellent resistance to water vapor and water absorption from freeze-thaw cycling.

XPS PIB is non-dusting and non-irritating and is not a known food source for mold and mildew.

Applications

XPS PIB is used extensively in industrial and commercial piping applications. With a service temperature range of -297°F to 165°F (-183°C to 74°C), XPS PIB is a preferred material for low-temperature systems, both for minimizing heat gain and preventing surface condensation. XPS PIB maintains its key insulating properties in low-temperature applications and other environments with high humidity and high-moisture conditions.

Typical applications for XPS PIB include:

- ammonia refrigeration lines
- freezer rooms
- chilled water piping
- transport pipelines
- cold storage systems
- refrigeration equipment
- pharmaceutical plants
- cryogenic systems

XPS PIB complies with ASTM C578, Type XIII

Table 1

Physical Properties of XPS PIB Property[1] and Test Method[2]	Value
Density, ASTM D1622, lb/ft³ (kg/m³)	1.6 (26)
Compressive Strength[3], ASTM D1621, lb/in² (kPa),	20 (138)
k-Factor ASTM C518, Btu-in/hr·ft²·°F (W/m°C) Aged 180 days @ 75°F (24° C)	0.259 (0.037)
Water Absorption, % by volume ASTM C272 ASTM D2842	 1.0 1.0
Water Vapor Permeability, ASTM E96 perm-inch (ng/Pa•s•m)	 1.5 (2.2)
Dimensional Stability[3], ASTM D2126, % volume change At 158° F (70°C), 97% R.H. 7 days	 1.0
Service Temperature, °F (°C)	-297 to +165 (-183 to +74)
Surface Burning Characteristics[4], ASTM E84, Max Flame Spread/Smoke Developed (FS/SD)	5/165 up to 4" (10 cm) thickness
Coefficient of Linear Thermal Expansion, ASTM D696 in/in•°F cm/m•°C	 35×10^{-6} 19.4×10^{-4}
Color	Blue

(1) All properties are measured at 74°F (23°C), unless otherwise indicated.
(2) Unless otherwise indicated, data shown are typical values obtained from representative production samples. This data may be used as a guide for design purposes, but should not be construed as specifications. For property ranges and specifications, consult your ITW Insulation Systems representative.
(3) Average value through foam cross section.
(4) This numerical flame spread data is not intended to reflect hazards presented by this or any other material under actual fire conditions.

ITW can provide general guidelines and recommendations for XPS PIB. For additional information, visit www.itwinsulation.com, call **1-800-231-1024** or contact your local ITW Insulation Systems representative.

SIZE

XPS PIB is extruded into billets.

Height and width:
7" x 14" (18 cm x 36 cm)
8" x 16" (20 cm x 41 cm)
10" x 20" (25 cm x 51 cm)
Length: 9' (2.75 m)
Custom lengths are also available. Contact your local ITW representative for details.

PHYSICAL PROPERTIES

XPS PIB exhibits the properties and characteristics indicated in Table 1 when tested as represented.

Consultation with local code officials and design engineers/ specifiers is recommended before application.

As with all cellular polymers, XPS PIB will degrade upon prolonged exposure to sunlight. A covering to block ultraviolet radiation must be used to prevent degradation. Other coverings to protect the insulation from the elements may be required.

XPS Pipe Insulation Billet

AP/Armaflex®

White and Black Tube Insulation

Fiber Free

The original, fiber-free, flexible elastomeric pipe insulation for reliable protection against condensation and energy loss.

- Fiber-free, formaldehyde-free, low VOC and non-particulating formulation protects indoor air quality
- Closed-cell structure provides excellent condensation control
- Built-in vapor barrier eliminates need for additional vapor retarder
- Microban® antimicrobial product protection inhibits the growth of mold and mildew in the insulation
- 25/50 rated for use in air plenums up to 2" wall
- Available up to 2" wall

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

FM APPROVED

U.S. GREEN BUILDING COUNCIL MEMBER

Microban® antimicrobial product protection

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

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

Technical Data: AP Armaflex® Tube Insulation

Description:

Black or white flexible closed-cell elastomeric thermal insulation in a tubular form

Specifications Compliance:

ASTM C 534, Type I — Grade 1 ASTM D 1056, 2B1 ASTM E 84, NFPA 255, UL723	ASTM G21/C1338 ASTM G22 CAN/ULC S102 [1] MEA 107-89M	MIL-P-15280J, FORM T [2] MIL-C-3133C (MIL STD 670B) Grade SBE 3 [2] NFPA 90A, 90B	UL 181 UL 94 5V-A, V-0, File E55798 City of LA – RR 7642

Approvals, Certifications, Compliances:

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

Typical Properties

Specifications:	Values:		Test Method:
	Through 1" Wall	1-1/2" & 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 CAN/ULC S102[1]
Water Absorption, % by Volume:	0.2%	0.2%	ASTM C 209
Mold Growth: **Fungi Resistance:** **Bacterial Resistance:**	Passed	Passed	UL181 ASTM G21/C1338 ASTM G22
Upper Use Limit: [3]	220°F (105°C)	220°F (105°C)	ASTM C534
Lower Use Limit: [4]	-297°F (-183°C) [5]	-297°F (-183°C) [5]	ASTM C534
Ozone Resistance:	GOOD	GOOD	Ozone Chamber Test

Sizes:

Wall Thickness (nominal)	3/8", 1/2", 3/4", 1", 1-1/2", 2" (10, 13, 19, 25, 38, 50mm)
Inside Diameter, Tubular	3/8" ID to 8"ID (10mm ID to 203mm)
Length of Sections, Feet, Tubular	6' (1.8m)

Outdoor Use	Painting with WB Finish or other protective jacketing is required for exterior applications.

[1] AP Armaflex meets CAN/ULC S102 through 1" wall. AP Armaflex Black tested. AP Armaflex White determined to be comparable through 1" wall.

[2] AP Armaflex meets MIL-P-15280J and MIL-C-3133C (MIL STD 670B) Grade SBE through 1" wall.

[3] AP Armaflex 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.

[4] 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.

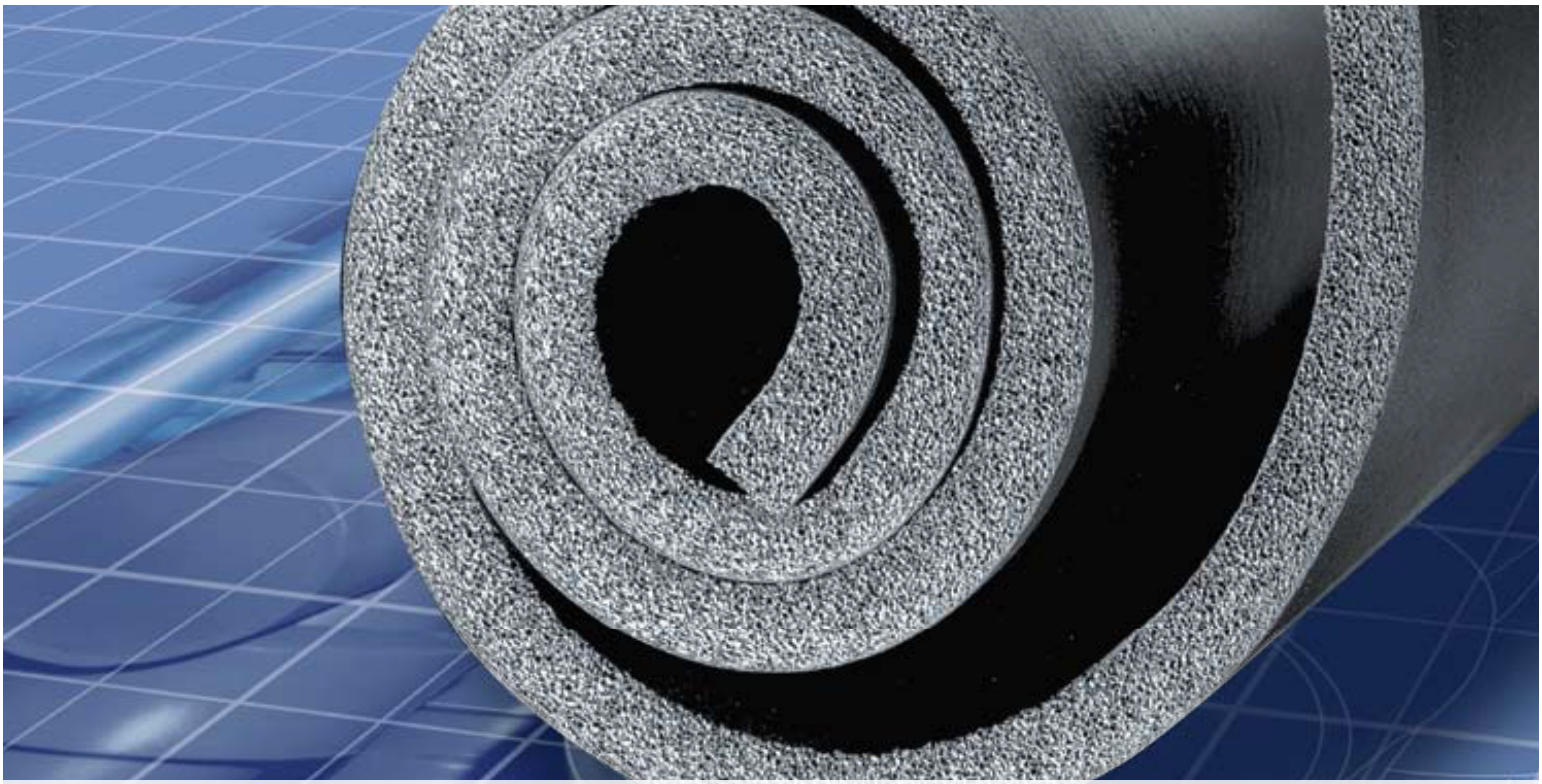
[5] For applications of -40°F to -297°F (-40°C to -183°C), contact Armacell.

armacell®

AP Armaflex	Tube	Submittal	017	Eng/USA	9/2015

armacell engineered foams

THE MAKERS OF Armaflex®



AP/Armaflex®

Sheet & Roll Insulation

Superior Moisture Control on Large Jobs, Mold Resistant

- Closed-cell, nonwicking
- Microban® antimicrobial product protection
- The IAQ Insulation™
- Reduces HVAC noise

THE GLOBAL COMPACT WE SUPPORT

FOR GREENER BUILDINGS

FM APPROVED

Microban® antimicrobial product protection

AP Armaflex Sheet and Roll Insulation

AP Armaflex Sheet and Roll Insulation is the original closed cell, fiber-free elastomeric foam and the world's most recognized brand in flexible mechanical insulation.

- **Proven:** World's first choice for insulating ductwork, large piping, fittings, tanks, vessels and curved or irregular surfaces
- **Mold resistant:** Made with Microban antimicrobial product protection
- **Indoor Air Quality-friendly:** Fiber-free, formaldehyde-free, low VOCs, nonparticulating
- **Quiet:** Noise blocking and vibration damage
- **Durable:** No fragile vapor retarder

Description

AP Armaflex Sheet and Roll Insulation is a black flexible elastomeric thermal insulation. It is furnished with a smooth skin on one side which forms the outer exposed insulation surface. The expanded closed-cell structure makes it an efficient insulation. It is manufactured without the use of CFC's, HFC's or HCFC's. All AP Armaflex products are made with Microban® antimicrobial product protection for added defense against mold on the insulation. It is also effective for reducing HVAC noise.

- **AP Armaflex Sheet** is supplied in flat sheets 36″ x 48″ (.915m x 1.22) in nominal wall thicknesses of 1/8″, 1/4″, 3/8″, 1/2″, 3/4″, 1″, 1-1/2″* and 2″* (3, 6, 10, 13, 19, 25, 38 and 50mm)
- **AP Armaflex Roll** is supplied in 48″ wide (1.22m) continuous rolls in nominal wall thicknesses of 3/8″, 1/2″, 3/4″, 1″, 1-1/2″* and 2″* (10, 13, 19, 25, 38 and 50mm). Also available in 60″ (1.53m) in 1″ thickness

Factory Mutual (FM) Approvals

AP Armaflex is approved through continuing supervision by Factory Mutual Approvals to consistently provide actual values on these key performance criteria for mechanical system insulation:

- **Thermal Conductivity:** 0.25 BTU-in/hr. ft² °F
- **Water Vapor Transmission:** 0.05 perm-inch
- **Fire Rating:** will not contribute significantly to fire (simulated end-use testing)

As tested by ASTM E 84 "Method of Test for Surface Burning Characteristics for Building Materials", AP Armaflex in wall thickness up to and including 2″ (50mm) has a flame-spread index of less than 25 and a smoke-developed index of less than 50.

Note: Numerical flammability ratings alone may not define the performance of products under actual fire conditions. They are provided only for use in the selection of products to meet limits specified.

ALL ARMACELL FACILITIES IN NORTH AMERICA ARE ISO 9001:2000 CERTIFIED.

Uses

- Retards heat gain and controls condensation drip from chilled-water and refrigeration systems. Efficiently reduces heat flow on hot systems
- Acceptable in wall thicknesses through 2″ (50mm) for use in air plenums and conforms to NFPA 90A and NFPA 90B requirements

The recommended temperature usage range for AP Armaflex Sheet & Roll Insulation is -297°F to +220°F (-183°C to +105°C) according to method of application. With full adhesive coverage attachment, the surface to which it is applied may operate to a limit of 180°F (82°C). When used for pipe insulation with adhesive adhering seams and joints only, AP Armaflex Sheet can be applied to lines that will operate to a limit of 220°F (105°C). On cold systems, insulation thicknesses have been calculated to control condensation on the insulation outer surface, as shown in the table of thickness recommendations.

AP Armaflex Sheet and Roll Insulation meets the energy code requirements of International Energy Conservation Code (IECC) and ASHRAE for **R-Value 4.2 at 1″ wall thickness** and R-Value 8 at 2″ wall thickness.

Application

AP Armaflex Sheet and Roll is installed using one of our Armaflex adhesives: Armaflex 520, 520 Black or, where a low V.O.C. adhesive is required, Armaflex 520 BLV or Armaflex Spray Contact Adhesive. For application to large, flat or curved metal surfaces such as ducts, very large pipes, tanks and vessels, full adhesive coverage is used. For application as pipe insulation and fitting covers, only the seams and joints are adhered with Armaflex adhesive. 520 Adhesives are contact adhesives; therefore, in all cases, both surfaces to be joined are coated with adhesive. Exterior ductwork must be pitched to allow rainwater to run off the insulation.

For many applications, Armaflex needs no supplementary protection. Additional vapor-retarder protection may be necessary on very-low-temperature surfaces or piping where the insulation is exposed to continually high humidity conditions.

AP Armaflex is designed for installation above ground. Outdoors, a weather-resistant protective finish is to be applied and Armaflex WB Finish is recommended. Armaflex insulation products must be installed according to "Installation of Armaflex Insulations" brochure. Proper installation is required to assure Armaflex insulation performance.

Specification Compliance

AP Armaflex Sheet & Roll Insulation developed to meet:

ASTM C 534, Type II — Sheet Grade 1
ASTM C 1534
ASTM E 84, NFPA 255, UL 723
CAN/ULC S102
NFPA 90A, 90B
ASTM G21/C1338
ASTM G22
ASTM D 1056, 2B1
MIL-P-15280J, FORM S
MIL-C-3133C (MIL STD 670B), Grade SBE 3
MEA 107-89M
UL 181
UL 94 5V-A, V-0, File E 55798
UL 84
City of Los Angeles – RR 7642

Physical Properties

Specifications	Values	Test Method
Thermal Conductivity, Btu • in./h • ft² • °F (W/mK) 75°F Mean Temperature (24°C) 90°F Mean Temperature (32°C)	 0.25 (0.036) 0.256 (0.037)	 ASTM C 177 or C 518
Water Vapor Permeability, Perm-in. [Kg/(s•m•Pa)]	0.05 (0.725 x 10^{-13})	ASTM E 96, Procedure A
Flame Spread and Smoke Developed Index through 2″ (50mm)*	25/50	ASTM E 84 CAN/ULC S102④
Mold Growth **Fungi Resistance** **Bacterial Resistance**	UL181 ASTM G21/C1338 ASTM G22	Meets requirements Meets requirements Meets requirements
Water Absorption, % by Volume	0.2%	ASTM C 209
Upper Use Limit①	180/220°F (82/105°C)	—
Lower Use Limit②	-297°F (-183°C)**	—
Ozone Resistance	GOOD	—
Sizes – Sheet **Width and Length Thickness (nominal)**	36″ x 48″ (.915m x1.22m) 1/8″, 1/4″, 3/8″, 1/2″, 3/4″, 1″, 1-1/2″ & 2″ (3, 6, 10, 13, 19, 25, 38 & 50mm)	—
Sizes – Roll **Width Thickness (nominal) x Length**	48″ (1.22mm) and 60″ (1.53m)† 3/8″ x 100′ (10mm x 30.5m) 1/2″ x 70′ (13mm x 21.4m) 3/4″ x 50′ (19mm x 15.2m) 1″ x 35′ (25mm x 10.7m) 1-1/2″ x 25′ (38mm x 7.6m) 2″ x 18′ (50mm x 5.4m) † 1″ thickness only	—
Density, Typical Range③	3.0 - 6.0 lbs./ft.³	ASTM D 1622 or D 1667

Notes

① When AP Armaflex Sheet is installed by adhering butt joints and seams only, the upper temperature limit is 220°F (105°C) using 520, 520 black, or 520 BLV Adhesive.

AP Armaflex Sheet adhered with complete adhesive coverage on flat or curved metal surfaces may be applied to surfaces that will operate as high as 180°F (82°C) using 520, 520 Black, 520 BLV or Armaflex Low VOC Spray Contact Adhesive.

② At temperatures below -20°F (-29°C), elastomeric insulation starts to become less flexible. However, this characteristic does not affect thermal efficiency or water vapor permeability of Armaflex insulation.

③ Reference only.

④ Though 1″

* 1-1/2″ and 2″ available in 25/50 and non 25/50.

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

Performance approved through continuing supervision by Factory Mutual Approvals.

Thickness Recommendations

For Controlling Outer Insulation Surface Condensation

(Based upon available manufactured thicknesses and not intended to supercede any state or local building codes.)

	Ducts/Tanks/Vessels/Equipment Metal Surface Temperature		
	50°F (10°C)	**35°F (2°C)**	**0°F (–18°C)**
BASED ON **NORMAL** DESIGN CONDITIONS AP Armaflex in the thicknesses noted and within the specified temperature ranges will control outer insulation surface condensation indoors under **normal** design conditions, a maximum severity of **85°F (29°C) and 70% RH**. Armacell research and field experience indicate that indoor conditions anywhere in the United States seldom exceed this degree of severity.	Nom 3/8″ (10mm)	Nom 3/4″ (19mm)	Nom 1-1/2″ (38mm)
BASED ON **MILD** DESIGN CONDITIONS AP Armaflex in the thicknesses noted and within the specified temperature ranges will control outer insulation surface condensation indoors under **mild** design conditions, a maximum severity of **80°F (27°C) and 50% RH**. Typical of these conditions are most air-conditioned spaces and arid climates.	Nom 1/8″ (3mm)	Nom 1/4″ (6mm)	Nom 1/2″ (13mm)
BASED ON **SEVERE** DESIGN CONDITIONS AP Armaflex in the thicknesses noted and within the specified temperature ranges will control outer insulation surface condensation indoors under **severe** design conditions, a maximum severity of **90°F (32°C) and 80% RH**. Typical of these conditions are indoor areas in which excessive moisture is introduced or in poorly ventilated confined areas where the temperature may be depressed below ambient.	Nom 1″ (25mm)	Nom 1-1/2″ (38mm)	Nom 2″ (50mm)
For **VERY SEVERE** DESIGN CONDITIONS which Armacell would consider temperatures above recommended insulation **90°F (32°C)** and/or above **80% RH**.	Consult Armacell for recommended insulation thickness		

Armaflex® 520 BLV Adhesive

Armaflex® 520 BLV ADHESIVE

Armaflex 520 BLV Adhesive is a black, low VOC air-drying contact adhesive that is excellent for joining seams and butt joints of Armaflex Pipe and Sheet Insulations

Description

520 BLV Adhesive will make a resilient and heat-resistant bond with many materials where the use of a solvent-base neoprene contact adhesive is suitable and desirable. It will make a strong resilient bond for sealing laminated aluminum foil and kraft paper vapor retarder jackets.

- Black, low VOC adhesive
- Developed to meet South Coast Air Quality Management District Rule 1168
- Hexane-free, toluene-free contact adhesive
- No gapping, no tape needed

Specifications	Values
Color	Black
Net Weight	6.9 lb per gallon (828 g/l)
Composition	Synthetic rubber base with synthetic resins and fillers added; hydrocarbon- and ketone-type solvents. Zero V.O.C. g/l, calculated SCAQMD 1168
Solids Content	Approximately 30% by weight
Coverage	200 sq ft (5m²/l) per gallon max, single coat (depending upon porosity of materials bonded and air temperature)
Shelf Life	2 years in original sealed container; storage temperature 60°F to 80°F (16°C to 27°C)
Minimum Drying Time	3 - 5 minutes under normal conditions
Temperature Limits	250°F (120°C)—Armaflex Pipe Insulation seams and joints 180°F (82°C)—full-bonding Armaflex Sheet Insulation
Container Sizes	Pint brush-top cans and gallon containers
Fire Performance	Wet: Flash point below -4°F (-20°C)(TOC)
	Dry: ASTM E 84 Method*
	Applied on Steel Plate Flame Spread Index — 5 Smoke Developed Index — 15

Notes
The recipients of this data should contact Armacell to verify that this data and information is applicable as listed for the intended application. The data and information are provided as a technical service and are subject to change without notice.

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BLV	MO	01	07	NA	NA

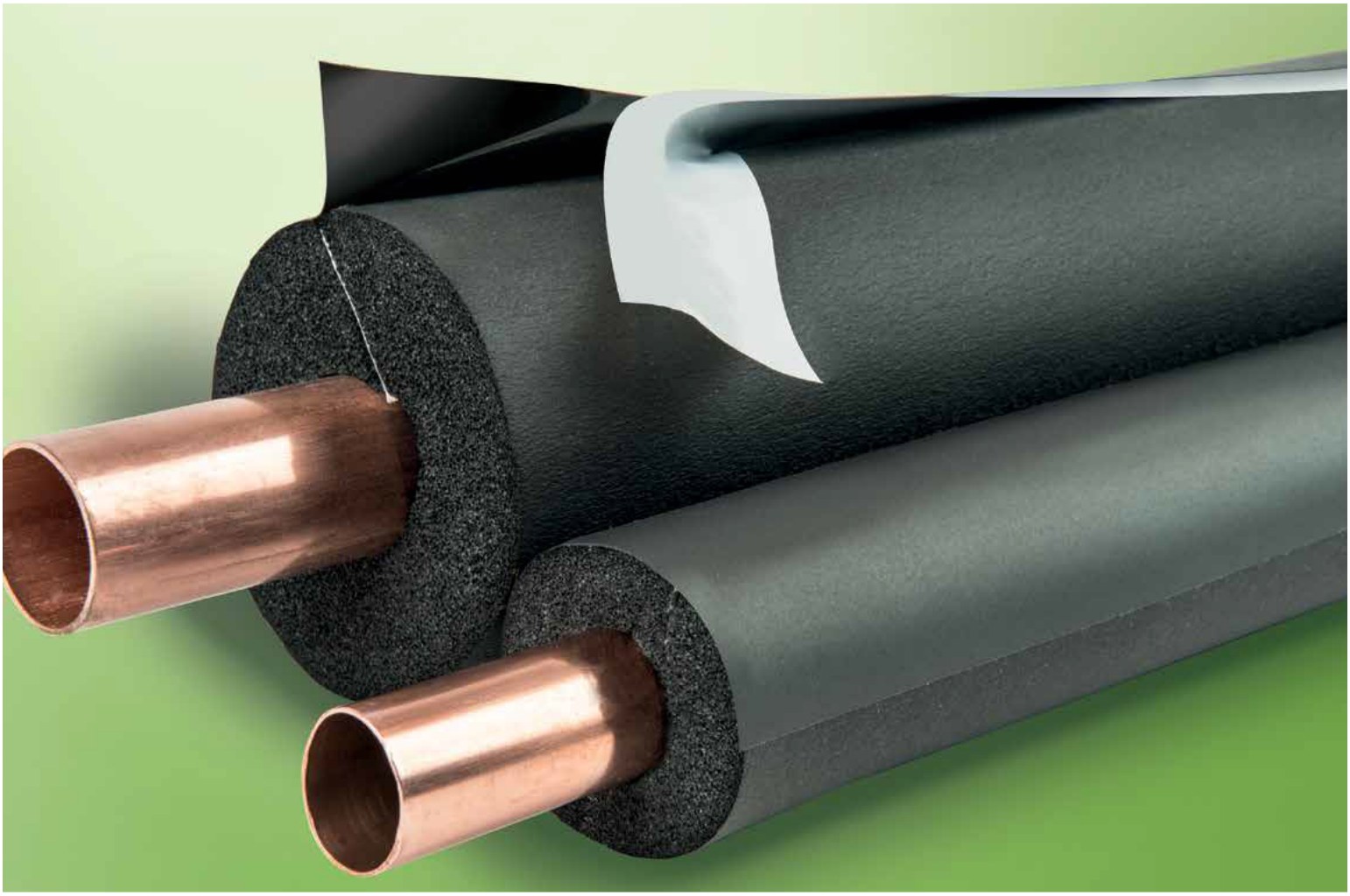
Printed in United States of America

AP/Armaflex®
Black LapSeal™

Tube Insulation with
Reinforced Lap Seal

Fiber Free

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



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

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

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U.S. GREEN BUILDING COUNCIL MEMBER

Microban® antimicrobial product protection

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

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

Technical Data: AP Armaflex® Black LapSeal™ Tube Insulation

Description:

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

Specifications Compliance:

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

Approvals, Certifications, Compliances:

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

Typical Properties

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

Tamaños:

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

Outdoor Use	Painting with WB Finish or other protective jacketing is required for exterior applications.

[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.

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THE MAKERS OF Armaflex®

Tubolit®
Pipe Insulation

Durable, economical for domestic lines

- Semi-slit polyethylene insulation
- Saves energy on hot and cold plumbing
- Reduces noise
- From the makers of Armaflex®

THE GLOBAL COMPACT
WE SUPPORT

FOR GREENER BUILDINGS

Tubolit Pipe Insulation

Tubolit Pipe (Tube) Insulation is an economical thermal solution from Armacell, the makers of Armaflex® and the world's leading supplier of tubular polyethylene insulation.

- **Proven:** Used worldwide for insulating domestic hot and cold plumbing lines
- **Indoor Air Quality-friendly:** Fiber-free, formaldehyde-free, low VOCs
- **Quiet:** Reduces plumbing noise
- **Resists Mold and Mildew**

Description

Tubolit Pipe (Tube) Insulation is a semi-slit 25/50-rated gray closed-cell polyolefin/polyethylene thermal insulation. Particularly effective for cost-efficient thermal insulation of domestic heating and plumbing lines. It is expanded without the use of CFC's, HFC's or HCFC's.

- Available in the most frequently specified pipe sizes and thicknesses

Use

- Reduces heat loss on hot water plumbing and heat gain on cold-water plumbing systems

Recommended for use on lines operating from -200° F (-129° C) to 200° F (93° C).

Application

Tubolit is easy to sleeve over new pipework, or cut longitudinally to snap over existing pipework. Installs with simple hand tools and one of our Armaflex adhesives: Armaflex 520, 520 Black or, where a low V.O.C. adhesive is required, 520 BLV. 520 Adhesives are contact adhesives; therefore, in all cases, both surfaces to be joined are coated with adhesive. Tubolit must be protected from direct sunlight exposure and weather elements. It must be protected when installed outdoors and Armaflex WB Finish is recommended or weather-resistant jacketing.

Specification Compliance

Tubolit Pipe Insulation developed to meet:
ASTM C 1427, Type I
MEA 6-02M

ALL ARMACELL FACILITIES IN NORTH AMERICA ARE ISO 9001:2000 CERTIFIED.

Physical Properties

Specifications	Values	Test Method
Thermal Conductivity, Btu • in./h • ft • °F (W/mK) 75°F (24°C) mean temperature	0.25 (0.036)	ASTM C 177 or C 518
Water Vapor Permeability, Perm-inch. [Kg/(s•m•Pa)]	0.0	ASTM E 96, Procedure A
Flame Spread and Smoke Developed Index Through 1˝ (25 mm) Thickness②	25/50	ASTM E 84
Mold Growth **Fungi Resistance** **Bacterial Resistance**	UL181 ASTM G21/C1338 ASTM G22	Meets requirements Meets requirements Meets requirements
Water Absorption, % by Volume	0.2%	ASTM C 209
Density, lbs/ft (Kg/m³) ③	2 (32)	ASTM D 1622
Ozone Resistance	GOOD	—
Upper Use Limit④	200˚F (93˚C)	—
Lower Use Limit④	-200˚F (-129˚C)	—
Sizes Wall Thickness (nominal) Inside Diameter, Tubular Length of Sections, Tubular	 3/8˝, 1/2˝, 3/4˝ and 1˝ (10, 13, 19 and 25 mm) 3/8˝ to 4˝ IPS ID (10 mm to 114 mm ID) 6˝ (1.83 m)	—

Notes

① Average values are not to be used for writing material specifications. Contact Armacell for specification ranges.

② Cellular plastics and thermoplastics, such as polyethylene/polyolefin insulation, that may drip, melt, delaminate or draw away from the fire, present unique problems and require careful interpretation of the test results.

③ For reference only.

④ See Armacell Technical Info-Service #010.

armacell
advanced insulation

THE MAKERS OF Armaflex®

AP Armaflex® & AP Armaflex W

Tube Insulation

Superior Moisture Control, Mold-Resistant, Available Black or White

- Closed-cell, nonwicking
- GREENGUARD Indoor Air Quality Certified®
- Microban® antimicrobial product protection
- The IAQ Insulation™
- Fiber-free
- 25/50 rated through 1" wall
- 25/50 rated through 2" wall available in AP Armaflex FS (see AP Armaflex FS submittal form)

Children & Schools GREENGUARD® Indoor Air Quality Certified

THE GLOBAL COMPACT WE SUPPORT

FM APPROVED

Microban® antimicrobial product protection

U.S. GREEN BUILDING COUNCIL MEMBER

AP Armaflex (and AP Armaflex W) Pipe (Tube) Insulation

AP Armaflex Pipe (Tube) Insulation is the original closed cell, fiber-free elastomeric foam and the world's most recognized brand in flexible mechanical insulation.

- **Proven:** World's first choice for insulating chilled water and refrigeration lines
- **Mold resistant:** Made with Microban antimicrobial product protection
- **Indoor Air Quality-friendly:** Fiber-free, formaldehyde-free, low VOCs, nonparticulating. GREENGUARD Indoor Air Quality Certified®
- **Durable:** No fragile vapor retarder

Description

AP Armafex Pipe (Tube) Insulation is a black or white flexible elastomeric thermal insulation. The expanded closed-cell structure makes it an efficient insulation. It is manufactured without the use of CFC's, HFC's or HCFC's. All AP Armaflex products are made with Microban® antimicrobial product protection for added defense against mold on the insulation.

- Nominal wall thicknesses of 3/8″, 1/2″, 3/4″ and 1″ (10, 13, 19 and 25mm)
- Popular sizes up to 8″ IPS

Factory Mutual (FM) Approvals

AP Armaflex is approved through continuing supervision by Factory Mutual Approvals to consistently provide actual values on these key performance criteria for mechanical system insulation:

- **Thermal Conductivity:** 0.25 BTU-in/hr. ft^2 °F
- **Water Vapor Transmission:** 0.05 perm-inch
- **Fire Rating:** will not contribute significantly to fire (simulated end-use testing)

As tested by ASTM E 84 "Method of Test for Surface Burning Characteristics for Building Materials" AP Armaflex Pipe Insulation has a flame-spread index of less than 25 and a smoke-developed index of less than 50.

AP Armaflex meets CAN/UL S102.

Note: Numerical flammability ratings alone may not define the performance of products under actual fire conditions. They are provided only for use in the selection of products to meet limits specified.

ALL ARMACELL FACILITIES IN NORTH AMERICA ARE ISO 9001:2000 CERTIFIED.

Uses

- Retards heat gain and controls condensation drip from chilled-water and refrigeration systems. Efficiently reduces heat flow for hot-water plumbing, liquid-heating and dual-temperature piping
- Acceptable for use in air plenums and conforms to NFPA 90A and NFPA 90B requirements

The recommended temperature usage range for AP Armaflex Pipe Insulation is -297°F to +220°F (-183°C to +105°C). For use on cold pipes, thicknesses have been calculated to control condensation on the insulation outer surface, as shown in the table of thickness recommendations. AP Armaflex meets the energy code requirements of ASHRAE 90.1, International Energy Conservation Code (IECC) and other building codes.

Application

AP Armaflex Pipe Insulation in unslit tubular form can be slipped onto piping before it is connected, or it can be slit lengthwise and snapped over piping already connected. Fitting covers are fabricated from miter-cut tubular form. In all cases, butt joints and seams are to be sealed with one of our Armaflex adhesives: Armaflex 520, 520 Black or, where a low V.O.C. adhesive is required, 520 BLV. 520 Adhesives are contact adhesives; therefore, in all cases, both surfaces to be joined are coated with adhesive.

For pipes greater than 8″ IPS*, use AP/Armaflex Sheet/Roll insulation (black only). For thicknesses greater than 1″, sleeve the insulation. See technical bulletin #030 for additional information.

AP Armaflex normally requires no supplemental vapor-retarder protection but additional vapor-retarder protection may be necessary when installed on very-low-temperature piping or exposure to continually high humidity conditions.

AP Armaflex is designed for installation above or below ground. For below ground applications, contact Armacell or see our Technical Bulletin No. 7 on our website, www. armacell.com. Outdoors, a weather-resistant protective finish is to be applied and Armaflex WB Finish is recommended.

Armaflex insulation products must be installed according to "Installation of Armaflex Insulations" brochure. Proper installation is required to assure Armaflex insulation performance.

AP Armaflex FS pipe insulation is available in 1-1/2″ and 2″ wall thicknesses with 25/50 rating for ID size range from 3/8″ to 8″ IPS*. See AP Armaflex FS submittal.

Specification Compliance

AP Armaflex Pipe Insulation developed to meet:

ASTM C 534, Type I — Tubular Grade 1
ASTM E 84, NFPA 255, UL 723
CAN/ULC S102
UL 94 5V-5A, V-O, File E 55798
NFPA 90A, 90B
UL 181
ASTM G-21/C1338,
ASTM G-22
ASTM D 1056, 2B1
MIL-P-15280J, FORM T (Black)
MIL-C-3133C (MIL STD 670B), Black
Grade SBE 3
MEA 96-85-M
City of LA – RR 7642

Physical Properties

Specifications	Values	Test Method
Thermal Conductivity, Btu • in./h • ft² • °F (W/mK) 75°F Mean Temperature (24°C) 90°F Mean Temperature (32°C)	 0.25 (0.036) 0.256 (0.037)	 ASTM C 177 or C 518
Water Vapor Permeability, Perm-in. [Kg/(s•m•Pa)]	0.05 (0.725 x 10^{-13})	ASTM E 96, Procedure A
Flame Spread and Smoke Developed Index	25/50*	ASTM E 84 CAN/ULC S102
Mold Growth **Fungi Resistance** **Bacterial Resistance**	Meets requirements	UL181 ASTM G21/C1338 ASTM G22
Water Absorption, % by Volume	0.2%	ASTM C 209
Upper Use Limit①	220°F (105°C)	—
Lower Use Limit②	-297°F (-183°C)**	—
Ozone Resistance	GOOD	—
Sizes **Wall Thickness, (nominal) Form** **Inside Diameter, Tubular Form** **Length of Sections, Feet, Tubular Form**	 3/8″, 1/2″, 3/4″, 1″, (10, 13, 19 and 25mm) 3/8″ ID to 8″ ID* (10mm ID to 203mm) 6 (1.8m) *Black Only	—

Notes

On the heating cycle, AP Armaflex Pipe Insulation will withstand temperatures as high as 220°F (105°C). 520, 520 Black or 520 BLV Adhesive may be used with pipe insulation applications up to 220°F (105°C).

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.

AP Armaflex Black tested for CAN/ULC 5102. AP Armaflex White determined to be comparable.

* For 25/50 above 1" (25mm) please see our AP Armaflex FS Submittal.

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

armacell advanced insulation

THE MAKERS OF Armaflex®

ArmaTuff®

Laminated Sheets & Rolls

New ArmaTuff! Tougher than ever.

- Armaflex with heavy-duty 12 mil laminate
- No painting required
- 10-year membrane warranty
- Puncture-resistant, embossed surface
- Durable, maintenance-free
- Available with or without pressure sensitive adhesive

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FOR GREENER BUILDINGS

GREENGUARD Indoor Air Quality Certified

ArmaTuff® Laminated Sheets & Rolls

ArmaTuff is the premiere Armacell Coating System for outdoor applications. It provides a tough metal surface on Armaflex insulation for superior protection against ultraviolet radiation and punctures.

- **Maintenance-free:** UV- and damage resistant 12 mil laminate
- **Long-lasting protection:** 10-year membrane limited warranty
- **Flexible application:** Available with or without PSA
- **Color:** White

Description

ArmaTuff is Armaflex insulation with a 12 mil laminated covering membrane. The membrane has a 10-year limited warranty against break-down due to UV radiation. Armaflex is a mold-resistant flexible elastomeric thermal insulation. Its closed-cell structure prevents condensation and moisture wicking, and makes it an efficient insulation. It is manufactured without the use of CFCs, HFCs or HCFCs.

It is available in 36” x 48” sheets (with or without pressure sensitive adhesive) and in rolls 48” wide (without PSA), in 1”, 1-1/2”, 2” thicknesses.

Uses and Applications

ArmaTuff is designed to be used for all exterior applications: Exterior ducts, tanks, vessels, large pipes and fittings. The laminate is resistant to UV, ozone, acid rain and most industrial pollutants. No painting is required.

Application

ArmaTuff is installed using Armaflex Adhesives or with pre-applied pressure sensitive adhesive (PSA) for application to large, flat or curved metal surfaces such as ducts, vessels, very large pipes or tanks. The seams must be installed in compression and sealed with Armaflex Adhesives. Cover the seam with ArmaTuff Seal Tape. Armaflex 520 Adhesive is a contact adhesive: therefore it must be applied to both surfaces, allowed to get tacky, and the surfaces joined with pressure. Exterior duct work must be pitched to allow rain water to run off the insulation.

ArmaTuff is designed for installation in above ground applications.

Armaflex insulation products must be installed according to Installation of Armaflex Insulations brochure. Proper installation is required to assure Armaflex insulation performance.

The application temperature should be above 40°F (+4°C) and 100°F (+38°C).

Installation

Applying Non-Self Adhering ArmaTuff

1. Always prepare surface by cleaning with denatured alcohol.

2. Apply thin, uniform coat of Armaflex 520 Adhesive.

3. Roll thin coat of 520 Adhesive to insulation.

4. Position carefully and apply ArmaTuff. Contact adhesive bonds instantly.

5. Apply ArmaTuff to top surface, overlapping the side pieces.

6. Seal and protect exposed edges and seams with ArmaTuff Seal Tape.

ALL ARMACELL FACILITIES IN NORTH AMERICA ARE ISO 9001:2008 CERTIFIED.

Physical Properties

Specifications	Values	Test Method
Thermal Conductivity, Btu • in./h • ft² • °F (W/mK) 75°F Mean Temperature (24°C) 90°F Mean Temperature (32°C)	 0.25 (0.036) 0.256 (0.037)	 ASTM C 177 or C 518
Water Vapor Permeability, Perm-in. [Kg/(s•m•Pa)]	Laminate 0.00 Foam 0.05	ASTM E 96, Procedure A
Mold Growth **Fungi Resistance** **Bacterial Resistance**	Meets requirements	UL181 ASTM G21/C1338 ASTM G22
Water Absorption, % by Volume	0.2%	ASTM C 209
Upper Use Limit	180°F (82°C)	—
Lower Use Limit ②	-297°F (-183°C)*	—
UltraViolet (UV) Resistance	Excellent	ASTM G 90 QUV Chamber
Chemical Resistance	Excellent	—
Weatherability	Excellent	ASTM D471
Durability	Excellent	—
Density, Typical Range ③	3.0 - 6.0 lbs./ft.³	ASTM D 1622 or D 1667
Sizes – Sheet – With or Without Adhesive **Width and Length** **Thickness (nominal)**	 36″ x 48″ (0.915 m x 1.22 m) 1″, 1-1/2″ and 2″ (25, 38 and 50 mm)	—
Sizes – Roll – Without Adhesive **Width** **Thickness (nominal) x Length**	48″ (1.22 m) 1″ x 35′ (25 mm x 10.7 m) 1-1/2″ x 25′ (38 mm x 7.6 m) 2″ x 18′ (50 mm x 5.4 m)	—

Notes

② At temperatures below -20°F (-29°C) elastomeric insulation starts to become less flexible. However, this characteristic does not affect thermal efficiency or water vapor permeability of ArmaTuff.

③ Reference only.

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

Finishing the Installation with ArmaTuff Seal Tape

ArmaTuff is a complete insulation system providing durable, UV-resistant and maintenance-free outdoor performance. Tape is backed with pressure sensitive adhesive and designed to provide protection along the seams and exposed edges of the insulation. Tape is supplied in rolls 6″-wide for sealing seams and exposed edges of ArmaTuff.

Apply ArmaTuff Seal Tape along all exposed edges of ArmaTuff installations. Finish by applying even pressure, using a roller.

Use the ArmaTuff Seal Tape for weather-tight seam protection. Use roller to finish.

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THE MAKERS OF
Armaflex®

Armaflex® 520 ADHESIVE

STRONGER BONDS, FOR TIGHTER SEAMS

Formulated for Armaflex Insulations

Air-drying contact adhesive

Years of on-the-job performance

Meets MIL-A-24179A and Amend-2

Description

Armaflex® 520 Adhesive is an air-drying contact adhesive that is excellent for joining seams and butt joints of Armaflex Pipe and Sheet Insulations for line temperatures up to 250°F (120°C). The adhesive may also be used to apply Armaflex Sheet Insulation to flat or curved metal surfaces that will operate at temperatures up to 180°F (82°C).

- Meets Military Specification MIL-A-24179A and Amend-2 as Type II, Class 1
- Dried film also meets 25/50 flame spread index and smoke developed index requirements of codes and specifications when tested by ASTM E 84 Test Method

Uses

520 Adhesive will make a resilient and heat-resistant bond with many materials where the use of a solvent-base neoprene contact adhesive is suitable and desirable.

It will make a strong resilient bond for sealing laminated aluminum foil and kraft paper vapor retarder jackets.

Properties

Color

Light tan

Net Weight

6.9 lb per gallon (828 g/l)

Composition

Synthetic rubber base with synthetic resins and fillers added; hydrocarbon- and ketone-type solvents. V.O.C. Content: 432 g/l, calculated SCAQMD 1168

Solids Content

Approximately 22% by weight.

Coverage

200 sq ft (5m²/l) per gallon max, single coat (depending upon porosity of materials bonded and air temperature)

Shelf Life

1-1/2 years in original sealed container; storage temperature 60°F to 80°F (16°C to 27°C)

Minimum Drying Time

3–5 minutes under normal conditions

Temperature Limits

250°F (120°C)—Armaflex Pipe Insulation seams and joints
180°F (82°C)—full-bonding Armaflex Sheet Insulation

Container Sizes

Half-pint and pint brush-top cans and pint, quart, and gallon containers

Fire Performance

Wet: Flash point below 20°F (-7°C) (TOC)
Dry: ASTM E 84 Method*
Applied on steel plate

Flame Spread Index	5
Smoke Developed Index	15

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DANGER—Extremely flammable mixture; vapors may cause flash fire; vapors may ignite explosively; prevent buildup of vapors—open all windows and doors—use only with cross ventilation; keep away from heat, sparks, and open flame; do not smoke; extinguish all flames and pilot lights; and turn off stoves, heaters, electric motors, and other sources of ignition during use and until all vapors are gone; close container after use; avoid prolonged breathing of vapor and prolonged contact with skin; do not take internally; keep away from children.

Not for consumer use. Sold only for professional or industrial application.

Application Instructions

Mix well, and apply only to clean, dry, oil-free surfaces. For best results, the adhesive should be brush-applied in a thin, uniform coat to both bonding surfaces. Allow the adhesive to tack prior to joining both surfaces. Avoid open time of more than 10 minutes. 520 Adhesive bonds instantly, so pieces must be positioned accurately as contact is made. Moderate pressure should then be applied to the entire bonding area to insure complete contact.

It is recommended that the adhesive be applied at temperatures above 40°F (4°C) and not on heated surfaces. Where application between 32°F and 40°F (0°C and 4°C) can not be avoided, exercise more care in applying the adhesive and closing the joint. Applications below 32°F (0°C) are not recommended.

Where lines and tanks that are insulated and will operate at hot temperatures, 520 Adhesive must cure a minimum of 36 hours at room temperature to attain heat resistance for insulated pipe to 250°F (120°C) and insulated tanks and equipment to 180°F (82°C).

Adhesive-bonded seams and joints of Armaflex Pipe Insulation must cure before finishes are applied. Where the insulation is installed by adhering seams and butt joints, the adhesive must cure 24 to 36 hours.

Adhesive-bonded seams and joints of Armaflex Sheet Insulation must cure before finishes are applied. Where the insulation is installed by adhering seams and butt joints only, the adhesive must cure 24 to 36 hours. Where the insulation is installed against surfaces with full adhesive coverage, requiring wet adhesive at joints, the adhesive must cure seven days.

Thinning is not recommended.

Either methyl ethyl ketone or most lacquer thinners can be used to clean fresh residue from tools and workpieces.

Printed in United States of America

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THE MAKERS OF Armaflex®

Armaflex®

Low VOC Spray Contact Adhesive

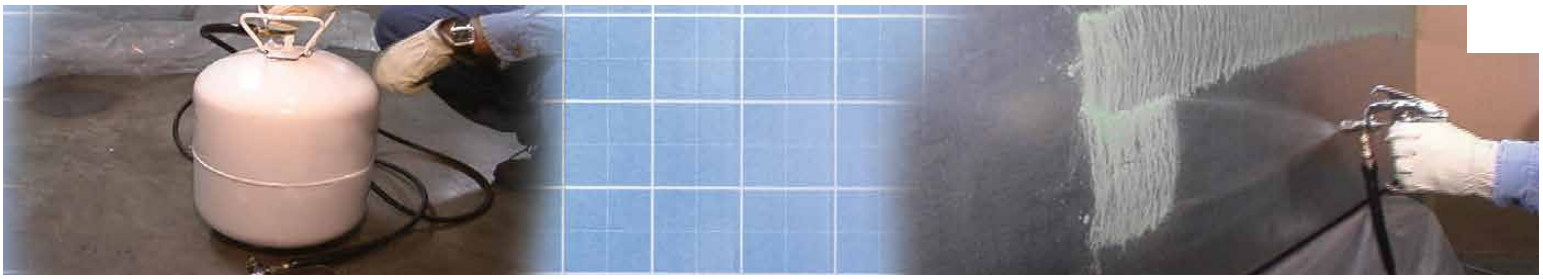
FASTER, EASIER, LESS MESS

Saves installation time and labor

Low VOC

Formulated for Armaflex insulation

Complies with SCAQMD Rule 1168



Description
Armaflex Low VOC Spray Contact Adhesive is supplied in 27 pound aerosolized canisters. The product contains no chlorinated solvents such as methylene chloride and does not contain ozone depleting compounds. The adhesive complies with SCAQMD rule 1168 for volatile organic compound content less than 80 g/l. Dried film meets the fire building codes of flame spread index of less than 25 and smoke developed index of less than 50 when tested according to ASTM E 84.

Uses
Excellent for bonding Armaflex sheet and roll insulations to vessels, tanks, ducts and mechanical equipment operating at temperatures below 180°F (82°C).

Properties	
Color:	Green
Net Weight:	7.8 pounds per gallon
Composition:	Synthetic rubber base and solvents
Volatile Organic Compounds (VOC) Content:	58.9 g/l
Solids Content:	Approximately 22% by weight.
Coverage:	1000 square feet per canister maximum, single coat. Depending on porosity of materials bonded, spray pattern and air temperature
Shelf Life:	One year in original sealed container; storage temperature 60°F to 80°F (16°C to 27°C)
Minimum Drying Time:	2 to 5 minutes under normal conditions
Container Sizes:	Gross Weight 39 pounds. Net Weight 27 pounds

DANGER—Extremely flammable mixture; vapors may cause flash fire; vapors may ignite explosively; prevent buildup of vapors – open all windows and doors—use only with cross ventilation; keep away from heat, sparks and open flame; do not smoke; extinguish all flames and pilot lights; and turn off stoves, heaters, electric motors and other sources of ignition during use and until all vapors are gone; avoid prolonged breathing of vapor and prolonged contact with skin; do not take internally; keep away from children. Not for consumer use. Sold only for professional or industrial applications.

Application Instructions

Preparation:
Surfaces to be bonded should be clean, dry and free of any dust, loose paint, wax, moisture, dirt, grease, oil, rust or other contaminants. Clean the surfaces with denatured alcohol. The recommended installation temperature should be between 60 to 80 F. Securely attach spray gun (SG200) to hose (MH973) then hose to canister. Fully open the valve on the canister, DO NOT CLOSE VALVE UNTIL CANISTER IS EMPTY. Remove the dry adhesive from the orifice of the spray gun in between use.

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Adhesive Application:
Hold spray gun approximately 8 to 12 inches from the substrate, allow a uniform coat of adhesive to both surfaces. Adjust the numerical knob on the spray gun behind the trigger for width of web spray pattern. Use Armaflex 520 adhesive with compression fit method for sealing seams and where spraying adhesive is not possible. Do not allow the adhesive to puddle. Protect surrounding area from adhesive overspray. Do not apply in direct sunlight. Spraying and bonding must be in an area with approved and adequate ventilation. Contact local authorities for requirements in your area. See warnings above and MSDS for further safety information. Prevent static buildup. Properly bond and ground all containers and components. Use precaution in windy conditions.

Bonding:
Both surfaces must be tacky prior to bonding; tack is achieved when touched with your fingernails and no adhesive is lifted off the substrate. This will usually take from 2 to 5 minutes under normal conditions. Heat and humidity or cold weather can cause change in tack times

Assembly:
Align one edge of sprayed Armaflex insulation onto the other substrate carefully since no shifting is possible once contact is made. Apply uniform pressure over 100% of the bonded area. Adhesive-bonded seams and joints of Armaflex sheet/roll insulation must cure 24 to 36 hours before finishes are applied.

Handling & Storage:
After initial assembly, leave the hose and spray gun attached to the canister with the valve open. Detach spray gun and hose from canister only when transferring to a new canister. Transfer spray gun and hose to a new canister immediately to keep the product from drying in the hose. Store in a cool, well-ventilated area below 90°F and out of direct sunlight. Avoid storing canister directly on the floor or against an outside wall.

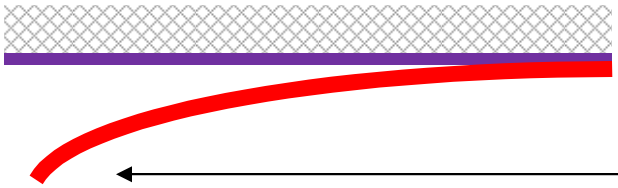
Disposal:
Observe all labeled hazard precautions. After the canister is empty, close valve and remove hose and spray gun. Transfer spray gun and hose to a new canister immediately to keep the product from drying in the hose. Open the valve on the new canister. Open the valve on the old canister and leave the canister for a few hours to make sure residual vapors are dispersed. Remove the valve from the canister. Dispose of according to all federal, state and local regulations. Methyl ethyl ketone or most lacquer thinners can be used to clean fresh residue from tools and work places. Adhesive removers such as Goof Off® or Goo Gone® are also suitable.

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 TAPES & ADHESIVES a 3M Company

COMPAC

Where innovative ideas take hold.

#110
Foil-Scrim-Kraft (FSK) Tape
UL Classified

Product Information

PRODUCT DESCRIPTION

Principal Uses:
Compac #110 FSK tape is used for seam sealing and patching of FSK-faced duct wrap insulation, and other insulation applications where FSK facing is used, providing a matching appearance and vapor retarder integrity.

Features/Benefits:
Compac #110 tape features an aggressive, all-weather acrylic adhesive that bonds tightly and permanently when smoothed down on the insulation facing surface. AW adhesive technology permits service temperatures of 0ºF to 150ºF (-18ºC to 66ºC), and an application range of 10ºF to 120ºF (-12ºC to 49ºC).

TECHNICAL INFORMATION	TEST METHOD	VALUE	
Substrate (Backing)	ASTM C 1136 Type II,IV	FSK, Meets Types II,IV	
Adhesive	Infrared Analysis	Acrylic	
Liner	Visual	Kraft	
Thickness without Liner	PSTC 33/ASTM D 3652	9 mils	0.23 mm
Peel Adhesion to Steel	PSTC 1/ASTM D 3330	90 oz/in	1.0 kN/m
Tensile Strength	PSTC 31/ASTM D 3759	30 lb/in	5.3 kN/m
Elongation	PSTC 31/ASTM D 3759	1%	
Permeance	ASTM E 96, Procedure A	0.02 perm	1.15 ng/m^2·s·Pa
Surface Burning Characteristics	UL 723/ASTM E 84 UL File No. R6131	5 flame	0 smoke

The listed values are typical, and not intended to serve as product specifications. Weights and thicknesses are nominal, +/-10%.

Application and Storage:
Surface to which tape will be applied must be clean and dry, and free of contaminants. Apply pressure with plastic squeegee. Ideal storage conditions are 60ºF to 80ºF (16ºC to 27ºC), with low humidity.

COMPAC

Where innovative ideas take hold.

#120
2 mil Aluminum Foil Tape
UL Classified

Product Information

PRODUCT DESCRIPTION

Principal Uses:
Compac #120 foil tape is used for seam sealing and patching of foil and FSK-faced duct wrap and board insulation and other insulation applications where FSK or foil facing is used, providing a matching appearance and vapor retarder integrity. Also used for general sealing and patching applications.

Features/Benefits:
Compac #120 tape features an aggressive, all-weather acrylic adhesive that bonds tightly and permanently when smoothed down on the insulation facing surface. AW adhesive technology permits service temperatures of -25ºF to 250ºF (-32ºC to 121ºC), and an application range of 10ºF to 120ºF (-12ºC to 49ºC).

TECHNICAL INFORMATION	TEST METHOD	VALUE	
Substrate (Backing)	Visual, Micrometer	2 mil Aluminum Foil	
Adhesive	Infrared Analysis	Acrylic	
Liner	Visual	Kraft	
Thickness without Liner	PSTC 33/ASTM D 3652	3.3 mils	0.08 mm
Peel Adhesion to Steel	PSTC 1/ASTM D 3330	60 oz/in	0.66 kN/m
Tensile Strength	PSTC 31/ASTM D 3759	15 lb/in	2.6 kN/m
Elongation	PSTC 31/ASTM D 3759	1%	
Permeance	ASTM E 96, Procedure A	0.0 perm	0.0 ng/m^2·s·Pa
Surface Burning Characteristics	UL 723/ASTM E 84 UL File No. R10984	5 flame	0 smoke

The listed values are typical, and not intended to serve as product specifications. Weights and thicknesses are nominal, +/-10%.

Application and Storage:
Surface to which tape will be applied must be clean and dry, and free of contaminants. Apply pressure with plastic squeegee. Ideal storage conditions are 60ºF to 80ºF (16ºC to 27ºC), with low humidity.

PC 622

Shurtape®
TRUE TO YOUR WORK®

PREMIUM GRADE
CLOTH DUCT TAPE

TYPICAL APPLICATIONS

- Stucco masking
- Motorsports
- Silk screening
- Plastering
- HVAC duct systems
- Bundling, seaming, sealing and splicing

ADVANTAGES AND BENEFITS

- Waterproof backing
- High tensile strength
- Conformable to most surfaces
- Excellent holding power
- Green Point contributor product

CONSTRUCTION

Overall Grade/Function: Premium
Backing: Polyethylene film with a cloth carrier
Adhesive: Natural rubber

COLOR(S)

Black (BLK)
Red (RED)
Silver (SIL)
White (WHI)
Olive Drab (OLV)

STANDARD WIDTH(S)

48 mm 72 mm

STANDARD LENGTH(S)

55 m

Contact your Shurtape sales representative for other available sizes.

Shurtape® GREEN POINT CONTRIBUTOR PRODUCT

PHYSICAL PROPERTIES

	STANDARD	METRIC
Tensile Strength	36 lbs/in width	63.0 N/10 mm
Adhesion to Stainless Steel	60 oz/in width	6.57 N/10 mm
Thickness	12 mils	0.30 mm
Elongation	14%	14%
Service Temperature Range	50 F to 200 F	10 C to 93 C

Physical and performance characteristics shown above are obtained from tests recommended by PSTC, ASTM, government agencies or Shurtape Technologies, LLC, Quality Assurance and Technical Service Departments and do not represent a guarantee of product performance. Individual rolls may vary slightly from these averages. The user should determine whether the product is fit for a particular purpose and is suitable for the user's method of application before use.

APPLICABLE STANDARDS

Tested in accordance with UL 723; FSI 10/SDI 10; US Green Building Council – LEED® Point Contributor Product

STORAGE & USAGE CONDITIONS

Tape should be stored in its original packaging in a cool, dry area away from direct sunlight and should be used within 12 months of date of shipment. Surfaces to which tape is applied should be clean, dry and free of grease, oil or other contaminants.

GS 500

UTILITY GRADE
FIBER GLASS REINFORCED STRAPPING TAPE

TYPICAL APPLICATIONS

• Non-critical strapping, packaging, bundling and palletizing

ADVANTAGES AND BENEFITS

• Resists moisture and solvents
• Good adhesion, quick stick and shock resistance
• Backing resists splitting and cracking
• High adhesion

CONSTRUCTION

Overall Grade/Function: Utility
Backing: Fiberglass reinforced, biaxially oriented polypropylene film
Adhesive: Hot melt, synthetic rubber

COLOR(S)

Clear (CLR)

STANDARD WIDTH(S)

9 mm 12 mm 18 mm 24 mm 48mm

Contact your Shurtape sales representative for other available sizes.

STANDARD LENGTH(S)

55 m 330 m

PHYSICAL PROPERTIES

	STANDARD	METRIC
Tensile Strength	150 lbs/in width	262.7 N/10 mm
Adhesion to Stainless Steel	70 oz/in width	7.66 N/10 mm
Thickness	5.2 mils	0.13 mm
Elongation	3.7%	3.7%
Service Temperature Range	-10 F to 150 F	-23 C to 66 C

Physical and performance characteristics shown above are obtained from tests recommended by PSTC, ASTM, government agencies or Shurtape Technologies, LLC, Quality Assurance and Technical Service Departments and do not represent a guarantee of product performance. Individual rolls may vary slightly from these averages. The user should determine whether the product is fit for a particular purpose and is suitable for the user's method of application before use.

APPLICABLE STANDARDS

FDA Indirect Contact CFR 21, B, 175.105; FDA Indirect Contact CFR 21, 177.1520

STORAGE & USAGE CONDITIONS

Tape should be stored in its original packaging in a cool, dry area away from direct sunlight and should be used within 12 months of date of shipment. Surfaces to which tape is applied should be clean, dry and free of grease, oil or other contaminants.

Form# TDS-GS500- 03/10/2015

AF 973

Shurtape®
TRUE TO YOUR WORK®

HVAC CONTRACTOR GRADE
ALUMINUM FOIL TAPE

TYPICAL APPLICATIONS

- HVAC industry to seal and join fiberglass duct insulation
- Temporary metal repair

ADVANTAGES AND BENEFITS

- Virtually wrinkle-free appearance
- Resists water vapor, odor and smoke transmission
- Excellent shelf life
- Indefinite product life after application
- Solvent-free

CONSTRUCTION

Overall Grade/Function: HVAC Contractor Grade
Backing: 2 mil, dead soft aluminum foil
Adhesive: High tack, synthetic rubber, all weather adhesive
Liner: Non-contaminating, siliconized, flat, white, paper release liner

COLOR(S)

Silver (SIL)

STANDARD WIDTH(S)

48 mm 60 mm 72 mm

STANDARD LENGTH(S)

46 m

Contact your Shurtape sales representative for other available sizes.

Shurtape® GREEN POINT CONTRIBUTOR PRODUCT

PHYSICAL PROPERTIES

	STANDARD	METRIC
Tensile Strength	17 lbs/in width	29.8 N/10 mm
Adhesion to Stainless Steel	119 oz/in width	13.02 N/10 mm
Thickness (with liner)	6.17 mils	0.17 mm
Thickness (without liner)	4.1 mils	0.10 mm
Elongation	3%	3%
Application Temperature Range	32 F to 230 F	0 C to 110 C

Physical and performance characteristics shown above are obtained from tests recommended by PSTC, ASTM, government agencies or Shurtape Technologies, LLC, Quality Assurance and Technical Service Departments and do not represent a guarantee of product performance. Individual rolls may vary slightly from these averages. The user should determine whether the product is fit for a particular purpose and is suitable for the user's method of application before use.

APPLICABLE STANDARDS

Tested in accordance with UL 723; FSI 0/SDI 10; US Green Building Council – LEED® Point contributor product

STORAGE & USAGE CONDITIONS

Tape should be stored in its original packaging in a cool, dry area away from direct sunlight and should be used within 12 months of date of shipment. Surfaces to which tape is applied should be clean, dry and free of grease, oil or other contaminants.

Form# TDS-AF-973-08/19/2013

AF 100

HVAC PRINTED, UL 181A-P/B-FX LISTED
ALUMINUM FOIL TAPE

TYPICAL APPLICATIONS

- HVAC industry for joining and sealing joints, connections, and seams on rigid fiberglass ductboard and flexible air duct.
- May also be used for other industrial uses requiring a tape with these characteristics and benefits

ADVANTAGES AND BENEFITS

- Provides air-tight bond
- Excellent adhesion
- Flexible and easy to use
- Superior stability during extreme fluctuations in temperature
- Resists water vapor and other HVAC duct contaminations
- Static shear on high/low temperatures in excess of six hours
- Indefinite product life after application

CONSTRUCTION

Overall Grade/Function: HVAC, UL181A-P/B-FX Listed
Backing: 2 mil, dead soft aluminum foil
Adhesive: Acrylic adhesive
Liner: Non-contaminating, siliconized, flat, white, paper release liner

COLOR(S)

Silver Printed (SPT)

Shurtape GREEN POINT CONTRIBUTOR PRODUCT

STANDARD WIDTH(S) STANDARD LENGTH(S)

2 ½ in	72 mm	60 yd	

Contact your Shurtape sales representative for other available sizes.

PHYSICAL PROPERTIES

	STANDARD	METRIC
Tensile Strength	25 lbs/in width	43.8 N/10 mm
Adhesion to Stainless Steel	70 oz/in width	7.66 N/10 mm
Thickness (with liner)	6.8 mils	0.17 mm
Thickness (without liner)	4.2 mils	0.11 mm
Elongation	2%	2%
Application Temperature Range	-20 F to 260 F	-29 C to 127 C

Physical and performance characteristics shown above are obtained from tests recommended by PSTC, ASTM, government agencies or Shurtape Technologies, LLC, Quality Assurance and Technical Service Departments and do not represent a guarantee of product performance. Individual rolls may vary slightly from these averages. The user should determine whether the product is fit for a particular purpose and is suitable for the user's method of application before use.

APPLICABLE STANDARDS

FSI 25/SDI 50; Tested in accordance with UL 723; UL181 A-P/B-FX; UL Listed; US Green Building Council – LEED® Point contributor product

STORAGE & USAGE CONDITIONS

Tape should be stored in its original packaging in a cool, dry area away from direct sunlight and should be used within 24 months of date of shipment. Surfaces to which tape is applied should be clean, dry and free of grease, oil or other contaminants.

PRODUCT DATA

DSA20 CONSTRUCTION & FRP ADHESIVE

A premium, mastic-type adhesive formulated for adhering FRP panel to studs and other common building materials. MUST HAVE ONE POROUS SURFACE. It can also be used for a variety of applications where a heavy bodied adhesive is essential. It can bond paneling, drywall, wall fixtures, ceramic, tile, brick, wood strips and many other materials.

Accepted by FHA-HUD Meets ASTM C557 See ICC-ES Evaluation Report No. ESR-2065

SPECIAL CHARACTERISTICS

Quick Tack/High Strength
Water Proof
Exterior/Interior Use
Permanently Flexible
Eliminates unattractive nail pops
Freeze/thaw stable

RECOMMENDED APPLICATIONS

FRP Panels
Wood and Plywood
Paneling
Gypsum board
Stone
Concrete
Drywall
Fiberglass

PHYSICAL PROPERTIES

BASE: Synthetic Rubber
TYPE: Solvent Base
COLOR: Tan
WEIGHT/GALLON: 9.4 lbs/gallon
MILDEW RESISTANCE: Excellent
CONSISTENCY: Medium Mastic
OPEN TIME: 20 minutes maximum at 75° and 50% relative humidity.
DRY TIME: 24-48 hours at 75°F and 50% relative humidity.
STORAGE TEMP: 60°F to 80°F with cross ventilation
APPLICATION TEMP: 40°F to 100°F; trowels easily 70°F–100°F
SERVICE TEMP: -20F to 170°F
FLASH POINT: Less than 0°F
WATER RESISTANCE: Excellent
COVERAGE: Up to 55 sq ft/gal using recommended trowel
SHELF LIFE: 12 months in unopened container from date of Manufacture.

PACKAGING INFORMATION:

ITEM NO	SIZE	PACKED	WEIGHT
293	Gallon	4/Carton	41 lbs/Carton
294	5 Gallon	36/Pallet	50 lbs/Carton

DIRECTIONS for FRP Panels

- Surface Preparation: Surfaces to be bonded must be clean, dry, and free of foreign material.
- Suggested trowel sizes: V-Notches trowel 3/16” wide x 3/16” deep x 5/16” apart or ¼” wide x ¼” deep x ¾” apart.
- Do not apply below 40 degrees F. Do not thin adhesive. Store adhesive and building materials at room temperature at least 24 hours prior to installation.
- Cut and prefit panels. Lay panels flat and let them acclimate to room temperature.
- Spread adhesive over entire back of Panel (100% coverage), using the recommended notched trowel.

DSA20
STRUCTURAL DRYWALL STUD ADHESIVE

- Press firmly to keep area between ridges from accumulating adhesive.
- Immediately place panel against wall. Press and knead panels to ensure contact with the wall at all points.
- Install panel within 5-20 minutes after applying adhesive.
- Follow panel manufacturer's instructions for molding and mechanical fasteners. Do not fit panels tightly into moldings. Allow 1/16" in molding channels for expansion.
- Allow assembly to dry for 3-4 days, depending on temperature and humidity, before subjecting to stresses.
- Limitations: Concrete must be dry, fully cured and free of hydrostatic pressure. Not recommended for bonding impervious surfaces to each other, must have one porous surface.

DIRECTIONS for Drywall

- Apply a continuous 3/8" bead to clean framing members. Where two boards butt on a framing member apply zigzag bead so adhesive will contact both boards. Use 1/8" bead on steel studs.
- Do not apply adhesive more than 20 minutes before installing gypsum wallboard. Do not use warped boards. Follow nailing schedule per Gypsum Association manual (GA-201-85).
- Walls: Place board on framing and press firmly into place. Use fasteners 16" o.c. around perimeter of board. No fasteners are required in the field of the board
- Ceilings: Follow wall instructions except, in the field of the board use fasteners 24" o.c.
- Coverage: 3/8" bead: 174 lineal feet/gallon, ¼" bead: 402 lineal feet/gallon
- For best results store adhesives at 70°F for at least 24 hours before using. Do not apply below 40°F. Do not store above 100°F.

CLEAN UP: When dry, mineral spirits, exercising safe practices. .

ASTM C557 STANDARD SPECIFICATION FOR FASTENING GYPSUM WALLBOARD TO WOOD FRAMING.

	TEST	RESULTS	REQUIREMENTS
SHEAR STRENGTH:	24 Hour	32 psi	10 psi
	14 Days	60 psi	40 psi
TENSILE STRENGTH:	24 Hours	21 psi	15 psi
	14 Days	73 psi	25 psi

DANGER!

EXTREMELY FLAMMABLE LIQUID AND VAPOR.
VAPORS MAY CAUSE FLASH FIRE AND EXPLOSION.
HARMFUL OR FATAL IF SWALLOWED.

KEEP OUT OF REACH OF CHILDREN
REFER TO MSDS FOR MORE INFORMATION

WARNING: This product contains silica, quartz, a chemical known to the state of California to cause cancer.

NOTICE: Reports have associated repeated and prolonged occupational exposure to solvents with permanent brain and nervous system damage.

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This warranty gives you specific legal rights, and you may also have other rights which vary from state to state; therefore, some of the limitations stated above may not apply to you. It is to your benefit to save your documentation upon purchase of a product.

PRODUCT DATA

STA'-PUT®

SP80 Low-VOC Liquid Adhesive

SP80 is a high performance, spray-grade contact adhesive that meets *SCAQMD, Rule 1168* and other California air district VOC requirements. Used for HPL and a variety of substrates, SP80 is high-solids, providing high yield. SP80's smooth spray pattern reduces telegraphing on thin laminates. It is water-resistant, non-staining bond for common applications in the HPL industry.

PHYSICAL PROPERTIES

BASE:	Synthetic polymer	SOLIDS:	30%
SOLVENT:	Methyl Acetate	VOC CONTENT:	< 80 g/L
SHELF LIFE:	12 months, unopened	VISCOSITY:	150 cPs ± 75 cps
WEIGHT/GALLON:	7.9 lbs/gallon	OPEN TIME:	Up to 30 minutes
COVERAGE:	300-430 sq ft/gallon	DRY TIME:	4 – 5 minutes
COLORS:	Clear or Red	FORMALDEHYDE:	No added urea formaldehyde

BENEFITS

- Excellent adhesion to a wide variety of common laminating substrates
- Strong Bonds
- Smooth, flat spray pattern
- Fast drying with high initial green strength
- Bonds are resistant to humidity and water
- Complies with *SCAQMD, Rule 1168*
- Contributes to *LEED®-NC EQ Credit 4.1: Low Emitting Materials: Adhesives & Sealants*
- Contributes to *LEED®-CI EQ Credit 4.4: Low-Emitting Materials: Composite Wood & Agrifiber Products*

PACKAGING: 55-Gallon Drums, 5-Gallon Pail

DIRECTIONS FOR USE

1. **Use only after careful consideration of the warnings, directions, and first aid instructions given.**
2. **Surface Preparation:** Surfaces to be bonded should be clean, dry and free of any dust, loose paint, wax, moisture, dirt, grease, oil, rust, or other contaminants.
3. **Adhesive Preparation:** Stir thoroughly before using. Adhesive should be at 60ºF to 80ºF.
4. **Working Temperature:** For best results, adhesive and materials to be bonded should be 60ºF to 80ºF during application.
5. **Adhesive Application:** Apply a uniform coat of adhesive to both surfaces to be bonded. Be sure to have complete coverage of the surfaces. Use only approved equipment. Do not apply adhesive in the direct sunlight. Be sure to have sufficient coverage of the surfaces for the application. For typical applications a coating weight of 2.5 - 3.5 dry grams per square foot is recommended. Spraying and drying must be in an area provided with approved adequate ventilation to exhaust the solvent vapor, or in an approved spray booth. Contact local authorities for requirements in your area. Do not breathe dust, vapors or spray mist. Prevent static build-up. Properly bond and ground all containers and components. Vapors may ignite explosively. Keep away from heat, sparks and flame. Do not smoke. Extinguish all flames and pilot lights, and turn off stoves, heaters, electric motors, and other sources of ignition during use and until all vapors are gone.
6. **Drying:** Both surfaces must be allowed to dry before bonding. This will usually take from 2 to 5 minutes at room temperature under normal conditions. Heat and humidity, or cold weather can effect drying times. Daily pretesting is recommended prior to use. Surfaces are dry if adhesive is tacky, but no adhesive transfers to the hand when touched. Complete the bond within 30 minutes (under normal conditions) after the adhesive is dry. If the two surfaces don't grab immediately when brought into contact, they have dried too long.
7. **Assembly:** Position coated surfaces carefully before putting them together since no shifting is possible once

ITW TACC

contact is made. Bring surfaces together and immediately apply firm pressure over entire surface working from the center to the edges. Apply uniform pressure over 100% of the area to be bonded.

8. **Storage:** Replace lid after each use and secure tightly for storage. Store out of direct sunlight in a cool, well-ventilated area. Avoid storing container directly on the floor or against an outside wall.
9. Do not expose bonded parts to direct sunlight or excessive heat. Do not use on some vinyls or polystyrene foam. Some vinyls contain plasticizers, which can, over time, soften and dissolve the bond, or bleed through/discolor. When in doubt, or if product is to be used on vinyls, or other light colored materials, conduct compatibility testing on the product to be bonded before use.

NOTE: The shelf life for an unopened container of this adhesive is 1 year from date of manufacture.

ATTENTION: Empty container remains hazardous until all flammable vapors, which may explode upon ignition, are gone from residue and container. Observe all labeled hazard precautions. Do not cut, puncture, or weld while hazard exists. Do not reuse empty container. Dispose of according to all federal, state, and local regulations.

APPROVED EQUIPMENT

Spray Gun:	Binks 2001M	Atomization Pressure:	70 – 90 psi
Fluid Tip:	Binks 63B-SS	Fluid Pressure:	6 – 10 psi
Fluid Needle:	Binks 563A	Air Cap:	Binks 66 SD-3

DANGER!

EXTREMELY FLAMMABLE LIQUID AND VAPORS.
VAPORS MAY CAUSE FLASH FIRE OR IGNITE EXPLOSIVELY.
VAPOR HARMFUL.
HARMFUL OR FATAL IF SWALLOWED.

Do not breathe dust, vapors or spray mist. Prevent static build-up. Properly bond and ground all containers and components. Vapors may ignite explosively. Keep away from heat, sparks and flame. Do not smoke. Extinguish all flames and pilot lights, and turn off stoves, heaters, electric motors, and other sources of ignition during use and until all vapors are gone. Minimum HMIS Rating: 2-3-0-B.

NOTICE TO PURCHASER: NO WARRANTIES, EXPRESS OR IMPLIED, ARE MADE INCLUDING MERCHANTABILITYAND/OR FITNESS FOR A PARTICULAR PURPOSE. EXCEPT FOR PERSONAL INJURY RESULTING FROM USE OF THE PRODUCT AS DIRECTED, ITW TACC SHALL NOT BE LIABLE IN TORT OR CONTRACT FOR ANY LOSS OR DAMAGE. UNDER NO CIRCUMSTANCES SHALL ITW TACC, A DIVISION OF ILLINOIS TOOL WORKS INC., OR ITS AFFILIATES (“ITW TACC”) BE LIABLE FOR ANY LOSS OR DAMAGE ARISING FROM THE PURCHASE, USE, OR INABILITY TO USE THIS PRODUCT, OR FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THE USER MAY SEND A SAMPLE OF PRODUCT TO ITW TACC FOR TESTING. IF SUCH TESTING PROVES A PRODUCT DEFECTIVE, THE USER’S SOLE AND EXCLUSIVE REMEDY IS EITHER REIMBURSEMENT OF THE PURCHASE PRICE OF THE PRODUCT OR REPLACEMENT OF THE CONTAINER OF PRODUCT. NO FABRICATOR, INSTALLER, DEALER, AGENT OR EMPLOYEE OF ITW TACC HAS THE AUTHORITY TO MODIFY THE OBLIGATIONS OR LIMITATIONS OF THIS WARRANTY. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state; therefore, some of the limitations stated above may not apply to you. It is to your benefit to save your documentation upon purchase of a product. The information and suggestions for use contained herein are believed to be accurate, but are not to be construed as warranties. User shall determine the suitability of the product for his or her intended use and shall assume all risk associated therewith.

STA'-PUT®

1535

SPRAY GRADE CONTACT ADHESIVE

TECHNICAL DATA SHEET

PRODUCT DESCRIPTION:

ITW STA'-PUT® *1535* is a non-flammable solvent–based adhesive developed to bond various types of foam to wood, fiberfill, or to itself. The adhesive is for use in the upholstery furniture industry.

ADVANTAGE:

- High Green Strength
- Aggressive Grab Tack
- High Strength Bonds
- Quick Dry Time
- Good Spray Pattern
- Long Open Time
- Excellent Adhesion to many Substrates
- Excellent for Foam Bonding Applications

TYPICAL PROPERTIES:

Property	Typical Value
Base:	Synthetic Polymer
Solvent:	Methylene Chloride*
Shelf Life:	9 months from Date of Manufacture**
Color:	Clear/ Red
Flash Point:	N/A
Weight / Gallon	9.57 lbs./ gallon
VOC Content	110.4 g/L (EPA Method 24)
Open Time	6 - 8 minutes
Dry Time	N/A
Solids	33.4 ± 2.5%
Viscosity	225 - 275 cps
Coverage	575 ft^2/gallon @ 2.5 dry grams/ ft^2
Formaldehyde	No urea formaldehyde added during adhesive manufacturing

* Reports have associated repeated and prolonged occupational exposure to solvents with permanent brain and nervous system damage

** The shelf life for an unopened container of this adhesive stored at temperatures between 60°F (15.6°C) and 95°F (35°C) is 1 year from date of manufacture. Store out of direct sunlight in a cool, well-ventilated area. Avoid storing container directly on the floor or against an outside wall

APPROVED EQUIPMENT:

Automatic		
	BINKS	DEVILBISS
Spray gun	21,95A	AGX-550
Fluid Tip	63ASS	FX
Fluid Needle	263A, 763A	FX
Air Cap	66SD-3	24
Manual		
	BINKS	DEVILBISS
Spray gun	95, 2100	JGA-510, MSA-510
Fluid Tip	63ASS	FX
Fluid Needle	663A, 563A	FX
Air Cap	66SD-3	24

Air Atomization Pressure: 80 – 100 psi
Fluid Pressure: 10 – 15 psi
Hot spray Temperature: 120°F (93.3°C) maximum

DIRECTIONS FOR USE:

- Use only after careful consideration of the warnings, directions, and first aid instructions given. Do not thin.
- Surfaces to be bonded should be clean, dry and free of any dust, loose paint, wax, moisture, dirt, grease, oil, rust, or other contaminants.
- Before initial use securely attach gun to hose, then hose to canister. Fully open canister valve; do NOT close valve until empty.
- Adhesive should be at 60°F (15.6°C) to 95°F (35°C). For best results, adhesive and materials to be bonded should be 60°F (15.6°C) to 95°F (35°C) during application. Allow substrates to acclimate to room temperature for 48 hours before bonding.
- Apply adhesive uniformly to both surfaces and cover each surface a minimum of 80%. Some porous surfaces may require two coats. 100% coverage is recommended for the edges. Use only approved equipment. For typical applications a coat weight of 2.5 dry grams per square foot is recommended.
- Both surfaces must be allowed to dry before bonding. This will usually take from 2 to 5 minutes at room temperature under normal conditions. Heat and humid
- Heat and humidity, or cold weather can cause longer drying times. Surfaces are dry if adhesive is tacky, but no adhesive transfers to the hand when touched.
- Complete the bond within 60 minutes (under normal conditions) after the adhesive is dry. If the two surfaces don't grab immediately when brought into contact, they have dried too long.

- Position coated surfaces carefully before putting them together since no shifting is possible once contact is made.
- Bring surfaces together and immediately apply firm pressure (30 psi) over entire surface working from the center to the edges.
- Let bonded parts cure for at least 72 hours before exposing to direct sunlight of temperatures over 150°F (65.6°C).
- Replace lid after each use and secure tightly for storage.
- Do not use on vinyls or polystyrene foam. Some vinyls contain plasticizers, which can, over time, soften and dissolve the bond, or bleed through/ discolor. When in doubt, or if product is to be used on vinyls, or other light colored materials, conduct compatibility testing on the product to be bonded before use.
- DO NOT use on copper substrates or its alloys. DO NOT use copper spray systems or fluid components.

ATTENTION:

- Empty container remains hazardous until all flammable vapors, which may explode upon ignition, are gone from residue and container. Observe all labeled hazard precautions. Do not cut, puncture, or weld while hazard exists.
- Do not reuse empty container. Recycle, or dispose of, according to all federal, state, and local regulations. Follow solvent manufacture's recommendations and instructions for safe handling.

KEEP OUT OF REACH OF CHILDREN
FOR PROFESSIONAL OR INDUSTRIAL USE ONLY
USE ONLY WITH APPROVED EQUIPMENT

NOTICE TO PURCHASER:
NO WARRANTIES, EXPRESS OR IMPLIED, ARE MADE INCLUDING MERCHANTABILITYAND/OR FITNESS FOR A PARTICULAR PURPOSE. EXCEPT FOR PERSONAL INJURY RESULTING FROM USE OF THE PRODUCT AS DIRECTED, ITW POLYMERS SEALANTS NORTH AMERICA, INC. SHALL NOT BE LIABLE IN TORT OR CONTRACT FOR ANY LOSS OR DAMAGE. UNDER NO CIRCUMSTANCES SHALL ITW POLYMERS SEALANTS NORTH AMERICA, INC., A DIVISION OF ILLINOIS TOOL WORKS INC., OR ITS AFFILIATES ("ITW POLYMERS SEALANTS NORTH AMERICA, INC.") BE LIABLE FOR ANY LOSS OR DAMAGE ARISING FROM THE PURCHASE, USE, OR INABILITY TO USE THIS PRODUCT, OR FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES. THE USER MAY SEND A SAMPLE OF PRODUCT TO ITW POLYMERS SEALANTS NORTH AMERICA, INC. FOR TESTING. IF SUCH TESTING PROVES A PRODUCT DEFECTIVE, THE USER'S SOLE AND EXCLUSIVE REMEDY IS EITHER REIMBURSEMENT OF THE PURCHASE PRICE OF THE PRODUCT OR REPLACEMENT OF THE CONTAINER OF PRODUCT. NO FABRICATOR, INSTALLER, DEALER, AGENT OR EMPLOYEE OF ITW POLYMERS SEALANTS NORTH AMERICA, INC. HAS THE AUTHORITY TO MODIFY THE OBLIGATIONS OR LIMITATIONS OF THIS.

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Complete technical information is available from
ITW Polymers Sealants North America, Inc.

Insta-Tack™

Rapid-Tacking, Solvent-Based
Insulation Adhesive

Insta-Tack is an instant-tack, solvent-based insulation adhesive engineered for spray booth applications. Insta-Tack's exceptional coverage and fast tack provides reduced labor and lower application cost.

PART NUMBERS

308591	1 Case w/ (4) 1-Gallon Pails (Red)
308592	1 5-Gallon Pail (Red)
308593	1 50-Gallon Drum (Red)

TECHNICAL DATA

Color	Red (wet), Clear (dry)
Consistency	Low-viscosity liquid
Base	Synthetic polymers and resins
Solvent	Aliphatic
Weight per Gallon	6.5 lbs.
Solids Content	33%
Viscosity	200 cps
Coverage	500–700 sq. ft./gal
Tack Time	Immediate
Open Time	Approximately 15 minutes
Service Temperature	-20°F to 200°F
Surface Burning	Flame spread 0, Smoke developed 0, (When tested in accordance with ASTM E84)
Water Resistance	Excellent
Mildew Resistance	Excellent
VOC	543 g/l
Packaging	1-gal pail, 5-gal pail, 50-gal drum
Freeze/Thaw Stability	Passed 5 cycles
Flammability	Flammable when wet Non-flammable when dry

SPECIFICATION/STANDARDS COMPLIANCE

Property	Method	Results
Surface Burning Characteristics	UL 723	Pass
Duct Thermal Insulation	ASTM C916	Pass

APPLICATION

Temperature	35°F to 110°F (1.7°C to 44°C)
Method	Brush, rolled or spray applied
Preparation	Surface must be dry, dirt, oil, and grease free.
Clean Up	UN-TACK™ Solvent or mineral spirits (Use safe handling practices.)

STORAGE

Temperature	35°F to 110°F (1.7°C to 44°C)
Shelf Life	One year (unopened)
Flammability	Extremely flammable. Store according to code.

PRECAUTIONS

EXTREMELY FLAMMABLE LIQUID AND VAPOR.

Keep away from sparks and open flame. May cause flash fire. Vapors are heavier than air and may travel to a distant ignition source. Contains heptane solvents. Harmful if swallowed or inhaled. May cause eye irritation. Keep out of the reach of children. Review Material Safety Data Sheet for complete safety information prior to use.

For Industrial Professional Use Only.

CLASSIFIED c UL us

UNDERWRITERS LABORATORIES INC.®
CLASSIFIED ADHESIVE

Surface Burning Characteristics 294U
*Applied to inorganic reinforced cement board

FLAME SPREAD 0
SMOKE DEVELOPED 0

*Tested as applied in two 3"-wide strips 8" on center at a coverage of 750 sq. ft./gal. Flash point of finished adhesive, closed cup; less than -10°C.

TRAVEL-TACK™

Insulation Adhesive in a Portable Spray System

TRAVEL-TACK is a self-contained, instant tacking, **portable spray system** engineered to deliver a low pressure web spray that eliminates adhesive vaporization and overspray. TRAVEL-TACK's portability, limited equipment clean-up and low equipment cost makes this adhesive ideal for **shop** or **field use.**

TRAVEL-TACK PART NUMBERS

1 Case w/ (12) 15 oz. Spray Cans (Clear)	308599
1–#12 Cylinder (Green)	308600
1–#40 Cylinder (Green)	308602
1–#187 Cylinder (Green)	308603
1–#375 Cylinder (Green)	308604
1–VOC #40 Cylinder (Clear)	308605

TECHNICAL DATA	STANDARD FORMULA	VOC COMPLIANT
Color	Green	Clear
Consistency	Aerosol spray	Aerosol spray
Spray Pattern	Variable web	Variable web
Odor	Solvent-like	Organic Solvent
Base	Polymer	Polymer
Vapor Pressure	350mm	350mm
Solvent	Methylene Chloride	Methyl Acetate, Hexane, Tertiary Butyl Acetate
Approx. Coverage[1]	125 sq.ft. per 1 lb. of adhesive.[2]	125 sq.ft. per 1 lb. of adhesive.[2]
Initial Bonding Time	Immediate[2]	Immediate[2]
Dry Time	4 minutes[2]	4 minutes[2]
Adhesion	Excellent	Excellent
Service Temperature	-40°F to 200°F	-40°F to 200°F
Surface Burning	Flame Spread 5, Smoke developed 20 (When tested in accordance with ASTM E-84)	Flame Spread 0 Smoke developed 10 When tested in accordance with ASTM E-84)
Flammability	Flammable when wet (flame projection test). Non-flammable when dry.	Flammable when wet (flame projection test). Non-flammable when dry.
Water Resistance	Excellent	Excellent
Mildew Resistance	Good	Good
VOC	424 g/l	<100 g/l
Packaging	#12, #40, #187 & #375 Aerosol Cylinders	#40 Aerosol Cylinders, 15 oz. Spray Cans[3]
Specification Compliance	ASTM C-916	City of Los Angeles Approval RR #8069 VOC Compliant Formulation, ASTM C-916

[1]By Volume [2]For optimal coverage see Application Instruction Sheet, cylinder back label or cylinder shipping carton back label. [3]Not tested to ASTM C-916

STORAGE

Temperature	60°F to 95°F (15°C to 35°C)
Shelf Life	One year (unopened)
Flammability	Extremely flammable. Store according to code.

APPLICATION

Temperature	60°F to 90°F (15.5°C to 32.2°C) (Keep at 70°F for optimum performance. If canister temperature falls below 70°F, move it to a warm area until optimum performance is achieved.)
Method	For use in shop applications or field work. The self-contained property of TRAVEL-TACK allows improved mobility, reduced labor cost and greater jobsite efficiency. Apply according to SMACNA specifications and local codes.
Preparation	Surface must be dry, dirt, oil, moisture, & grease free.
Rate	16 ounces per minute
Clean Up	UN-TACK Cleaner/Adhesive Remover, petroleum solvents or mineral spirits.

PRECAUTIONS

Flammable liquid & vapor. Keep away from open flame. Do not expose to heat or store above 100° F. Do not puncture or incinerate can or canister. Harmful or fatal if swallowed. Avoid direct contact with skin or eyes. May cause eye irritation.If skin or eye contact causes irritation, flush with water & seek immediate medical attention. Use with adequate ventilation & avoid inhalation of spraymist or vapors. If inhalation causes irritation, remove individual to fresh air. Keep out of reach of children. Review Material Safety Data Sheet for complete safety information prior to use. Goggles & gloves recommended. Cylinders not refillable & when empty are harmless & disposable (according to local codes & laws.)

For Industrial Professional Use Only.

FLEX-GRIP™ 550

Compliant with LEED Requirements

Indoor/Outdoor Water Based Duct Sealant

FLEX-GRIP 550 is an **all purpose, fiber-free, duct sealant** for use on all types of metal duct, glass fiber duct board, and flex duct, as well as duct fabric and flexible tubing runouts. Distinguished by its ability to accomodate minor vibration and movement, FLEX-GRIP 550 **stays flexible** to **save call-back labor**. FLEX-GRIP's **excellent coverage** rates and **easy spray and brush-on application** provide **low installed cost** while providing Hardcast's **proven reliability**.

TECHNICAL DATA

Color	Gray
Consistency	Heavy Brush On/Spray Grade
Base	Synthetic latex
Solvent	Water
Weight per Gallon	10.7 lbs.
Solids Content	63%
Viscosity	>300K cps
Coverage (per gal.)	Up to 320 lin. ft. at 3" width, 20 mil thickness
Shore A Hardness	>20
Flexibility	Passes ¼ in. mandrel bend
Time to Test	48 hours*
Service Temperature	-20˚F to 200˚F
Water Resistance	Excellent
Mildew Resistance	Mold & Mildew resistant
VOC	75 g/l (less water)
Pressure Classes	*SMACNA* ½, 1, 2, 3, 4, 6 and 10 inches w.g.
Seal Classes	*SMACNA* A, B, C
Packaging	11 oz. cartridges, 1, 5, & 55 gallon pails.
Freeze/Thaw Stability	Passed 5 Cycles
Specifications Compliance	Passes ASTM C-731, ASTM D-2202. USDA, EPA and FDA Approved. LEED compliant SCAQMD Rule 1168.

*May vary according to temperature and humidity

CLASSIFIED C UL US

CAULKING AND SEALANTS
94PF
SURFACE BURNING CHARACTERISTICS
FLAME SPREAD 0
SMOKE DEVELOPED 0
*Applied to inorganic reinforced Cement Board *Tested as applied in one 3 in. (76.2 mm) wide strip, on center covering 16.7 percent of the exposed test sample area) at a coverage of 80 sq. ft/ gal (2 sq. M/L). Flash point of finished sealant, closed cup : No flash to boiling.

UL LISTED

17NF
UL 181B-M
Mastic closure systems for use with flexible duct systems or connectors.

City of Los Angeles Approval RR#8069

FLEX-GRIP 550 PART NUMBERS

1 Case w/ (25) 11 oz. Cartridges	304134
1 Case w/ (4) 1-Gallon Pails	304132
1 - 5-Gallon Pail	304133
1 - 55-Gallon Drum	305437

APPLICATION

Apply to entire surface of duct joint

Temperature	35°F. to 110°F. (1.7°C to 38°C)
Method	Brush, putty knife, caulk gun, trowel or spray.For spray, use Hardcast Sealant Delivery System w/ 55 gallon drum.
Preparation	Surface must be dry, dirt, oil, and grease free.
Rate	Apply at joints and fasteners 20 mil thick wet film
Clean Up Wet	Soap and water
Clean Up Dry	UN-TACK™ or Solvent (Use safe handling practices.)
Painting	Only latex or epoxy paints

STORAGE

DO NOT FREEZE

Temperature	35°F. to 110°F. (1.7°C to 44°C)
Shelf Life	One year (unopened)
Flammability	Non-flammable

PRECAUTIONS

Surface must be clean and free of moisture, contamination and foreign matter. Do not allow this product to freeze. Apply when temperatures will not fall below freezing for at least 36 hours. Do not apply this product where temperatures will exceed 200°F. Keep out of the reach of children. Review MSDS for complete safety information prior to use. DO NOT use where acidic or alkaline chemicals are present (ie., lab fume hood, vents, etc.)

For Industrial Professional Use Only.

For additional information contact:

HARDCAST® CARLISLE

Carlisle Coatings & Waterproofing Incorporated

Printed in U.S.A. 08/07 supercedes 11/06

Coil-Tack™

Low-Tack, High-Yield
Water-Based Insulation Adhesive

Coil-Tack is a nonflammable, water-based insulation adhesive engineered for spray or extruding coil line applications and spray booth applications. It has been developed to eliminate clogging within the adhesive delivery system, ensuring consistent operation. Coil-Tack's exceptional coverage and easy clean-up means lower application cost.

PART NUMBERS

308582	1 5-Gallon Pails (Black)
308580	1 5-Gallon Pail (White)
308581	1 50-Gallon Drum (White)
308584	1 50-Gallon Drum (Black)

TECHNICAL DATA

Color	White (wet), White (dry) and Gray (wet), Black (dry)
Consistency	Low-viscosity liquid
Base	Synthetic latex
Solvent	Water
Weight per Gallon	10.0 lbs (+/- 0.2)
Solids Content	36% (+/- 2%)
Viscosity	11,000–12,000 cps
Coverage	Up to 530 sq ft/gal (sprayed)
Initial Bonding Time	30 minutes* (5 mils @ RT)
Dry Time	45 minutes to 1 hour* (5 mils @ RT)
Service Temperature	-20°F to 200°F (-28.8°C to 93.3°C)
Water Resistance	Good
Mildew Resistance	Mold and mildew resistant
VOC	71 g/l (less water)
Packaging	5-gal pail, 50-gal drum
Freeze/Thaw Stability	Passed 5 cycles

SPECIFICATION/STANDARDS COMPLIANCE

Property	Method	Results
Duct Thermal Insulation	ASTM C916	Pass
VOC Limitation	SCAQMD Rule 1168	Pass
	City of Los Angeles Approval RR #8069	Pass

APPLICATION

Temperature	35°F to 110°F (1.7°C to 44°C)
Method	Use when the insulation is immediately secured by an insulation fastener or the duct section is stored horizontally until the adhesive is dry. May be spray, brush- or roller-applied to secure insulation to the substrate. Apply according to SMACNA specifications and local codes.
Preparation	Surface must be dry and free of dirt, oil and grease.
Clean Up	UN-TACK™ or Solvent (Use safe handling practices)

STORAGE

Temperature	35°F to 110°F (1.7°C to 44°C)
Shelf Life	One year (unopened)
Flammability	Non-flammable

PRECAUTIONS

Inspect all winter shipments upon arrival. Apply when temperatures will not fall below freezing. Do not apply this product in weather-exposed areas or where temperatures will exceed 200°F. Keep out of the reach of children. Review Material Safety Data Sheet for safety information prior to use.

For Industrial Professional Use Only.

UNDERWRITERS LABORATORIES, INC.®
CLASSIFIED ADHESIVE
Surface Burning Characteristics 294U
*Applied to inorganic reinforced cement board

FLAME SPREAD..... 0
SMOKE DEVELOPED..... 0

*Tested as applied in two 3" (76.2 mm)-wide strips 8" (203.2 mm) on center at a coverage of 530 sq ft/gal (13 sq M/L). Flash point of finished adhesive, closed cup: no flash to boiling.

Roto-Tack™

Mid-Tack, High-Yield
Water-Based Insulation Adhesive

Roto-Tack is a mid-tack, antimicrobial, nonflammable, water-based insulation adhesive. Roto-Tack is engineered for mechanical roll coating systems that rapidly apply adhesive to insulation prior to bonding to the sheet metal, as well as extruding coil line systems and spray booth applications. Roto-Tack offers exceptional versatility, and easy clean-up, providing lower application cost.

PART NUMBERS

308574	1 5-Gallon Pail (Clear)
308573	1 50-Gallon Drum (Clear)

TECHNICAL DATA

Color	White (wet), Clear (dry)
Consistency	Low-viscosity liquid
Base	Synthetic latex
Solvent	Water
Weight per Gallon	8.7 lbs (+/- 0.2)
Solids Content	38% (+/- 2%)
Viscosity	3,500–4,500 cps
Coverage	Up to 530 sq ft/gal (sprayed)
Initial Bonding Time	25 minutes* (5 mils @ RT)
Dry Time	40 minutes* (5 mils @ RT)
Service Temperature	-20°F to 200°F
Water Resistance	Good
Mildew Resistance	Mold and mildew resistant, contains antimicrobial components
VOC	73 g/l (less water)
Packaging	5-gal pail, 50-gal drum
Freeze/Thaw Stability	Passed 5 cycles

SPECIFICATION/STANDARDS COMPLIANCE

Property	Method	Results
Duct Thermal Insulation	ASTM C916	Pass
VOC Limitation	SCAQMD Rule 1168	Pass
City of Los Angeles Approval RR #8069		Pass

APPLICATION

Temperature	35°F to 110°F (1.7°C to 44°C)
Method	Use when the insulation is promptly secured by an insulation fastener or the duct section is stored horizontally until the adhesive is dry. May be spray-, brush- or roller-applied to secure insulation to the substrate. Apply according to SMACNA specifications and local codes.
Surface Preparation	Surface must be dry and free of dirt, oil and grease.
Clean Up Wet	Soap and Water
Clean Up Dry	UN-TACK™ or Solvent (Use safe handling practices)

STORAGE

Temperature	.40°F to 110°F (4.4°C to 44°C)
Shelf Life	One year (unopened)
Flammability	Non-flammable

UNDERWRITERS LABORATORIES, INC.®
CLASSIFIED ADHESIVE
Surface Burning Characteristics 294U
*Applied to inorganic reinforced cement board

FLAME SPREAD..... 0
SMOKE DEVELOPED..... 0

*Tested as applied in two 3" (76.2 mm)-wide strips 8" (203.2 mm) on center at a coverage of 530 sq ft/gal (13 sq M/L). Flash point of finished adhesive, closed cup: no flash to boiling.

PRECAUTIONS

Inspect all winter shipments upon arrival. Apply when temperatures will not fall below freezing. Do not apply this product in weather-exposed areas or where temperatures will exceed 200°F. Keep out of the reach of children. Review Material Safety Data Sheet for safety information prior to use.

For Industrial Professional Use Only.

Booth-Tack™

Quick-Tack, High-Yield Water-Based Insulation Adhesive

Booth-Tack is a quick-tack, antimicrobial, nonflammable, water-based insulation adhesive engineered for spray booth applications. Booth-Tack is used in situations when duct insulation is promptly secured by an insulation fastener or the duct section is stored horizontally until the adhesive is dry. Booth-Tack offers high strength, low viscosity, great coverage and low suspended solids.

PART NUMBERS

308585	1 5-Gallon Pail (Black)
308587	1 50-Gallon Drum (Black)

TECHNICAL DATA

Color	Gray (wet), Black (dry)
Consistency	Low-viscosity liquid
Base	Synthetic latex
Solvent	Water
Weight per Gallon	10.0 lbs (+/- 0.2)
Solids Content	53% (+/-2)
Viscosity	8,500–9,500 cps
Coverage	Up to 530 sq ft/gal (sprayed)
Initial Bonding Time	10 minutes* (5 mils @ RT)
Dry Time	20 minutes* (5 mils @ RT)
Service Temperature	-20°F to 200°F (-28.8°C to 93.3°C)
Surface Burning	Flame spread 0, smoke developed 0 (when tested in accordance with ASTM E84)
Water Resistance	Good
Mildew Resistance	Mold and mildew resistant, contains antimicrobial components
VOC	72 g/l (less water)
Packaging	5-gal pail, 50-gal drum
Freeze/Thaw Stability	Passed 5 cycles

SPECIFICATION/STANDARDS COMPLIANCE

Property	Method	Results
Duct Thermal Insulation	ASTM C916	Pass
VOC Limitation	SCAQMD Rule 1168	Pass
	City of Los Angeles Approval RR #8069	Pass
Surface Burning Characteristics	UL 723	Pass

APPLICATION

Temperature	35°F to 110°F (1.7°C to 44°C)
Method	For use in spray booth operations or specific areas. Booth-Tack may be spray-, brush- or roller-applied to secure insulation to the substrate. Apply according to SMACNA specifications and local codes.
Preparation	Surface must be dry and free of dirt, oil and grease.
Clean Up	UN-TACK™ or Solvent (Use safe handling practices)

STORAGE

Temperature	35°F to 110°F (1.7°C to 44°C)
Shelf Life	One year (unopened)
Flammability	Non-flammable

UNDERWRITERS LABORATORIES, INC.®
CLASSIFIED ADHESIVE
Surface Burning Characteristics 294U
*Applied to inorganic reinforced cement board

FLAME SPREAD..... 0
SMOKE DEVELOPED..... 0

*Tested as applied in two 3" (76.2 mm)-wide strips 8" (203.2 mm) on center at a coverage of 530 sq ft/gal (13 sq M/L). Flash point of finished adhesive, closed cup: no flash to boiling.

PRECAUTIONS

Inspect all winter shipments upon arrival. Apply when temperatures will not fall below freezing. Do not apply this product in weather-exposed areas or where temperatures will exceed 160°F. Keep out of the reach of children. Review Material Safety Data Sheet for safety information prior to use.

For Industrial Professional Use Only.

VIMASCO CORPORATION

WC-5

VINYL ACRYLIC WEATHER BARRIER MASTIC

WC-5 is a heavy-bodied, water-based, vinyl-acrylic mastic, for use over all types of insulation systems, both indoors and outdoors. It can also be applied as a protective coating over masonry surfaces and a variety of other substrates. NOTE: Special care should be taken when applying WC-5 to foil facing as it will not always bond tightly, depending on the type of foil Test applications are recommended.

WC-5 is suitable for application by brush, trowel, or spray (application method should be specified when ordering). After drying it becomes a tough, flexible, color retentive coating which is resistant to weather, alkalis, oil, grease, moisture, and mechanical damage. Its normal recommended dry thickness for full-scale outdoor protection is 1/16" (63mils), but it also provides excellent protection at thinner thicknesses. A minimum dry film thickness of 40 mils is recommended. WC-5 should not be applied where it will be subjected to continual standing water.

WC-5 must be protected from freezing during storage. It must be protected during and after application, from precipitation, freezing, oil, grease, and foot traffic until thoroughly cured.

WC-5 is breathing-type mastic which allows water vapor to pass through it. This is a benefit because residual water trapped underneath the coating is allowed to escape in the form of water vapor. WC-5 should not be used over a low temperature system unless a vapor barrier is present.

WC-5 is USDA acceptable for use in meat, poultry, and food processing plants.

COLOR
White, E2 Gray, Green, Blue, Black
(Special colors available upon request)

COVERAGE (ASTM C 461)
13sq. ft./gal. @ 1/16" dry (63 mils.)
(.32 m²/liter @ 1.6 mm)
20 sq ft/gal @ 40 mils dry thickness
(.5 m²/liter @ 1.0 mm)

DRYING TIME (ASTM D 1640-69)
To touch: 2 hours
Through: 24 to 48 hours
(depending upon temperature, relative humidity and substrate)

WEIGHT PER U.S. GALLON (ASTM D 1475)
10.2 pounds (1.22 kg/liter)

SOLIDS
61% by weight
53% ± 2% by volume

APPLICATION TEMPERATURE RANGE
40°F (4°C) to 120°F (49°C)

SERVICE TEMPERATURE RANGE
0ºF to 180ºF constant
(-17.8ºC to 82.2ºC)
-20ºF to 200ºF intermittent
(-29ºC to 93ºC)

TYPICAL ELONGATION
750% (60 mils dry, @ 70ºF)

FLAME SPREAD INFORMATION
ASTM E 84: 15
ASTM E 162: 14
@ 1/16" dry film (1.59 mm)

WET FLAMMABILITY INFORMATION
No flash to boiling (212ºF) closed cup (ASTM D 93)

CLEANUP
Wet state - water
Dry state - safety solvent

RECOMMENDED SHELF LIFE
18 months in unopened container
@40°F (4°C) to 90°F (32°C)

CAUTION
The addition of water or any thinning agent to this product will change its physical properties and will adversely affect its performance. No expressed or implied warranty will be offered on applications where this product has been thinned or altered in any manner.

In accordance with OSHA Standard 29 CFR 1910.12 (Right to Know Law) a Material Safety Data Sheet is available for the product and all

ALL VIMASCO PRODUCTS ARE ASBESTOS FREE AND CONTAIN NO LEAD OR MERCURY COMPOUNDS.

VINYL ACRYLIC WEATHER BARRIER MASTIC

WC-7 is a heavy-bodied, water-based, vinyl-acrylic, general-purpose mastic, for use over all types of insulation systems, both interior and exterior. It can also be applied over masonry surfaces and a variety of other substrates. WC-7 is a breathing type mastic and is formulated to provide maximum weather protection at an economical price.

WC-7 is suitable for application by brush, trowel, or spray (application method should be specified when ordering). Its normal recommended dry thickness for full-scale outdoor protection is 1/16" (63mils), but it also provides excellent protection at thinner thicknesses. A minimum dry film thickness of 40 mils is recommended. When dry, it provides a tough, durable, flexible film which affords excellent protection from the elements, other sources of water, and mechanical abuse at a wide range of temperatures. WC-7should not be applied where it will be subjected to standing water or where the requirement is for a vapor barrier.

WC-7 is resistant to fire, alkali, asphalts, salts, and mild acids and solvents. When properly applied and maintained, it will provide years of service life in a variety of environments. In most applications, the recommended dried film thickness for WC-7 is 1/16".

WC-7 CONTAINS NO ASBESTOS, LEAD, OR MERCURY COMPOUNDS.

WC-7 must be protected from freezing during storage. After application, until thoroughly cured, it must be protected from precipitation, freezing, oil, grease, and foot traffic.

When used on insulating cement, WC-7 should not be applied until the cement has dried thoroughly.

COLOR
White, E2 Gray
(Special colors available upon request)

COVERAGE (ASTM C 461)
13sq. ft./gal. @ 1/16" dry (63 mils.) (.32 m²/liter @ 1.6 mm)
20 sq ft/gal @ 40 mils dry thickness (.5 m²/liter @ 1.0 mm)

DRYING TIME (ASTM D 1640-69)
To touch: 2 hours
Through: 24 to 48 hours
(depending upon temperature, relative humidity and substrate)

WEIGHT PER U.S. GALLON (ASTM D 1475)
10.1pounds (1.21 kg/liter)

SOLIDS
58% by weight
50% ± 2% by volume

APPLICATION TEMPERATURE RANGE
40°F (4°C) to 120°F (49°C)

SERVICE TEMPERATURE RANGE
0ºF to 180ºF constant (-17.8ºC to 82.2ºC)
-20ºF to 200ºF intermittent (-29ºC to 93ºC)

TYPICAL ELONGATION
1,500% (50 mils dry, @ 70ºF)

WET FLAMMABILITY INFORMATION
No flash to boiling (212ºF) closed cup (ASTM D 93)

VOC (Volatile Organic Content, less water) (ASTM D 3960)
0 g/L
MEETS REQUIREMENTS FOR LEED CREDIT 4.2

CLEANUP
Wet state – water Dry state - safety solvent

RECOMMENDED SHELF LIFE
18 months in unopened container @40°F (4°C) to 90°F (32°C)

CAUTION
The addition of water or any thinning agent to this product will change its physical properties and will adversely affect its performance. No expressed or implied warranty will be offered on applications where this product has been thinned or altered in any manner.

SURFACE BURNING CHARACTERISTICS
(ASTM E 84) Tested at Underwriters Laboratories, Inc.
Flame Spread: 5
Smoke Developed: 0

ALL VIMASCO PRODUCTS ARE ASBESTOS FREE AND CONTAIN NO LEAD OR MERCURY COMPOUNDS.

In accordance with OSHA Standard 29 CFR 1910.12 (Right to Know Law) a Material Safety Data Sheet is available for the product and all Vimasco products.

Vimasco Corporation

749 VAPOR-BLOK™

VAPOR-BARRIER COATING

749 Vapor-Blok™ is a premium quality water-based vapor-barrier coating which effectively prevents water vapor from passing through it. It is designed to prevent the passage of water vapor into thermal insulation on cold systems or surfaces colder than ambient temperature. It is compatible with virtually all types of thermal insulation including Foamglas and can also be applied to a variety of other types of substrates as needed. It is a safe, easy-to-apply water-based latex emulsion, but it achieves the type of low perm rating normally associated with solvent-based products.

749 Vapor-Blok™ has a smooth, creamy consistency most suitable for application by brush (it can also be sprayed with the proper spray equipment). For applications where a heavy build is desired, a heavy-brush/trowel grade is available (method of application should be specified when ordering). It has a pure white color, which remains white in service and matches most white jacketings and facings. It is excellent for protecting the insulation on cold air ducts, chilled water lines, cold storage equipment, and other similar cold systems.

749 Vapor-Blok™ is a very low-odor, low VOC coating when compared to other coatings of this type, and thus it is preferable to workers on the job site and also when being applied in inhabited spaces. It achieves its low perm rating at only 30 mils dry film (30 sq ft/gal), therefore jobs can be completed using less material than with competitive products.

749 Vapor-Blok™ is very effective vapor-barrier coating and should not be used where a breathing coating is required. Always make sure insulation being coated is dry.

749 Vapor-Blok™ meets the 25/50 flame and smoke requirements of NFPA 90A, and complies with MIL-C-19565C, Type II, and is QPL listed.

749 Vapor-Blok™ MUST BE PROTECTED FROM FREEZING IN SHIPMENT AND STORAGE. After application it must be protected from freezing and moisture until thoroughly cured.

Note: 749 Vapor-Blok™ may be used outdoors but after exposure to ultra-violet light the white color will dull slightly to an off-white. It should not be applied to a flat horizontal surface where it will be subjected to standing water.

COLOR: White (Gray is available with minimum order requirements)

WATER VAPOR PERMEANCE (ASTM F 1249)
.03 to .05 U.S. Perms at 30 mils dry film
.015 to .03 U.S. Perms at 38 mils dry film
(.01 to .02 Metric Perms at .97 mm dry)

COVERAGE (ASTM C 461)
30 sq ft/gal at 30 mils dry (52 mils wet)
(.74 m²/liter at .76 mm dry, 1.32 mm wet)
24.5 sq ft/gal at 38 mils dry (66 mils wet)

DRYING TIME (ASTM D 1640)
To touch: 2 hours Through: 12 to 48 hours
Depending upon temperature, relative humidity, and substrate

WEIGHT PER U.S. GALLON (ASTM D 1475)
10.4 pounds (1.24 kg/liter)

SOLIDS: 67% by weight, 58% by volume

SERVICE TEMPERATURE RANGE
0°F (-17.8°C) to 180°F (82.2°C) constant
-20°F (-29°C) to 220°F (104°C) intermittent
Note: "Service temperature" refers only to the temperature of air or surfaces coming into direct contact with the coating. This should not be confused with the operating temperature of the system underneath the insulation, which may vary widely depending upon the effectiveness of the insulation used. 749 Vapor-Blok™ will lose some flexibility at very cold temperatures and will soften at very warm temperatures.

APPLICATION TEMPERATURE RANGE
40°F (4°C) to 120°F (49°C)

WET FLAMMABILITY (ASTM D 93)
No flash to boiling, 212°F (100°C)

VOLATILE ORGANIC COMPOUND (VOC) CONTENT (ASTM D 3960)
39 g/L(.384 lb/gal)
MEETS REQUIREMENTS FOR LEED CREDIT 4.2

ELONGATION
107% (30 mils dry @ 70°F) (.76 mm dry @ 21°C)

CLEANUP: Wet state: water Dry state: safety solvent

RECOMMENDED SHELF LIFE
12 months in unopened container at 40°F(4°C) to 90°F (32°C)

CAUTION
Do not add water to this product as that will change its physical properties and performance. No expressed or implied warranty will be offered on applications where the product has been thinned or altered.

ASTM E2178 – Air Permeance of Building Materials
749 has been tested and complies

SURFACE BURNING CHARACTERISTICS
(ASTM E 84) Tested at Underwriters Laboratories, Inc.
Flame Spread: 3.7; Smoke Developed: 9.2

In accordance with OSHA Standard 29 CFR 1910.12 (Right to Know Law) a Material Safety Data Sheet is available for this product and all Vimasco products.
ALL VIMASCO PRODUCTS ARE ASBESTOS FREE AND CONTAIN NO LEAD OR MERCURY COMPOUNDS.

PROTO FITTING COVERS

25/50 RATED
PER ASTM E-84 — LoSMOKE® PVC

PROTO REGULAR PVC
LoSMOKE® PVC JACKETING

PVC FITTING COVERS, PRE-MOLDED, INSULATED
WHITE GLOSS FINISH — INDOOR OUTDOOR GRADE

SUBMITTAL SHEET DOES NOT SUPERCEDE WRITTEN SPECIFICATIONS OR OWNER AGREEMENT.

DESCRIPTION

The Proto Fitting Cover System consists of one piece and two piece pre-molded high impact LoSMOKE® PVC fitting covers with fiberglass inserts and accessories, which include elbows, tee/valves, end caps, mechanical line couplings, specialty fittings, white and indoor color jacketing, Protop® Tank End Panels, tack fasteners, tapes and specialty items.

APPLICATIONS

The Proto Fitting Cover System is used to insulate mechanical piping systems at fitting locations and provide a PVC jacketing for straight run piping. Both give a quality appearance and have excellent durability.

FEATURES AND BENEFITS

25/50 Rated. All Proto PVC Fittings are made of LoSMOKE® grade PVC. Roll Jacketing is available in either 25/50 rated or regular PVC Grade (not 25/50 rated). The 25/50 products meet fire and smoke safety requirements of federal, state and local building codes.

Excellent Appearance. Bright high-gloss white coloring adds a distinct quality appearance to the system. The standard line of Proto Fitting Covers are made in LoSMOKE® PVC designed for indoor and outdoor use. Virtually all sizes pass 25/50 when made of LoSMOKE® PVC. Colored PVC is manufactured from a LoSMOKE® formula that is suitable for indoor use only.

Easy To Clean. Due to the smooth, high gloss finish on Proto PVC Fittings, the product cleans easily with soap and water. This makes the system ideal for food and drug facilities.

Low Cost Installation. Significant cost savings vs. conventional cement, molded sections, and mitered sections.

Fast and Easy. At fitting locations, wrap the fiberglass insert around the pipe fitting, apply the Proto PVC Fitting over the insert and tack or tape in place. Do not use tacks where a vapor retarder is applied.

Wide Temperature Range. May be used for mechanical piping systems operating from -20°F to +140°F surface temperature of insulation. Variety: LoSMOKE®, Indoor/Outdoor, Exod®, Exotuff®. Proto products are also available in LoSMOKE® Indoor colors. Exod® is CPVC, GOOD TO 225° F.

Long Lasting. Can be used more than once on retrofit projects, general maintenance.

Excellent Thermal Value. K value of .26 at 75°F (.037 W/m °C at 24°C) of fiberglass insert, mean temperature assures better thermal efficiency than conventional cement fittings.

Resistance To Fungi and Bacteria. (ASTM G 21, ASTM G 22) Does not promote growth of fungi or bacteria.

U.V. Resistant. Can be used on indoor or outdoor applications, for both (White) LoSMOKE® PVC and Regular PVC. Extra thick fitting covers should be used outdoors. (All Std. Proto Fitting covers are made of LoSMOKE® PVC.)

TECHNICAL PHYSICAL PROPERTIES OF PVC LoSMOKE® MATERIALS

Specific Gravity (ASTM D-792) 1.41
Tensile Modulus, PSI (ASTM D-638) . . . . . .361,000 (25,380 kg/cm²)
Tensile Strength, PSI (ASTM D-638) 6,011
Flexural Strength, PSI (ASTM D-790) 9,396
Izod Impact (1/4") ft. lb./in (ASTM D-256) 3.7
Heat Deflection Temp. (ASTM D-648) . . . . . .157°F (70°C)
at 264 PSI (8.95 kg/cm²), °F
VICAT Softening Temp. (ASTM D-1525) . . . . . .198°F (92°C)

Water Vapor Transmission
ASTM E 96-95
70°F & 50% Relative Humidity
.015" thick = .058
.020" thick = .047
.030" thick = .027

Surface Burning Characteristics of All Fitting Covers and Jacketing
LoSMOKE® PVC . . . . . .passes 25/50 ASTM-E 84
Up to .035" Thk.
Puncture Resistance (ASTM D 781) . . .006" thick = 178 Beach Units
.015" thick = 221 Beach Units

FEDERAL SPECIFICATIONS COMPLIANCE—

POLY VINYL CHLORIDE — ASTM 1784-92

LP-1035A Type II Grade GU and Type III

LP-535E Type II Grade GU and Type III

United States Department of Agriculture Authorized
Agriculture Canada Authorized
New York City MEA 243-84-M, Chicago, Los Angeles ASTM C-585-76 (sizes)
Canada CAN/CGSB - 51.53-95

TECHNICAL PROPERTIES OF FIBERGLASS INSERT MATERIAL

Thermal Conductivity (ASTM C 177)

Mean Temperature –	°F	"k" — BTU in/hr. Ft.2 °F
HH-I-558 Form B	75° 1(24°C)	.26 (.037 W/m. °C)
Type 1 Class B	150° 1(66°C)	.33 (.048 W/m. °C)
	250° (121°C)	.44 (.063 W/m. °C)

APPLICATION AND SPECIFICATION GUIDELINES

A. STORAGE

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

B. PREPARATION

Proto Fitting Covers should be applied on clean, dry surfaces.

C. APPLICATION

1. **General:** The matching fiberglass insert shall be wrapped completely around the metal fitting leaving no voids. Loose wrappings of twine is helpful in shaping difficult surfaces. The Proto Fitting Cover shall then be applied over the fitting and insert, and the throat secured by either tack fastening or taping.

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

3. **Hot Pipe:** Insulate as per General Instructions given above. Due to PVC softening point at approximately 159°F (70.6°C), care should be taken to ensure sufficient insulation thicknesses are applied.

For hot piping which requires Pipe Insulation over 1 1/2" (38 mm) wall thickness, an extra fiberglass insert shall be applied for each additional inch of pipe insulation wall thickness. Proto recommends the surface temperature of the Pipe Insulation and PVC to be no higher than 125°F (52°C). To complete application of Proto PVC Fittings on hot piping, the throat seam shall be tack fastened or taped. Seal all laps outdoors and in wash down areas.

CAUTION: During initial heat-up to operating temperatures above 350°F, (177°C) an acrid 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.

4. **Outdoor Pipe:** Insulate as per above instructions.

Minimum Proto PVC Jacketing thickness for outdoor applications should be .030" (.7 mm). Over 15" O.D., .040 is recommended. Under 3 1/8" O.D., .020 is permitted. The PVC Jacketing shall be overlapped a minimum of 2" (51 mm) on the down side so as to shed water. All long and round joints shall be completely weather sealed with caulk adhesive.

On all piping, insulation shall be of sufficient thickness to keep the surface temperature below 125°F (52°C). Additionally, a slip type expansion joint of 8" (202 mm) minimum width shall be applied at least every 25 lineal feet (6.1 lineal meters) and between fittings.

Painting: Painting must be done only after priming the PVC surface with a suitable primer, such as X-1-M 400W Primer, or a similar, approved product.

Outdoor Painting: Only over White Exotuff® 195°F deflection temp. (modified PVC) or EXOD™ 225°F deflection temp. CPVC after X-1-M primer, or a similar, approved product. Use PVC compatible paints without strong solvents. Test paint a section before proceeding.

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

D. HEAVY INDUSTRIAL APPLICATIONS OUTDOORS

Use .030" or higher PVC Jacketing. Use "heavy duty" two piece fitting covers made from minimum .030" thick to .050" thick PVC sheet depending on size of fitting cover. Jacketing to be cut and oven precurled

E. FIRE TEST RESULTS: PROTO LoSMOKE® — PVC

USA: E-84 25/50 Rated up to .035" thick (The Best Rated PVC)

CANADA: Conforms to CAN 4-S102.2

LoSMOKE® fitting covers conform to virtually all city, state and federal codes, for use in hotel, commercial and industrial buildings.

LoSMOKE® fitting covers will be labeled on the box "Passes ASTM E-84." Flame spread 25; smoke developed 50".

All E-84 ratings shown here were tested on flat sheets from which fitting covers are made.

Virtually all Proto LoSMOKE® fitting covers will pass E-84 25/50 flame spread and smoke development rating requirements.

SUGGESTIONS

Slide Joints: Do not apply PVC Jacketing too tightly. Slide joints plus PVC thickness must work together to prevent cracks and puckering.

Caulk/Adhesives:
Use: Celulon® (Red Devil Inc.) water base "Ultra Clear".
Service temp. -25°F to +175°F

PVC Cement: Avoid use if possible. Heavy application can cause puckering and cracks. Learn how to use it sparingly.

Vapor Retarder: A vapor retarder is required under all fitting covers for systems operating below ambient temperatures, such as chilled water lines, and is recommended for all outdoor applications. The fitting vapor retarder should provide a continuous seal with the adjacent pipe vapor retarder.

Outdoor Fitting Covers: Use extra thick, plastic heavy duty covers.

Outdoor and Indoor Washdown Areas: Use EXOD™ (CPVC) by Proto, for its higher deflection temperature (225°F). It is light grey.

PVC Outdoor Thickness (Reg. PVC Jacketing): Use .030" thick cut and oven precurled jacketing. Use "heavy duty" plastic fitting covers formed from minimum .030" to .050" thick PVC sheet depending on size of fitting cover. On pipe insulation larger than 15" O.D. use .040" thick PVC.

PVC Indoor Thickness: Use white or indoor color LoSMOKE® on piping. Use .020" thick with standard one piece fitting cover, .030" jacketing can also be used.

Vessels and Tank Tops: Use .050" or .060" thick tank panels for outdoor applications and .030" or .040" for indoor tanks. Use .050" thick Protop® segments for tank heads. (Only Proto Corp. has them.) Made of LoSMOKE® PVC.

Pipe Insulation End Caps: Use on all outdoor, indoor washdown areas, and all vapor sealed systems. End caps will be PVC, metal, or gasket materials appropriate for the metal pipe temperatures. Silicone rubber (500°F) can be applied (min. 1/16" thick) as an end cap outdoors.

Indoor hot piping need not be sealed to the end cap. Cap will be sealed or taped to the jacket.

Two-Ply Waterproofing System: Use .010" thick PVC with self-sealing long lap tape, as the first waterproof layer. Overlap ends 3" and PVC tape over. Caulk all openings with Celulon® or similar, approved product. The finished jacketing material should employ staggered joints with at least a .010 mil thick first layer. Recaulk again over last layer. Install slide joints every 25', caulk shut all other seams, openings, or end overlaps with PVC tape or caulk. Use vapor seal jacketing (instead of .010" thick PVC first layer) where a vapor seal system is required.

CPVC-High Chemical Resistance and High Deflection Temperature: Use "Exod®" CPVC jacketing and fitting covers for 225°F deflection temperature and maximum chemical resistance. Offered only by Proto Corp. as a substitute for stainless steel.

Regular PVC Jacketing Outdoors: Use regular PVC jacketing outdoors. It is less expensive, does the same job as LoSMOKE® PVC. Regular PVC has very good fire (self-extinguishing) properties — not as good as the LoSMOKE® PVC used in confined people areas (buildings), however much better than common plastics used outdoors.

Vessels with ends 24" O.D. or larger: Use .040" thick jacketing up to 48" O.D. On sides of vessels larger than 48" O.D. See Protop® brochure for instructions requiring a suspended band system, to hang panels from, (Gerrard & Company or equal). Use thick PVC panels on Outdoor Tanks not PVC Roll Jacketing. See Tank Tops above for end segments.

PROTO PVC CORP™

PROTO PVC CORP™


Roof Drain Sump (RDS)


Flanged Gate Valves (FGV)


G Y-45


Flanged (S) Tee


Cast Iron Y (CIY)


Flanged (S) 90


Victaulic 45 (V-45)


Victaulic 90 (V-90)


Reducer End Cap


Victaulic Tee (V-TEE)


Strainer Cover


Ball Plug Valve (BPV)


Extra Long Line Flange Covers (Ex


Handicapped Valve Guard (HGV)


Strainer Lateral Y's (SLY)


Victaulic Coupling Cover (GCPLG)


Reducer 90's (R-90's)


P-Traps


Sweep 90's


End Caps


Reducer Tees (R-Tees)


Line Flange Cover (LFC)


Reducer 45 (R-45)


Flat Round End Caps


Concentric Cone Reducer (CCR)


Tees


Iron Bare Pipe


90's


45's


Handicapped P-Trap


Long Radius Victaulic 90 (LR V-90)


Long Radius Gruvlok 90 (LR G-90)


Long Radius Victaulic 45 (LR V-45)


Soil Pipe Hub Cover (SPH)


Long Radius 90 (LR-90)

KNAUF INSULATION
it's time to save energy

www.knaufinsulation.us | PE-PL-20 09-11

Knauf Insulation Mechanical Insulation *with ECOSE® Technology*

Be sure your specs are up-to-date and include the technology that improves the sustainability of traditional fiber glass mechanical insulation.

with ECOSE® TECHNOLOGY

KNAUF INSULATION
it's time to save energy

Knauf Data Sheet | PE-DS-1e 04-11

Earthwool™ 1000° Pipe Insulation

with ECOSE® TECHNOLOGY

Earthwool® 1000° Pipe Insulation

Description

Knauf Insulation Earthwool® 1000° Pipe Insulation is a molded, heavy-density, one-piece insulation made from inorganic glass fibers bonded with ECOSE® Technology. It is produced in 3' lengths with or without a factory-applied jacket.

ASJ+ is the newest generation all-service jacket composed of aluminum foil, reinforced with a glass scrim bonded to a kraft paper interleaving with an outer film layer leaving no paper exposed. A matching ASJ+ butt strip is furnished in the carton for each section. The jacket is white, and the longitudinal lap of the jacket has a self-sealing adhesive. The SSL+ Advanced Closure System creates a strong and lasting bond.

Earthwool

Earthwool is the new benchmark that stands apart for its genuine sustainability, unsurpassed performance and consistently high product quality.

ECOSE Technology

ECOSE Technology is a revolutionary binder based on rapidly renewable bio-based materials rather than non-renewable petroleum-based chemicals such as phenol, formaldehyde or acrylics. ECOSE Technology reduces Knauf Insulation's binder embodied energy and contains no phenol, formaldehyde, acrylics or artificial colors found in traditional fiber glass insulation.

Application

Earthwool 1000° Pipe Insulation is used to insulate iron and copper piping in industrial applications and in commercial and institutional buildings. Earthwool 1000° Pipe Insulation is suitable for hot, cold, concealed and exposed piping systems operating at temperatures from 0°F-1000°F (-18°C to 538°C). Additional weather protection is needed outdoors.

Features and Benefits

Energy Conservation

- Offers excellent resistance to heat loss or gain, which saves energy and lowers operating costs.
- A low thermal conductivity of .23 at 75°F (24°C).

Low-Cost Installation

- ASJ+ faced pipe insulation has a self-sealing lap, which eliminates the need for staples, additional material and tools.
- Fast, easy installation reduces labor costs.

Condensation Control

- Installed properly, the foil vapor retarder and pressure-sensitive lap assure a positive vapor seal.

UL Classified

- All Earthwool 1000° Pipe Insulation, plain or jacketed, meets the fire and smoke safety requirements of most federal, state and local building codes.

Easy Size Identification

- Pipe size, wall thickness and Proto 25/50 Rated PVC fitting cover size are printed in a repeat pattern along the longitudinal lap.
- Easy identification at job site.
- Simplifies restocking.

ASJ+ SSL+

- Professional finished appearance — dimple and wrinkle resistant.
- Cleanable with a wet cloth and soapy water.
- Moisture resistant to intermittent, short duration liquid water exposure, such as precipitation during construction phase.
- ASJ+ has substantially less degradation and discoloration when exposed to UV.
- ASJ+ meets ASTM C1136 Type I, II, III, IV, and meets VIII based on the 75% better puncture resistance of ASJ+ (Mullen Burst).
- The SSL+ Advanced Closure System creates a strong and lasting bond.

Indoor Air Quality

- Certified for indoor air quality as a low emitting product by The GREENGUARD Environmental Institute to both the GREENGUARD Indoor Air Quality Certification Program℠ and the more stringent GREENGUARD Children & Schools standard and is verified to be formaldehyde free.

Sustainability

- Carbon negative: meaning Knauf Insulation products used for thermal insulating purposes recover the energy that it took to make them in just hours or a few days, depending on the application. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.
- Earthwool fiber glass insulation contains three primary ingredients:
  - Sand, one of the world's most abundant and renewable resources
  - A minimum 60% recycled post-consumer glass content and UL Environment verification every 6 months
  - ECOSE Technology which reduces binder embodied energy by up to 70%
    - It is anticipated to reduce its Global Warming Potential (GWP) by approximately 4%, a significant reduction in our carbon footprint

Specification Compliance

In U.S.:

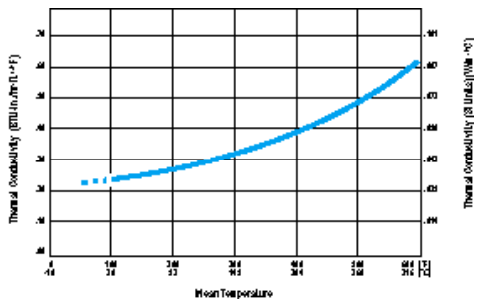
- ASTM C 547; Type I, Type IV
- ASTM C 585
- ASTM C 795
- ASTM C 1136 (jackets); Type I, II, III, IV,VIII
- HH-I-558C; Form D, Type III, Class 12; Class 13 (to 1000°F, 538°C)
- GREENGUARD Indoor Air Quality Certified®
- GREENGUARD Children & Schools Certified℠ and verified to be formaldehyde free
- NFPA 90A and 90B
- MIL-PRF-22344E (except pH requirements)
- MIL-I-24244D
- NRC Reg. Guide 1.36 (certification needs to be specified at time of order)
- This product complies with Oregon Revised Statue 453.085 and contains less than 0.10% decabromdiphenyl ether (DecaBDE) by mass.

In Canada:

- CAN/ULC S102-M88
- CCG F1-304 (plain only)

Thermal Efficiency (ASTM C 335)

Mean Temperature	k	k (SI)
75°F (24°C)	.23	.033
100°F (38°C)	.24	.035
200°F (93°C)	.28	.040
300°F (149°C)	.34	.049
400°F (204°C)	.42	.061
500°F (260°C)	.51	.074
600°F (316°C)	.62	.089



Minimum Pipe Insulation Thickness (in.)[a] (to meet ASHRAE 90.1 Requirements)

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

d 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.

e 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.

- CGSB 51-GP-9M
- CGSB 51-GP-52M (jacket)

Technical Data - Earthwool 1000° Pipe Insulation

Surface Burning Characteristics

- UL Classified.
- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E 84, CAN/ULC S102-M88, NFPA 255 and UL 723.

Temperature Range

- Pipe operating temperatures from 0°F to 1000°F (-18°C to 538°C) at a maximum recommended thickness of 6".

Corrosiveness (ASTM C 665)

- Does not accelerate corrosion on steel, copper or aluminum.

Corrosion (ASTM C 1617)

- The corrosion rate in mils/yr will not exceed that of 1 ppm chloride solution.

Microbial Growth (ASTM C 1338)

- Does not promote microbial growth.

Water Vapor Sorption (ASTM C 1104)

- Less than 0.2% by volume.

Linear Shrinkage (ASTM C 356)

- Negligible.

Technical Data - ASJ+

Surface Burning Characteristics

- UL Classified.
- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E 84, CAN/ULC S102-M88, NFPA 255 and UL 723.

Specification Compliance

- ASTM C 1136 (jackets); Type I, II, III, IV, VIII

Water Vapor Transmission (ASTM E 96, Procedure A)

- Jacket has a water vapor permeance of .02 perms or less.

Water Vapor Sorption (ASTM C 1104)

- Less than 0.2% by volume.

Product Forms amd Sizes

Produced in 3' (914 mm) sections:

KNAUF INSULATION
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Knauf Data Sheet | PE-DS-16e 04-12

Earthwool™ Redi-Klad® 1000° Pipe Insulation

with ECOSE® TECHNOLOGY

Earthwool® Redi-Klad® 1000° Pipe Insulation

Description

Knauf Insulation Earthwool® Redi-Klad® 1000° Pipe Insulation is a multi-purpose, molded, heavy-density, one-piece fiber glass insulation bonded with ECOSE® Technology. Earthwool Redi-Klad comes with factory applied 5-ply weather and abuse resistant jacketing with self-sealing lap. Earthwool Redi-Klad is designed for indoor or outdoor installation on mechanical piping systems with operating temperatures ranging from 0°F to 1000°F (-18°C to 538°C). Properly installed, Redi-Klad jacket provides a zero permeability rating. Earthwool Redi-Klad is produced in convenient 3' lengths with a matching 4" butt strip furnished for each 3' section. The installed product offers a finished appearance comparable to embossed aluminum.

Earthwool

Earthwool is the new benchmark that stands apart for its genuine sustainability, unsurpassed performance and consistently high product quality.

ECOSE Technology

ECOSE Technology is a revolutionary, more sustainable binder made from rapidly renewable bio-based materials, rather than non-renewable petroleum-based chemicals traditionally used in fiber glass insulation products. ECOSE Technology reduces Knauf Insulation's binder embodied energy and does not contain phenol, formaldehyde, acrylics or artificial colors.

Application

Knauf Insulation Earthwool Redi-Klad 1000° Pipe Insulation is designed for indoor and outdoor installation on industrial and commercial mechanical systems piping. Typical applications include, but are not limited to steam, condensate, process, chilled, and domestic water piping for new or retro-fit power generation, petro-chemical, pulp and paper, institutional, and educational construction projects, operating at temperatures from 0°F to (-18°C) to 1000°F (538°C).

Features & Benefits

Energy Conservation

- Offers excellent resistance to heat loss or gain, which saves energy and lowers operating costs.
- A low thermal conductivity of .23 at 75°F (24°C).

Low-Cost Installation

- Available with a self-closure tape, which eliminates need for banding, screws and caulk.
- Lightweight and easy to handle.
- Low maintenance costs.
- No off-site fabrication required.
- Safe installation.
- Fast, easy installation reduces installed costs versus standard aluminum jacketing systems.

Zero Permeability

- Properly installed, Redi-Klad jacket provides a zero perm vapor barrier.

Sustainability

- Carbon-negative - meaning: Knauf insulation products used for thermal insulating purposes recover the energy that it took to make them in just hours or a few days, depending on the application. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.
- Earthwool fiber glass insulation contains three primary ingredients:
  - Sand, one of the world's most abundant and renewable resources
  - A minimum 60% recycled post-consumer glass content and UL Environment verification every 6 months
  - ECOSE Technology which reduces binder embodied energy by up to 70%
    - It is anticipated to reduce its Global Warming Potential (GWP) by approximately 4%, a significant reduction in our carbon footprint

Specification Compliance
Earthwool Fiber Glass Pipe Insulation

In U.S.:

- ASTM C 547; Type I, Type IV
- ASTM C 585
- ASTM C 795
- HH-I-558C; Form D, Type III, Class 12; Class 13 (to 1000°F, 538°C): replaced by ASTM C 592
- NFPA 90A and 90B
- ASTM C 795
- MIL-PRF-22344E (except pH requirements)
- MIL-I-24244D
- NRC 1.36 (Certification needs to be specified at time of order)

Venture Clad Jacket and Tape

In U.S.:

- MEA 447-06-M (City of New York Department of Buildings)

Technical Data—
Earthwool Fiber Glass Pipe Insulation

Surface Burning Characteristics

- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E 84, CAN/ULC S102-M88, NFPA 90A and 90B, NFPA 255 and UL 723.

Temperature Range

- Pipe operating temperatures from 0°F to 1000°F (-18°C to 538°C).

Resists Microbial Growth (ASTM C 1338, G21)

- Does not promote microbial growth.

Corrosiveness (ASTM C 665)

- Does not accelerate corrosion on steel, copper or aluminum.

Corrosion (ASTM C 1617)

- The corrosion rate in mils/yr will not exceed that of the 1 ppm chloride solution.

Water Vapor Sorption (ASTM C 1104)

- Less than 0.2% by volume.

Linear Shrinkage (ASTM C 356)

- Negligible.

Technical Data—
Venture Clad Jacket and Tape

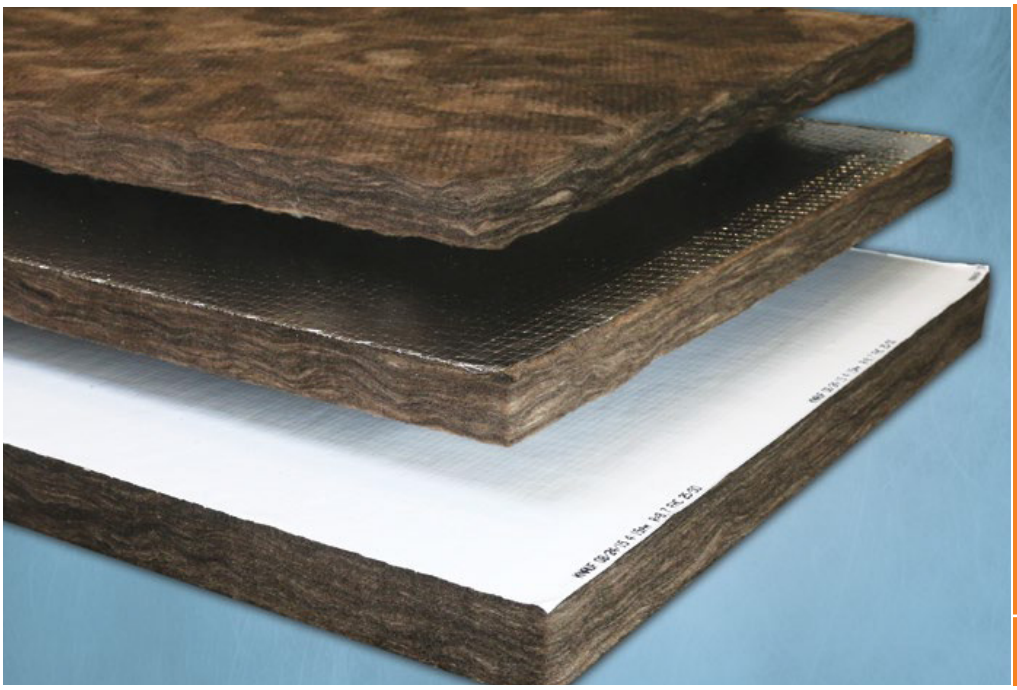
Surface Burning Characteristics

- UL/ULC listed.
- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with UL 723.

Surface Temperature Range

- Maximum temperature continuous use 300°F (149°C).

KNAUF INSULATION
it's time to save energy



Data Sheet | CI-IB-DS 10-15

Earthwool® Insulation Board

with ECOSE® Technology

with ECOSE® TECHNOLOGY

Earthwool Insulation Board *with ECOSE® Technology*

Description
Knauf Insulation Insulation Board is a thermal and acoustical insulation product bonded with ECOSE® Technology. It is available plain or with a factory-applied FSK facing or all-service jacket (ASJ+).

ECOSE® Technology
ECOSE® Technology is a revolutionary binder chemistry that enhances the sustainability of our products. The "binder" is the bond that holds our glass mineral wool product together and gives the product its shape and brown color. ECOSE® Technology is a plant-based, sustainable chemistry that replaces the phenol/formaldehyde (PF) binder traditionally used in glass mineral wool products. Products using ECOSE® Technology are formaldehyde-free and have reduced global warming potential when compared to our products of the past.

Application
Knauf Insulation Earthwool Insulation Board is a versatile product for thermal and acoustical applications such as: heating and air conditioning ducts, power and process equipment, boiler and stack installations, metal and masonry walls, wall and roof panel systems, curtain wall assemblies and cavity walls.

Features and Benefits
- Excellent thermal efficiency results in lower operating costs
- Lightweight, easy to handle and fabricate
- Fast, easy installation lowers labor costs
- Low emitting for indoor air quality considerations
- Excellent acoustical properties effectively reduce noise
- FSK and ASJ+ vapor-retardant facings provide a neat finished appearance

Sustainability
- Carbon negative: meaning Knauf Insulation insulation products used for thermal insulating purposes recover the energy that it took to make them in just hours or a few days, depending on the application. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.
- Glass mineral wool insulation with ECOSE® Technology contains three key ingredients:
  - Sand, one of the world's most abundant resources
  - A minimum of 50% recycled content and UL Environment verification every 6 months
  - ECOSE® Technology which reduces binder embodied energy by up to 70%
    - It reduces its Global Warming Potential (GWP) by approximately 4%, a significant reduction in our carbon footprint

Specification Compliance
In U.S.:
- UL/ULC Classified (FSK, ASJ+)
- ASTM C 612
  - Type IA (1.6, 2.25, 3.0, 4.25, 6.0 pcf) (26, 36, 48, 68, 96 kg/m3)
  - Type IB (3.0, 4.25, 6.0 pcf) (48, 68, 96 kg/m3)
- ASTM C 795
- MIL-I-24244C
- NRC Reg. Guide1.36. (Certification needs to be specified at time of order)
- ASTM C 1136 (facings)
  - Type I, II, III, IV, VIII (ASJ+)
  - Type II, IV (FSK)
- California Title 24
- HH-B-100B; Type I (ASJ+ facing), Type II (FSK facing)
- HH-I-558C
  - Form A, Class 1 (1.6, 2.25, 3.0, 4.25, 6.0 pcf) (26, 36, 48, 68, 96 kg/m3)
  - Form A, Class 2 (3.0, 4.25, 6.0 pcf) (48, 68, 96 kg/m3)
- NFPA 90A and 90B

In Canada:
- CAN/ULC S102-M88
- CGSB 51-GP-10M
- CGSB 51-GP-52M (facings)

Indoor Air Quality
- UL Environment GREENGUARD certified
- UL Environment GREENGUARD Gold certified
- UL Environment validated to be formaldehyde free
- This product complies with Oregon Revised Statute 453.085 and contains less than 0.10% decabromdiphenyl ether (DecaBDE) by mass.
- Tested and certified to meet all requirements of EUCEB
- IGCC 806.6 compliant

Technical Data
Surface Burning Characteristics
(UL Classified)
- Unfaced or composite (insulation, facing and adhesive) does not exceed 25 Flame Spread, 50 Smoke Developed when tested in acordance with UL 723, CAN/ULC S102-M88, ASTM E 84, NFPA 90A and 90B and NFPA 255.

Temperature Range (ASTM C 411)
- Operating temperatures from 0°F to 450°F (-18°C to 232°C)

Corrosiveness (ASTM C 665)
- Will not accelerate corrosion of aluminum, steel or copper.

Corrosion (ASTM C 1617)
- The corrosion rate in mils/yr will not exceed that of the 5 ppm chloride solution.

Puncture Resistance
(TAPPI Test T803) (Beach Units)
- FSK, PSK Facings: 25
- ASJ facing: 55
- ASJ+ facing: 120

Water Vapor Transmission
(ASTM E 96, Procedure A)
- FSK and ASJ+ vapor retarders have a maximum vapor transmission rate of .02 perms.

Water Vapor Sorption (ASTM C 1104)
- Less than 5% by weight when exposed to air at 120°F (49°C) and 95% humidity for 96 hours

Shrinkage (ASTM C 356)
- Less than 0.3% linear shrinkage

Resists Microbial Growth
(ASTM C 1338, G21)
- Does not promote or support the growth of mold, fungi or bacteria

KNAUF INSULATION
it's time to save energy

Knauf Data Sheet | PE-DS-7e 12-09

Pipe & Tank Insulation

with ECOSE® Technology

with ECOSE® TECHNOLOGY

Pipe & Tank Insulation *with ECOSE® Technology*

Description

Knauf Pipe and Tank Insulation with ECOSE Technology is a semi-rigid fiber glass board in roll form faced with a factory applied FSK or ASJ vapor retarder or a glass mat facing. The glass fibers are adhered perpendicular to the jacketing, for flexibility and easy installation.

ECOSE Technology

ECOSE Technology is a revolutionary new binder based on rapidly renewable bio-based materials rather than non-renewable petroleum-based chemicals such as phenol, formaldehyde or acrylics. ECOSE Technology reduces Knauf binder embodied energy and contains no phenol, formaldehyde, acrylics or artificial colors found in traditional fiber glass insulation.

Application

Knauf Pipe and Tank Insulation with ECOSE Technology is typically used on tanks, vessels and large-diameter pipes. It can be used for any curved or irregular surfaces that require finished characteristics of rigid fiber glass insulation.

Features and Benefits

Excellent Thermal Properties

- Temperature ratings to 850°F (454°C).

Low-Cost Installation

- Flexible.
- Easy to handle and fabricate.

Inventory Savings

- No need to stock multiple sizes.
- Various thicknesses available to meet all your pipe and tank insulation needs.

Resists Damage

- Tough and durable.
- Resists damage in shipment, during and after installation.

Resists Microbial Growth

- Does not promote the growth of fungi or bacteria.
- Will not rot.
- Will not sustain vermin.

Corrosiveness (ASTM C 665)

- Does not accelerate corrosion on steel, copper or aluminum.

Corrosion (ASTM C 1617)

- The corrosion rate in mils/yr will not exceed that of the 1 ppm chloride solution.

Specification Compliance

- ASTM C 1136
  - – Type I, II, III, IV (ASJ)
  - – Type II, IV (FSK)
- HH-B-100B (jackets)
  - – Type I and II (ASJ)
  - – Type II (FSK)
- HH-I-558C; Form A, Class 3

Technical Data

Temperature Range (ASTM C 411)

- Operating temperature to 850°F (454°C).

Compressive Strength (ASTM C 165)

- Not less than 150 PSF (7.18 kPa) at 10% deformation for 2" (51 mm) thickness.
- Not less than 275 PSF (13.2 kPa) at 10% deformation for 3" (76 mm).

Water Vapor Transmission (ASTM E 96, Procedure A)

- Both FSK and ASJ vapor retarders have a maximum vapor transmission rate of .02 perms.

Puncture Resistance (TAPPI Test T803) (Beach Units)

- FSK Facing: 25
- ASJ facing: 50

Surface Burning Characteristics

- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E 84, NFPA 255 and UL723.

Linear Shrinkage (ASTM C 356)

- Negligible.

Application & Specification Guidelines

Precautions

- ASJ and FSK jackets should not be used if outer-surface temperature exceeds150°F (66°C).
- 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 insultion 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.

Storage

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

Preparation

- Apply Knauf Pipe and Tank Insulation on clean, dry surfaces.

Application

For easy installation of Knauf Pipe and Tank Insulation simply follow these guidelines.

- Refer to the Stretch-out Chart (right) to find the appropriate length to cut for the specific pipe size. Be sure to add an additional 2" (51 mm) to 4" (102 mm) for your staple flap.
- Cut your stretchout length and wrap the material around the iron pipe to ensure the proper fit.
- Staple the lap on 3" (76 mm) centers with outward clinching staples.
- Butt edges shall be firmly secured, and butt strips matching the jacket shall be applied at each joint.

KNAUF INSULATION
it's time to save energy

Data Sheet | CI-DWA-DS 12-14

Atmosphere™ Duct Wrap

with ECOSE® Technology

with ECOSE® TECHNOLOGY

Atmosphere™ Duct Wrap *with ECOSE® Technology*

Description
Knauf Insulation Atmosphere™ Duct Wrap with ECOSE® Technology is a thermal and acoustical insulation blanket made from highly resilient, inorganic glass mineral wool 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.

ECOSE® Technology
ECOSE® Technology is a revolutionary binder chemistry that makes Knauf Insulation products even more sustainable than ever. It features rapidly renewable bio-based materials rather than non-renewable petroleum-based chemicals traditionally used in glass mineral wool insulation products. ECOSE® Technology reduces binder embodied energy and does not contain phenol, formaldehyde, acrylics or artificial colors.

Application
Knauf Insulation Atmosphere™ Duct Wrap is used as external insulation on commercial or residential heating or air conditioning ducts. It is suitable for the exterior of rectangular or round sheet metal ducts and spaces or surfaces where temperature and condensation must be controlled.

Features and Benefits
- Low "k" factor significantly reduces heat gain or loss when applied with proper compression
- Flexible
- Lightweight
- Excellent acoustical properties
- Tough and resilient
- Energy conservation, which lowers operating costs
- System efficiency increases; energy usage/costs decrease
- Conforms easily to flat or irregular surfaces
- Rolls allow for faster installation, lower labor costs
- Reduces sound transmission through the duct wall
- Assured condensation control when installed at proper thickness using FSK or PSK facings, proper installation and sealed joints, seams and penetrations.
- Resists damage in shipment and during and after installation
- Knauf Insulation achieved UL GREENGUARD Gold Certification and is UL Environment validated to be formaldehyde free. Products are certified to UL GREENGUARD standards for low chemical emissions into indoor air during product usage.
- Knauf Insulation has achieved a UL Environment claim validation for a minimum of 50% post-consumer recycled glass content in our insulation products.

Sustainability
- Carbon-negative, meaning Knauf Insulation products used for thermal insulating purposes recover the energy that it took to make them in just hours or a few days, depending on the application. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.
- Glass mineral wool insulation with ECOSE® Technology contains three primary ingredients:
  - Sand, one of the world's most abundant and renewable resources
  - A minimum of 50% recycled post-consumer glass content and UL Environment verification every 6 months
  - ECOSE® Technology which reduces binder embodied energy by up to 70%

Specification Compliance In U.S.:
- ASTM C 1139 - unfaced; Type I, Type II,
  Grade 1 - 0.75 lb/ft^3
  Grade 2 - 1.0 lb/ft^3
  Grade 3 - 1.5 lb/ft^3
- ASTM C 553; Type I, II, III
- ASTM C 1136; Type II
- ASTM C 1290
- HH-I-558C; Form B, Type I, Class 7
- NFPA 90A and 90B

In Canada:
- CAN/ULC S102-M88
- CAN/CGSB-51.11-92

Product Features
- UL GREENGUARD Air Quality Certified®
- UL GREENGUARD Gold Certified℠ and UL Enivronment verified to be formaldehyde free
- UL/ULC Classified FHC 25/50 (FSK, Unfaced)
- California Title 24 (installed at 25% compression)
- Does not contain polybrominated diphenyl ethers (PBDE) such as: Penta – BDE, Octa – BDE or Deca – BDE
- Tested and certified to meet all the requirements of EUCEB

KNAUF INSULATION
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Data Sheet | CI-DLA-DS 12-14

Atmosphere™ Duct Liner

with ECOSE® Technology

with ECOSE® TECHNOLOGY

Atmosphere™ Duct Liner with ECOSE® Technology

Description
Knauf Insulation Atmosphere™ Duct Liner is a flexible, mat-faced insulation bonded with ECOSE® Technology. It is faced with a tightly bonded mat to give the airstream a smooth, tough surface, resisting damage during installation and operation. The encapsulant edge coating eliminates airstream flaring.

ECOSE® Technology
ECOSE® Technology is a revolutionary binder chemistry that makes Knauf Insulation products even more sustainable than ever. It features rapidly renewable bio-based materials rather than non-renewable petroleum-based chemicals traditionally used in glass mineral wool insulation products. ECOSE® Technology reduces binder embodied energy and does not contain phenol, acrylics or artificial colors.

Application
Specifically designed as an interior insulation material for sheet metal ducts used in heating, ventilating and air conditioning. Provides an optimum combination of efficient sound absorption, low thermal conductivity and minimal airstream surface friction.

Features and Benefits
- Low thermal conductivity
- Fire-resistant, non-corrosive, durable and resilient
- Tough, tightly bonded mat facing
- Excellent sound absorption
- Energy conservation
- Better temperature control
- Lowers operating costs
- Greatly reduces noise from fans and mechanical equipment as well as cross-talk and air movement
- Withstands damage from normal handling and shop abuse
- If necessary, can be cleaned in accordance with NAIMA's "Cleaning Fibrous Glass Insulated Air Duct Systems Recommended Practices"
- Knauf Insulation achieved UL GREENGUARD Gold Certification. Products are certified to UL GREENGUARD standards for low chemical emissions into indoor air during product usage.
- Knauf Insulation has achieved a UL Environment claim validation for a minimum of 50% post-consumer recycled glass content in our insulation products.

Sustainability
- Carbon negative: meaning Knauf Insulation products used for thermal insulating purposes recover the energy that it took to make them in just hours or a few days, depending on the application. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.
  - Glass mineral wool insulation with ECOSE® Technology contains three primary ingredients:
    - Sand, one of the world's most abundant and renewable resources
    - A minimum of 50% recycled post-consumer glass content and UL Environment verification every 6 months
    - ECOSE® Technology which reduces binder embodied energy by up to 70%

Specification Compliance
In U.S.:
- ASTM C 1071; Type I
- ASTM G 21
- ASTM G 22
- NFPA 90A and 90B

In Canada:
- CAN/ULC S102-M88
- CAN/CGSB-51.11-92

Product Features
- UL/ULC classified
- UL GREENGUARD Certified
- UL GREENGUARD GOLD Certified and UL Enivronment verified to be formaldehyde free
- Does not contain polybrominated diphenyl ethers (PBDE) such as Penta-BDE, Octa-BDE, or Deca-BDE
- Tested and certified to meet all the requirements of EUCEB

Technical Data
Surface Burning Characteristics
- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with UL 723, ASTM E 84, UL/ULC S102-M88 and NFPA 255

Temperature Range (ASTM C 411)
- Up to 250°F (121°C)

Air Velocity (ASTM C 1071)
- Maximum 6000 fpm (1829 mpm)
- Tested to 15,000 fpm (4572 mpm)

Corrosiveness (ASTM C 665)
- Does not accelerate corrosion on steel, copper or aluminum

Corrosion (ASTM C 1617)
- Corrosion rate in mils/yr will not exceed that of the 1 ppm chloride solution

Water Vapor Sorption (ASTM C 1104)
- Less than 3% by weight

KNAUF INSULATION
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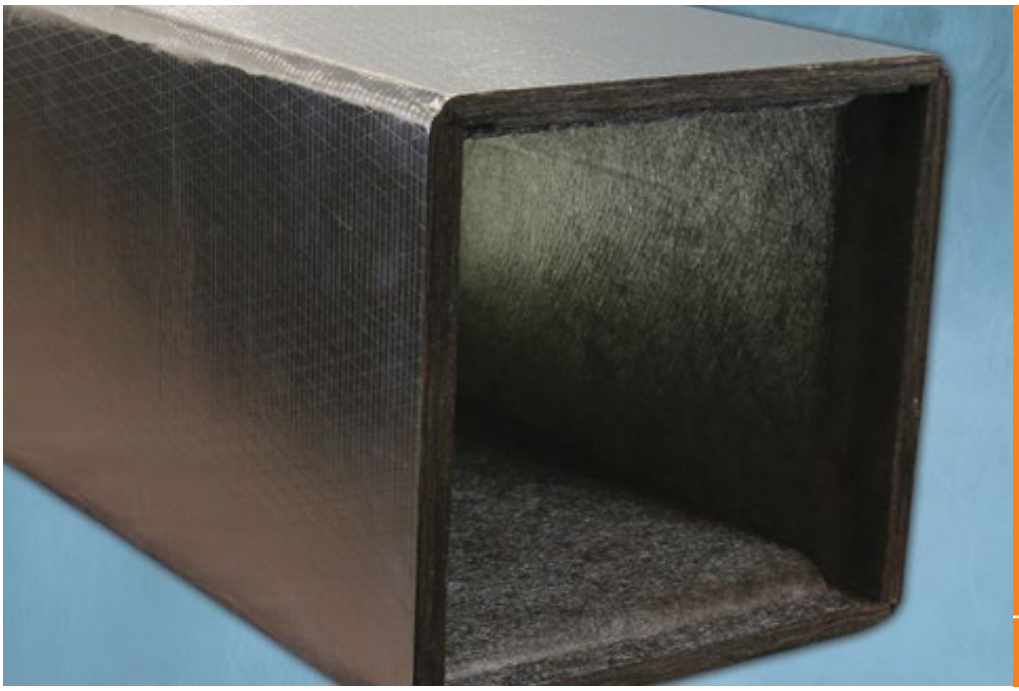


Data Sheet | CI-ADB-DS 10-15

Atmosphere™ Air Duct Board

with ECOSE® Technology

with ECOSE® TECHNOLOGY

Atmosphere™ Air Duct Board

with ECOSE® Technology

Description

Knauf Insulation Atmosphere™ Air Duct Board with ECOSE® Technology is a rigid glass mineral wool board faced on one side with a foil-scrim-kraft (FSK) vapor retarder and with a lightweight non-woven mat on the airstream surface. It is used to fabricate rectangular or Max[10] air duct systems. Available in two stiffness ratings, EI-475 or EI-800. Both types are available with butt edge or factory molded male-female shiplap edges.

ECOSE® Technology

ECOSE technology is a revolutionary binder chemistry that enhances the sustainability of our products. The "binder" is the bond that holds our glass mineral wool product together and gives the product its shape and brown color. ECOSE technology is a plant-based, sustainable chemistry that replaces the phenol/formaldehyde (PF) binder traditionally used in glass mineral wool products. Products using ECOSE technology are formaldehyde-free and have reduced global warming potential when compared to our products of the past.

Application

Knauf Insulation Atmosphere™ Air Duct Board with ECOSE® Technology is designed for commercial and residential air handling installations for cooling, heating or dual-temperature service where good temperature control and noise absorption are required.

Features

- Low thermal conductivity of 0.23 at 75°F (24°C) mean temperature
- Low installed cost pre-insulated duct system
- Excellent acoustical characteristics
- Assured insulation thickness, shiplap joints and FSK vapor retarder
- If necessary, can be cleaned in accordance with NAIMA's "Cleaning Fibrous Glass Insulated Air Duct Systems Recommended Practices" (AH122)
- Meets the fire and smoke safety regulations of most federal, state and local building codes.
- Fabrication in shop or on jobsite
- Low emitting for indoor air quality considerations

Sustainability

- Carbon negative: Knauf Insulation's products used for thermal insulating purposes recover the energy that it took to make them in just hours or a few days, depending on the application. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.
  - Glass mineral wool insulation with ECOSE® Technology contains three key ingredients:
    - Sand, one of the world's most abundant resources
    - A minimum of 50% recycled glass content and UL Environment verification every 6 months
    - ECOSE® Technology which reduces binder embodied energy by up to 70%
      - It reduces its Global Warming Potential (GWP) by approximately 4%, a significant reduction in our carbon footprint

Benefits

- Fabrication in shop environment lowers field installation time
- One trade required to fabricate and install system
- Minimum capital investment for fabrication equipment
- Portability allowing for assembly or fabrication at job site
- ECOSE mat facing ensures a smooth airstream surface for a clean cut and durability
- Lower installation cost than with duct wrap or duct liner with sheet metal
- Dark internal duct appearance
- Quiet, efficient air delivery
- Reduces noise generated by air turbulence and mechanical equipment
- Eliminates "booming" and "cracking" sounds caused by sheet metal duct contraction and expansion

Specification Compliance

In U.S.:

- UL 181; Class 1
- ASTM C 1136; Type II (FSK facing)
- ASTM G 21
- Corps of Engineers Guide Specifications
- International Mechanical Code
- International Building Code
- NFPA 90A and 90B
- California Title 24
- ASHRAE 62

In Canada:

- CAN/ULC S102-M88
- CAN/CGSB 51-GP-52M (facing)
- CAN/CGSB 51.10-92

KNAUF INSULATION
it's time to save energy

Knauf Data Sheet | PE-DS-10e 03-12

Elevated Temperature Batt 1000° and HD Blanket 1000°

with ECOSE® Technology

with ECOSE® TECHNOLOGY

Elevated Temperature Batt 1000° and HD Blanket 1000° *with ECOSE® Technology*

Description

Knauf Insulation ET Batt 1000° and Knauf Insulation ET HD Blanket 1000° with ECOSE® Technology are semi-rigid thermal insulations (1.6 pcf, 25.6 kg/m^3) bonded with ECOSE Technology.

ECOSE Technology

ECOSE Technology is a revolutionary new binder chemistry that makes Knauf Insulation products even more sustainable than ever. It features rapidly renewable bio-based materials rather than non-renewable petroleum-based chemicals traditionally used in fiberglass insulation products. ECOSE Technology reduces binder embodied energy and does not contain phenol, formaldehyde, acrylics or artificial colors.

Application

Knauf Insulation ET Batt 1000° and Knauf Insulation ET HD Blanket 1000° with ECOSE Technology are used in high-temperature marine applications, industrial furnaces, boilers, vessels and industrial ovens, where lighter-weight insulation is needed or flexible and/or semi-rigid high-temperature insulations are needed for irregular surfaces.

Features and Benefits

Excellent Thermal Properties

- Low thermal conductivity.
- Increase system efficiency and decrease fuel usage.

Low-Cost Installations

- Lightweight and easy to handle and fabricate.
- Flexibility makes them ideal for flat or irregular surfaces.

Damage Resistant

- More resistant to abuse than standard ET blankets.
- Tough and resilient.
- Resist damage in shipment and during and after installation.

Custom Sizes

- All items are available in made-to-order sizes.

Indoor Air Quality Excellence

- Certified for indoor air quality as a low emitting product by The GREENGUARD Environmental Institute to both the GREENGUARD Indoor Air Quality Certification Program℠ and the more stringent GREENGUARD Children & Schools standard and is verified to be formaldehyde free.

Sustainability

- Carbon-negative: meaning Knauf Insulation products used for thermal insulating purposes recover the energy that it took to make them in just hours or a few days, depending on the application. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.
- Fiber glass insulation with ECOSE Technology contains three primary ingredients:
  - Sand, one of the world's most abundant and renewable resources
  - A minimum 60% recycled post-consumer glass content and UL Environment verification every 6 months
  - ECOSE Technology which reduces binder embodied energy by up to 70% and total product embodied energy by up to 4%.

Specification Compliance

In U.S.:

- UL/ULC Classified
- MIL-I-24244C
- NRC Reg. Guide1.36. (Certification needs to be specified at time of order)
- GREENGUARD Indoor Air Quality Certified®
- GREENGUARD Children & Schools Certified℠ and verified to be formaldehyde free
- HH-I-558C; Form B, Type I, Class 7, 8
- This product complies with Oregon Revised Statue 453.085 and contains less than 0.10% decabromdiphenyl ether (DecaBDE) by mass.

In Canada:

- CAN/ULC S102-M88
- CCG F1-314
- CGSB 51-GP-11M

Technical Data

Surface Burning Characteristics

- UL/ULC Classified
- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E 84, CAN/ULC S102-M88, NFPA 90A and 90B, NFPA 255 and UL 723.

Water Vapor Sorption (ASTM C 1104)

- 0.1% or less by volume.

Temperature Limit (ASTM C 411)

- Up to 1000°F (538°C) at a maximum recommended thickness of 6".

Resists Microbial Growth (ASTM C 1338, G21)

- Does not promote or support the growth of mold, fungi or bacteria.

Corrosiveness (ASTM C 665)

- Does not accelerate corrosion on aluminum, steel or copper.

Corrosion (ASTM C 1617)

- The corrosion rate in mills/yr will not exceed that of the 1 ppm chloride solution.

Application and Specification Guidelines

Precautions

- 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

Sproule WR-1200®

PERLITE PIPE & BLOCK INSULATION

DESCRIPTION

Sproule WR-1200® is a pre-formed, high temperature, non-wicking pipe and block insulation composed of expanded perlite uniformly reinforced with a high strength fiber for use on systems operating up to 1200°F(650°C). It is inorganic, non-combustible and meets or exceeds the physical property requirements of ASTM C610. Sproule WR-1200 is produced with a blue visual color coding dispersed throughout the product to assure it can be identified as Asbestos Free. Integral to Sproule WR-1200 is XOX, a distinctive formula and process that inhibits corrosion to outside surfaces of pipe and equipment.

ADVANTAGES

- Pipe insulation sections shrink-wrapped with poly film for protection from abrasion during shipment
- Block insulation manufactured with reinforcing scrim beneath the outside surface enhancing structural integrity

Available Forms and Sizes	
Pipe Sizes	
in.	mm
½ - 40	15-1000

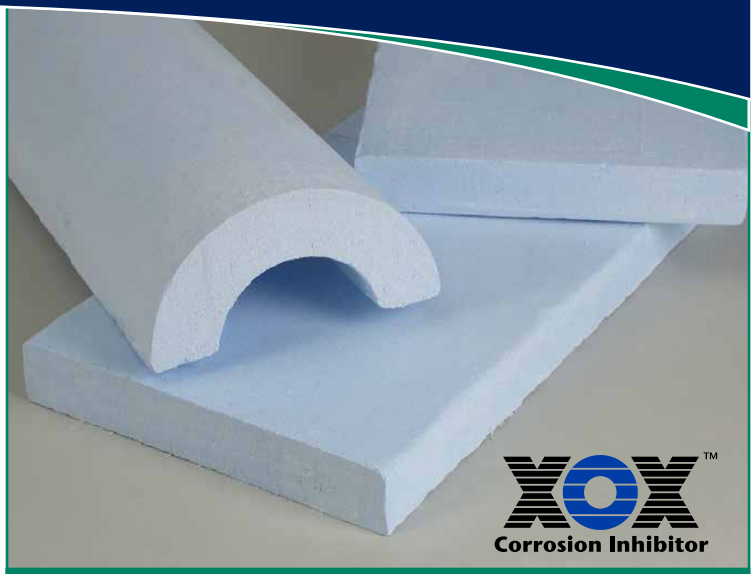
APPLICATIONS

Because of its compressive strength, low thermal conductivity and corrosion inhibiting properties, it is an product for application on high temperature piping and equipment. In industrial processing and power generation facilities, Sproule WR-1200 is the preferred product for stainless steel piping, which is very susceptible to stress corrosion cracking at operating temperatures above 140°F (60°C). The XOX feature inhibits corrosion where moisture and chlorides may become trapped between insulation and stainless steel.

FIRE SAFETY

Surface Burning Characteristics. When tested in accordance with ASTM E84, NFPA 255, and UL 723, Thermo-12 Gold has flame spread/smoke developed ratings of 0/0.

Non Combustible. When tested in accordance with ASTM E136 as defined by NFPA 255 and NFPA 101.



Sproule WR-1200®

OPERATING TEMPERATURE LIMIT: 1200°F(650°C)

Pipe Sizes		Sproule WR-1200
in.	mm	
½-40	15-1000	Pipe Insulation**
24-40	600-1000	Quad
30 Minimum	750 Minimum	Scored Block [12" (305 mm) wide] [18" (457 mm) wide]
Flat Surfaces		Flat Block [6", 12" and 16" wide (152 mm, 305 mm and 457 mm wide)]

Sproule WR-1200 pipe insulation is 36"(914 mm) in length, and is available in thicknesses from 1" to 5" (25 mm to 127 mm) in ½" (15 mm) increments. Thick wall material is furnished in double layers.

Sproule WR-1200 flat block insulation is 12" (305 mm) wide and 36" (914 mm) in length, and is available in thicknesses from 1" to 4" (25 mm to 100 mm) in ½" (15 mm) increments. Non-standard widths of 18", 24" and 36" (457 mm, 610 mm and 914 mm) are available on a made-to-order basis. Inquire for price and availability.

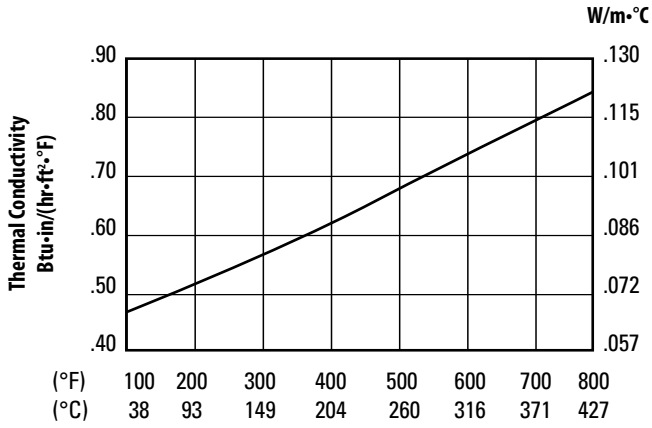
****Double layered pipe insulation is available for heat-traced line applications.**

SCORED BLOCK APPLICATION GUIDE

Minimum Diameter					
Insulation Thickness		Triple Scored		Single Scored	
in.	mm	in.	mm	in.	mm
1½	38	30	762	95	2413
2	51	40	1016	125	3175
2½	64	50	1270	155	3937
3	76	60	1524	190	4826
3½	89	70	1778	220	5588
4	102	-	-	250	6350

Sproule WR-1200®
PERLITE PIPE & BLOCK INSULATION

THERMAL CONDUCTIVITY*



Mean Temperature	°F	100	200	300	400	500	600	700	800
	°C	38	93	149	204	260	316	371	427
Btu • in/(hr • ft² • °F)		.47	.51	.56	.62	.68	.74	.79	.85
W/m • °C		.068	.074	.081	.089	.098	.107	.114	.123

*Sproule WR-1200 Pipe & Block Insulation is tested in accordance with ASTM C177, ASTM C518, ASTM C335.

SPECIFICATION COMPLIANCE	
ASTM C165 Compressive Strength	80 psi (550 kPa) to Produce 5% Compression
ASTM C203 Flexural Strength	50-60 psi (345-415 kPa)
ASTM C302 Average Density	13 lbs. per cu. ft. (210 kgs./m³)
ASTM C356 Linear Shrinkage	Less than 2% After 24-Hour Soaking Period at 1200°F(650°C)
ASTM C442 Maximum Service Temperature	1200°F (650°C)
ASTM C610 Material Specification	Passes
ASTM C665 Çorrosivity to Steel	Passes-Inhibits
ASTM C795/C891/C692	Passes-Inhibits
ASTM C1338 Fungi Resistant	Passes
ASTM C1617 Corrosivity to Steel	Passes-Inhibits
ASTM E84 Surface Burning Characteristics	Flame Spread - 0 Smoke Developed - 0
ASTM E136 Noncombustibility	Passes
NRC Reg. Guide 1.36	Passes
R-Value @ 75°F	2.2 per inch of thickness

PRODUCT CERTIFICATION
When ordering material to comply with any government specification or any other listed specification, a statement of that fact must appear on the purchase order. Government regulations and other listed specifications require specific lot testing, and prohibit the certification of compliance after shipment has been made. There may be additional charges associated with specification compliance testing. Please refer to IIG-CSP-3 for Certification Procedures and Charges. Call customer service for more information.

QUALITY STATEMENT
IIG Products are designed, manufactured and tested to strict quality standards in our own facilities. This along with third party auditing is your assurance that this product delivers consistent high quality.

Industrial Insulation Group, LLC is a Calsilite/Johns Manville joint venture. IIG manufactures MinWool-1200® mineral fiber pipe, block and a variety of other insulations; Thermo-12® Gold Calcium Silicate pipe and block insulation; Super Firetemp® fireproofing board; SprouleWR-1200® Perlite pipe and block insulation; high temperature adhesives, and insulating finishing cement.

IIG®
Industrial Insulation Group, LLC
A Calsilite/Johns Manville Joint Venture

Thermo-12® Gold

PIPE & BLOCK INSULATION

DESCRIPTION

Thermo-12 Gold is a pre-formed, high temperature, abuse-resistant pipe and block insulation with exceptional structural strength, composed of hydrous calcium silicate for use on systems operating up to 1200°F(650°C). It is inorganic, noncombustible, Asbestos Free and meets or exceeds the physical and thermal property requirements of ASTM C533, Type 1. Integral to Thermo-12 Gold is, XOX a distinctive formula and process that inhibits corrosion to outside surfaces of pipe and equipment.

ADVANTAGES

- **Excellent resistance to damage** enhancing the life of the system.
- **Inhibits corrosion on carbon steel** and stainless steel piping and equipment.
- **Consistent thermal performance to 1200°F(650°C).**
- **Noncombustible Insulation.**
- **Structural strength protects** against damage to lagging.
- **Asbestos, Mercury and Lead Free.**
- **No organic binders**; No loss of insulation integrity due to binder burn out.
- **Large selection** of sizes and forms.

APPLICATIONS

Thermo-12 Gold is the product of choice for high temperature pipe and equipment due to it's high strength and durability, low thermal conductivity and corrosion inhibiting performance. Thermo-12 Gold is especially recommended for use in the petrochemical, power generation and process industries where piping and equipment operating up to 1200°F (650°C). The XOX corrosion inhibiting properties are not diminished by temperature cycling so the corrosion protection will continue for the life of the product. Thermo-12 Gold will not burn and may be used as a component in fire protection systems in the some applications. Please visit our website at www.iig-ll.com for specific application information.

FIRE SAFETY

Surface Burning Characteristics. When tested in accordance with ASTM E84, NFPA 255, and UL 723, Thermo-12 Gold has flame spread/smoke developed ratings of 0/0.

Non Combustible. When tested in accordance with ASTM E136 as defined by NFPA 255 and NFPA 101.

ADDITIONAL INFORMATION AND MSDS

Please visit our website at www.iig-llc.com.

Thermo-12® Gold
Operating Temperature Limit: 1200°F (650°C)

AVAILABLE FORMS AND SIZES

Pipe Sizes		Thermo-12 Gold
in.	mm	
½-24	15-600	Pipe Insulation
20-37	500-925	Quad Segments
38-52	950-1300	Hex Pipe Covering (Ruston Plant Only)
30 minimum	750 minimum	Scored Block [12" (305 mm) wide] [18" (457 mm) wide (Mesa Plant Only)]
Flat Surfaces		Flat Block [6", 12" and 18" wide] (152 mm, 305 mm and 457 mm wide)

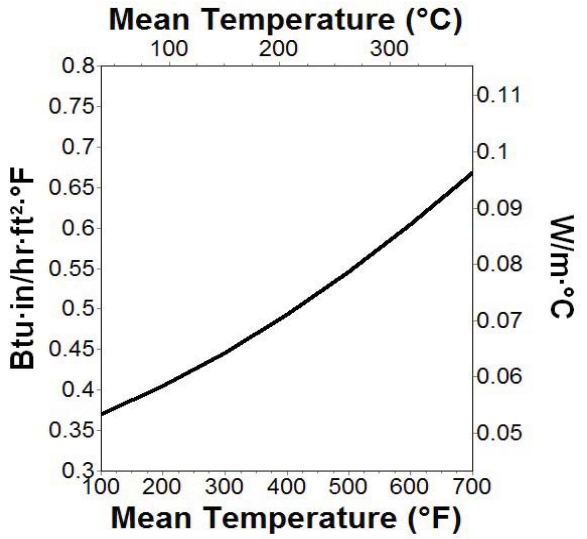
Thermo-12 Gold pipe insulation is 36" (914 mm) in length, and is available in thicknesses from 1" to 6" (25 mm to 150 mm) in ½" (15 mm) increments. Thick wall material is furnished in double layers.

Thermo-12 Gold flat block insulation is 12" (305 mm) wide and 36" (914 mm) in length, and is available in thicknesses from 1" to 4" (25 mm to 100 mm) in ½" (15 mm) increments. Non-standard widths of 18", 24" and 36" (457 mm, 610 mm and 914 mm) are available on a made-to-order basis. Inquire for price and availability.

SCORED BLOCK APPLICATION GUIDE

Minimum Diameter			
Insulation Thickness		Triple Scored	
in.	mm	in.	mm
1½	38	30	762
2	51	40	1016
2½	64	50	1270
3	76	60	1524
3½	89	70	1778
4	102	80	2032

THERMAL CONDUCTIVITY *



Mean Temperature	°F	100	200	300	400	500	600	700
	°C	38	93	149	204	260	316	371
Btu • in/(hr • ft² • °F)		.37	.41	.45	.49	.55	.60	.67
W/m • °C		.053	.058	.064	.071	.079	.087	.096

* Thermo-12 Gold Pipe & Block Insulation as tested in accordance with ASTM C177, ASTM C518 and ASTM C335.

PRODUCT CERTIFICATION

When ordering material to comply with any government specification or any other listed specification, a statement of that fact must appear on the purchase order. Government regulations and other listed specifications require specific lot testing, and prohibit the certification of compliance after shipment has been made. There may be additional charges associated with specification compliance testing. Please refer to IIG-CSP-3 for Certification Procedures and Charges. Call customer service for more information.

ISO 9000 CERTIFICATION

Thermo-12 Gold is designed, manufactured, and tested in our own facilities, which are certified and registered to stringent ISO 9000(ANSI/ASQ 90) series quality standards. This certification, along with regular independent third-party auditing for compliance, is your assurance that this product delivers consistent high quality.

SPECIFICATION COMPLIANCE	
ASTM C165 Compressive Strength	>100psi(690kPa) 5% compression
ASTM C203 Flexural Strength	>50psi(450kPa)
ASTM C302 Density (Dry) Average	>14pcf(230kg/m³)
ASTM C356 Linear Shrinkage	<2.0% after 24hr Soaking period at 1200°F(650°C)
ASTM C421 Abrasion Resistance Weight Loss by Tumbling	After the first 10min <20% After the second 10min <40%
ASTM C447 Maximum Service Temperature	1200°F(650°C)
ASTM C533, Type I Material Specification	Passes
ASTM C665 Corrosivity to Steel	Passes-Inhibits
ASTM C795/C871/C692 Corrosion	Passes-Inhibits
ASTM C1338 Fungi Resistant	Passes
ASTM C1617 Corrosion	Passes-Inhibits
ASTM E84 Surface Burning Characteristics	Flame Spread -0 Smoke Developed -0
ASTM E119 Building Fire Test	Passes
ASTM E136 Non Combustibility	Passes
BS 476 PART II	Passes
Can/ULC S-102 Surface Burning Characteristics	Flame Spread -0 Smoke Developed -0
City of New York MEA	436-88-M
ISO 8143 Material Specification	Passes
MIL-I-24244 Military Specification	Passes
MIL-I-2781F to 1200°F(650°C) [Pipe] Military Specification	Passes
MIL-I-2819F Class 2 to 1200°F(650°C) [Block] Military Specification	Passes
NRC Reg. Guide 1.36	Passes
NFPA 255 Surface Burning Characteristics	Flame Spread -0 Smoke Developed -0
UL 1709 Hydrocarbon Fire Test	Rated (See IIG document TB005)

Industrial Insulation Group, LLC is a Calsilite/Johns Manville joint venture. IIG manufactures MinWool-1200® mineral fiber pipe, block and a variety of other insulations; Thermo-12® Gold Calcium Silicate pipe and block insulation; Super Firetemp® fireproofing board; SprouleWR-1200® Perlite pipe and block insulation; high temperature adhesives, and insulating finishing cement.

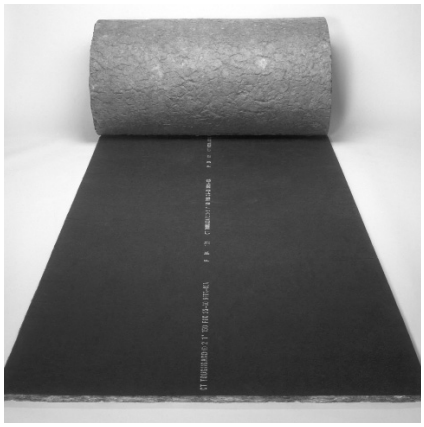
IIG®
Industrial Insulation Group, LLC
A Calsilite/Johns Manville Joint Venture

The physical and chemical properties presented 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. Numerical flame spread and smoke developed ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions. Check with the Customer Service Office to assure current information. All Industrial Insulation Group products are sold subject to the IIG Limited Warranty and Limitation of Remedy. For a copy of the IIG Limited Warranty and Limitation of Remedy, email - info@iig-llc.com.

CertainTeed

Specification Sheet

ToughGard®2 Textile Duct Liner



1. PRODUCT NAME

ToughGard®2 Textile Fiber Glass Duct Liner

2. MANUFACTURER

CertainTeed Corporation
P.O. Box 860
Valley Forge, PA 19482-0105
Phone: 610-341-7000
800-233-8990
Fax: 610-341-7571
Fax-On-Demand: 800-947-0057
Website: www.certainteed.com

3. PRODUCT DESCRIPTION

Basic Use: ToughGard2 Duct Liner is used primarily as an acoustical liner in HVAC sheet metal ducts to absorb unwanted crosstalk, equipment and air rush noise.

This product can be used in most types of comfort heating and cooling duct systems, operating at velocities up to 6,000 fpm (30.5 m/s) and temperatures to 250˚F (121˚C).

Benefits: ToughGard2 Duct Liner is more water repellent than standard duct liners. This product is durable, abuse-resistant and easy to clean. In addition, ToughGard2 Duct Liner provides excellent thermal properties, exhibits low air flow resistance and meets all applicable fire resistance standards and building code requirements. This product has a factory-applied edge coating that assures sealing of the transverse edges as per SMACNA and NAIMA Installation Standards. The product can be precision cut using both manual and automatic cutting equipment.

Composition and Materials: Composed primarily of long, textile-type glass fibers firmly bonded together with a thermosetting resin overlaid with an extremely tough and durable fire-resistant, black composite surface on the air stream side. The airstream surface contains an EPA registered antimicrobial agent in order to reduce the potential of microbial growth that may affect this product. The antimicrobial properties are intended to only protect this product.

Limitations: Insulation should be kept clean and dry during shipping, storage, installation and system operation.

Sizes: See the table below for available sizes. Contact CertainTeed for availability and minimum order quantities.

4. TECHNICAL DATA

Applicable Standards:

- Model Building Codes:
  - (BOCA, ICBO, SBCCI, ICC)
  - California Title 24
- Material Standards
  - (ASTM C 1071)
  - (CAN/CGSB-51.11-92)
- Fire Safety Standards:
  - (NFPA 90A, NFPA 90B)

Fire Resistance:

- Fire Hazard Classification:
  - (UL 723, ASTM E 84, NFPA 255)
  - (CAN/ULC-S102-M88)
    Max. Flame Spread Index; 25
    Max Smoke Developed Index; 50
- Limited Combustible: (NFPA 259)
  - < 3,500 Btu/lb

Physical/Chemical Properties:

- Thermal Performance:
  - See table on back page.
- Acoustical Performance:
  - See table on back page.
- Operating Limits:
  - Temperature: (ASTM C 411)
    Max. 250°F (121°C)

STANDARD SIZES

Product Types		Nominal Thickness		Length		Width	
ToughGard2	ASTM[1]	in.	mm	ft.	m	in.	mm
150 Density: 1.6 pcf (24 kg/m³)	I	1	25	50 & 100	15.2 & 30.5	24 to 72 in 1/4" increments*	610 to 1829 in 6 mm increments
		1 1/2	38	100	30.5		
		2	51	50	15.2		
200 Density: 2.0 pcf (32 kg/m³)		1/2	13	100	30.5		
		1	25	50 & 100	15.2 & 30.5		
300 Density: 3.0 pcf (48 kg/m³)		1/2	13	100	30.5		
		1	25	50 & 100	15.2 & 30.5		

1) Classification per ASTM C 107: Type I is roll form; Type II is sheet form

*Not all widths between 24" and 72" are standard. Please contact CertainTeed for the standard sizes.

*Made-To-Order sizes are available and subject to an upcharge, additional lead time and minimum quantities.

– Air Velocity: (ASTM C 1071, UL181)
Max. 6,000 fpm (30.5 m/s)
- Water Vapor Sorption: (ASTM C 1104)
  – < 3% by weight
- Corrosion Resistance: (ASTM C 665)
  – Pass
- Bacteria Resistance: (ASTM G 22)
  – No Growth
- Fungi Resistance: (ASTM C 1338 & ASTM G 21)
  – Pass; No Growth
- Water Repellency Rating
  – ≥ 4 (INDA IST 80.6-92)

5. INSTALLATION

All duct liner products shall be installed in accordance with the requirements of NAIMA Fibrous Glass Duct Liner standard, or SMACNA HVAC Duct Construction standards and the project specification.

The products can be precision cut using both manual and automatic cutting equipment. The liner shall be cut and fitted to assure all joints are neatly and tightly butted with no interruptions or gaps.

All duct liner products shall be adhered to the sheet metal ductwork using an adhesive meeting the requirements of ASTM C 916. The adhesive film coverage shall be a minimum 90% of the metal surface. Secure the duct liner to the sheet metal ductwork using mechanical fasteners (impact-driven or weld-secured). These fasteners vary in length and type. Mechanical fasteners of the specified type and length shall be used assuring no greater than 10% compression of the liner thickness. Maximum fastener spacing shall be in accordance with NAIMA or SMACNA standards.

ToughGard Duct Liner provides clean "buttered" transverse edges. However, some circumstances will require the use of adhesive to "butter" raw exposed liner edges. Final job site "buttering" may be required to coat duct cut-ins and/or minor installation damage. ToughGard Duct Liner fabricated duct systems shall be kept clean and dry from the point of fabrication through job site installation. Special precautions at the job site may be necessary to accomplish this. The installed lined ductwork shall be protected to avoid contamination by water and dirt. An HVAC system commissioning program should be considered to assure proper start up and purging of the duct system.

INSERTION LOSS, dB per ft of Lined Duct

P/A, ft/ft²	1" Liner Octave band center frequencies, Hz 125	250	500	1000	2000	4000	2" Liner Octave band center frequencies, Hz 125	250	500	1000	2000	4000
8	0.6	1.5	2.7	5.8	7.4	4.3	0.8	2.9	4.9	7.2	7.4	4.3
6	0.5	1.2	2.3	5.0	5.8	3.6	0.6	2.3	4.2	6.2	5.8	3.6
4	0.4	0.8	1.9	4.0	4.1	2.8	0.5	1.6	3.5	5.0	4.1	2.8
2	0.2	0.5	1.4	2.8	2.2	1.8	0.3	0.8	2.3	3.3	2.0	1.7
1	0.1	0.3	1.0	2.0	1.2	1.2	0.2	0.5	1.8	2.3	1.1	1.1

Duct Liner Insertions Loss—Data extracted from ASHRAE Handbook, HVAC Applications, Chapter 46, 1999. P/A = duct perimeter, ft/duct cross sectional area (ft²). Example: 12" x 12", P/A = 4 (1/ft).

ACOUSTICAL PERFORMANCE

Product Type	Nominal Thickness in.	mm	Sound Absorption Coefficients @ Octave Frequencies (Hz) 125	250	500	1000	2000	4000	NRC
150	1	25	0.14	0.29	0.55	0.77	0.94	0.94	0.65
	1½	38	0.16	0.47	0.77	0.96	1.04	1.00	0.80
	2	51	0.23	0.62	1.01	1.04	1.00	1.01	0.90
200	½	13	0.06	0.15	0.33	0.56	0.76	0.91	0.45
	1	25	0.10	0.33	0.65	0.86	0.94	0.96	0.70
	1½	38	0.16	0.47	0.77	0.96	1.04	1.00	0.80
	2	51	0.24	0.57	0.90	0.95	0.95	0.96	0.85
300	½	13	0.06	0.15	0.33	0.56	0.76	0.91	0.45
	1	25	0.10	0.33	0.65	0.86	0.94	0.96	0.70
	1½	38	0.20	0.46	0.82	0.94	0.95	0.91	0.80
	2	51	0.27	0.72	1.04	1.02	0.96	0.92	0.95

Sound absorption tested in accordance with ASTM C 423 using Type A mounting per ASTM E 795

THERMAL PERFORMANCE

Product Type	Nominal Thickness* in.	mm	K-Value Btu•in / h•ft.²•°F	W / m•°C	C-Value Btu / h•ft.²•°F	W / m²•°C	R-Value h•ft.²•°F / Btu	m²•°C / W
150	1	25	0.26	0.038	0.25	1.42	4.0	0.70
	1½	38	0.27	0.039	0.17	0.95	6.0	1.06
	2	51	0.26	0.038	0.13	0.71	8.0	1.41
200	½	13	0.25	0.036	0.5	2.84	2.0	0.35
	1	25			0.24	1.35	4.2	0.74
	1½	38			0.17	0.95	6.0	1.06
	2	51			0.13	0.71	8.0	1.41
300	½	13	0.24	0.035	0.48	2.73	2.1	0.37
	1	25			0.23	1.30	4.4	0.77
	1½	38			0.16	0.91	6.3	1.10
	2	51			0.12	0.68	8.3	1.47

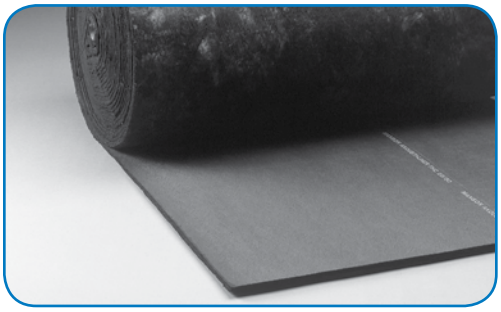
Thermal conductance (C) and resistance (R) values are derived from the material thermal conductivity (k) value. Tested in accordance with ASTM C 518 and/or ASTM C 177 at 75° F (24° C) mean temperature.

*Actual finished thicknesses are 1.05" thick (nominal 1.0"), actual 1.6" (nominal 1.5", Type 150), actual 2.1" (nominal 2", Type 150).

Specification Sheet

ToughGard® R Duct Liner

PRODUCT DESCRIPTION



Basic Use: ToughGard R Duct Liner is used primarily as an acoustical liner in HVAC sheet metal ducts to absorb unwanted crosstalk, equipment and air rush noise. This product can be used in most types of heating and cooling duct systems, operating at velocities up to 6,000 fpm (30.5 m/s) and temperatures to 250˚F (121˚C).

Benefits: This product provides excellent thermal properties, exhibits low air flow resistance and meets applicable fire resistance standards and building code requirements. It is durable, easy to clean and has a factory-applied edge coating that assures sealing of the transverse edges as per SMACNA and NAIMA installation standards.

Composition and Materials: Composed of rotary-type glass fibers firmly bonded together with a thermosetting resin overlaid with an extremely tough and durable fire-resistant black composite surface on the airstream side. The airstream surface contains an EPA-registered antimicrobial agent in order to reduce the potential of microbial growth that may affect this product. The antimicrobial properties are intended to protect only this product. Product contains minimum 30% recycled content based on LEED definition.

Limitations: ToughGard R Duct Liner should be kept clean and dry during shipping, storage, installation and system operation.

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

INSTALLATION

All duct liner must be installed in accordance with the requirements of the NAIMA Fibrous Glass Duct Liner Standards or SMACNA HVAC Duct Construction Standards and the project specification.

The liner must be cut and fitted to ensure all joints are neatly and tightly butted with no interruptions or gaps.

All duct liner products shall be adhered to the sheet metal ductwork using an adhesive meeting the requirements of ASTM C916. The adhesive film coverage must be a minimum 90% of the metal surface. Additionally, secure duct liner as required to the sheet metal ductwork using mechanical fasteners (impact-driven or weld-secured). These fasteners vary in length and type. Mechanical fasteners of the specified type and length must be used, ensuring no greater than 10% compression of the liner thickness. Maximum fastener spacing must be in accordance with NAIMA or SMACNA standards. ToughGard R provides clean “buttered” transverse edges. However, some circumstances will require the use of adhesive to butter raw exposed liner edges. Final job site buttering may be required to coat duct cut-ins and/or minor installation damage.

ToughGard Duct Liner fabricated duct systems must be kept clean and dry from the point of fabrication through job site installation and system commissioning. Special precautions at the job site may be necessary to accomplish this.

AVAILABILITY AND COST

Manufactured and sold throughout the United States. For availability and cost contact your local distributor, or call CertainTeed Sales Support Group in Valley Forge, PA at 800-233-8990.

WARRANTY

Refer to CertainTeed’s Limited One-Year Warranty for ToughGard R Fiber Glass Duct Liner (30-33-010).

MAINTENANCE

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

TECHNICAL DATA

Applicable Standards

- Model Building Codes:
  – ICC
  – California Title 24
- Material Standards:
  – ASTM C1071, Type I
  – CAN/CGSB-51.11-92
- Fire Safety Standards:
  – NFPA 90A, NFPA 90B

Fire Resistance

- Fire Hazard Classification:
  – UL 723, ASTM E84,
  CAN/ULC-5102
  Max. Flame Spread Index: 25
  Max Smoke Developed Index: 50
- Limited Combustible:
  – NFPA 259
  <3500 Btu/lb

Physical/Chemical Properties

- Thermal Performance:
  – See table on other side
- Acoustical Performance:
  – See table on other side
- Operating Limits:
  – Temperature: ASTM C411
  Max. 250°F (121°C)
  – Air Velocity: ASTM C1071
  Max. 6,000 fpm (30.5 m/s)
- Water Vapor Sorption: ASTM C1104
  ≤ 3% by weight
- Corrosiveness: ASTM C665
  – Pass test requirements
- Bacteria Resistance: ASTM G22
  – No growth
- Fungi Resistance: ASTM C1338 and ASTM G21
  – Pass Test Requirements; no growth
- Water Repellency Rating: INDA IST 80.6-92
  ≥ 4

Quality Assurance

CertainTeed’s commitment to quality and environmental management has ensured the registration of the Athens, Chowchilla and Kansas City plants to ISO 9001:2000 and ISO 14001:2004 standards.

AVAILABLE SIZES

Product Type	Density	Thickness		Length		Width	
		in.	mm	ft.	m	in.	mm
150	1.5 pcf (32 kg/m³)	1	25	50-140	15.2-42.67	34-72	864-1829
		1½	38	50-90	15.2-27.43	34-72	864-1829
		2	51	50-70	15.2-21.34	34-72	864-1829
200	2.0 pcf (32 kg/m³)	½	13	50-200	15.2-61	34-72	864-1829

THERMAL PERFORMANCE

PRODUCT			K-VALUE		C-VALUE		R-VALUE	
Type	Thickness		Btu•in / h•ft.²•°F	W / m•°C	Btu / h•ft.²•°F	W / m²•°C	h•ft.²•°F / Btu	m²•°C / W
	in.	mm						
150	1	25	0.24	0.035	0.24	1.36	4.2	0.73
	1½	38	0.24	0.035	0.16	0.91	6.3	1.10
	2	51	0.24	0.035	0.12	0.68	8.3	1.47
200	½	13	0.24	0.035	0.48	2.73	2.1	0.37

Thermal conductance (C) and resistance (R) values are derived from the material thermal conductivity (k) value. Tested in accordance with ASTM C518 and/or ASTM C177 at 75°F (24°C) mean temperature.

ACOUSTICAL PERFORMANCE

Product			Absorption Coefficients @ Octave Band Center Frequencies (Hz)						NRC
Type	Thickness		125	250	500	1000	2000	4000	
	in.	mm							
150	1	25	0.18	0.36	0.59	0.86	0.95	0.90	0.70
	1½	38	0.35	0.51	0.83	0.93	0.97	0.96	0.80
	2	51	0.34	0.64	0.96	1.03	1.00	1.03	0.90
200	½	13	0.09	0.14	0.40	0.60	0.73	0.82	0.45

Sound absorption tested in accordance with ASTM C423 using Type A mounting per ASTM E795.

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GYPSUM • CEILINGS • INSULATION

CertainTeed SAINT-GOBAIN

Ultra*Duct™ Black Duct Board

1. PRODUCT NAME

CertainTeed Ultra*Duct™ Black Duct Board

2. PRODUCT DESCRIPTION

Basic Use: Ultra*Duct Black Duct Board is a rigid board designed for fabrication into supply and return air HVAC duct work. The product can be used in heating and cooling systems which operate at velocities up to 5,000 fpm (25.4 m/s), temperatures up to 250˚F (121˚C) and maximum internal pressures of ± 2" (51mm) water gauge.

Benefits: This product is strong, resistant to mold, bacteria and microbial growth, and easy to clean. In addition, Ultra*Duct Black provides excellent thermal properties, absorbs unwanted crosstalk, equipment and air rush noise and exhibits low air flow resistance. It also meets all applicable fire resistance standards and building code requirements. The product can be precision cut using both manual and automatic cutting equipment.

Composition and Materials: Composed of resin bonded glass fibers with a reinforced foil laminate air barrier/vapor retarder facing applied to the outside surface and a fiber glass textile mat bonded to the air stream surface.

The air stream surface contains an EPA registered anti-microbial agent in order to reduce the potential of microbial growth that may affect this product. The anti-microbial properties are intended to only protect this product.

Limitations: Ultra*Duct Black is not to be used under poured concrete slabs or to convey exhaust fumes, solids or corrosive gases. Ducts exposed to the weather must be weather protected and reinforced per industry standards. Ducts must not be used as vertical risers more than two stories in height. They must not be used adjacent to high-temperature heating coils. Insulation should be kept clean and dry during shipping, storage and system operation.

Sizes: Standard available sizes as noted in the table below. Contact CertainTeed for availability and minimum order quantities.

3. TECHNICAL DATA

Applicable Standards:

- Model Building Codes:
  – ICC
- Material Standards: UL 181
  – Class 1 Rigid Air Duct
- Fire Safety Standards:
  – NFPA 90A, NFPA 90B

Fire Resistance:

- Surface Burning Characteristics:
  UL 723 and ASTM E84
  – Max. Flame Spread Index: 25
  – Max Smoke Developed Index: 50
- Limited Combustible:
  – NFPA 259
  <3,500 Btu/lb

Physical/Chemical Properties:

- Thermal Performance:
  – See table on other side
- Acoustical Performance:
  – See table on other side
- Operating Limits:
  – Temperature: ASTM C411
  Max. 250°F (121°C)
  – Air Velocity: UL 181
  Max. 5,000 fpm (25.4 m/s)
  – Pressure
  ± 2" wc (498 Pa)
  – Ambient Temperature
  150°F (66°C)
- Water Vapor Sorption:
  – ASTM C1104
  ≤ 2% by weight
- Water Vapor Transmission (Facing):
  – ASTM E96, Desicant Method
  Max. 0.02 perms
  1.15 x 10^{-9}g/Pa•s•m^2

- Air Leakage Class:
  – SMACNA
  Class 6
- Corrosiveness:
  – ASTM C665
  Pass
- Bacteria Resistance:
  – ASTM G22
  No Growth
- Fungi Resistance:
  – ASTM C138 & ASTM G21
  Pass; No Growth

Quality Assurance: CertainTeed's commitment to quality and environmental management has ensured the registration of the Athens, Chowchilla and Kansas City plants to ISO 9001:2000 and ISO 14001:2004 standards.

4. INSTALLATION

Ultra*Duct Black shall be fabricated and installed in accordance with the NAIMA or SMACNA Fibrous Glass Duct Construction Standards and all closure systems shall meet the requirements of UL 181A. The installed duct system should be purged prior to occupancy to remove any loose material.

AVAILABLE SIZES

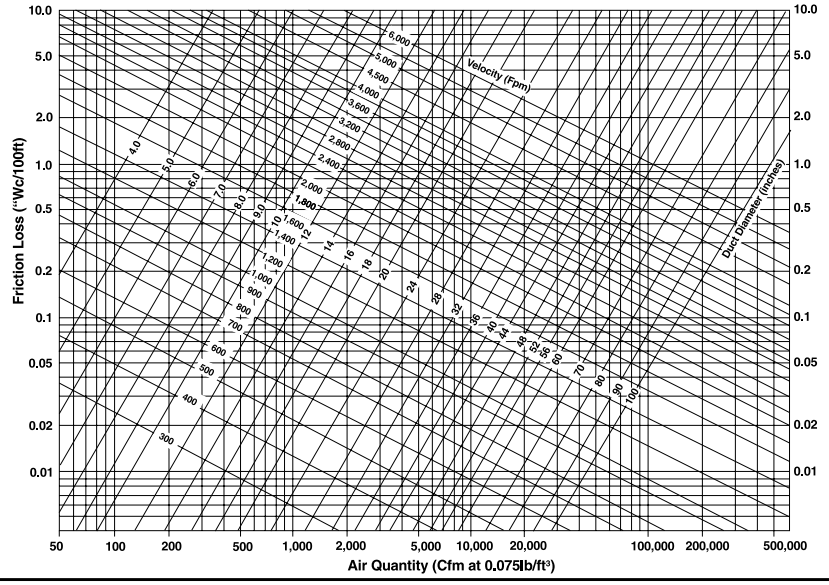
Product Type		Thickness		Width		Length		No. Boards Per	
EI	Edge	in.	mm	in.	mm	in.	mm	Carton	Pallet
475	Shiplap or Butt Edge	1	25	48	1219	120	3048	6	45
						96	2438	8	
800	Shiplap or Butt Edge	1½	38			120	3048	6	30
								4	
						96	2438	6	
	Butt Edge	2	51			120	3048	3	22

ACOUSTICAL PERFORMANCE									
Product Type			Absorption Coefficients @ Octave Band Frequencies (Hz)						NRC
EI	Thickness		125	250	500	1000	2000	4000	
	in.	mm							
475	1	25	0.04	0.20	0.70	0.98	1.05	1.01	0.75
800	1	25	0.07	0.22	0.77	1.00	1.03	1.05	0.75
	1½	38	0.14	0.46	1.02	1.10	1.07	1.05	0.90
	2	51	0.17	0.76	1.05	1.02	0.95	0.96	0.95

Sound absorption tested in accordance with ASTM C423 using Type A mounting per ASTM E795.

THERMAL PERFORMANCE								
Product			K-Value		C-Value		R-Value	
EI	Thickness		Btu•in / h•ft²•°F	W / m•°C	Btu / h•ft²•°F	W / m²•°C	Btu / h•ft²•°F	W / m²•°C
	in.	mm						
475	1	25	0.23	0.033	0.23	1.31	4.3	0.76
800	1½	38			0.15	0.87	6.5	1.15
	2	51			0.12	0.65	8.7	1.53

Thermal conductance (C) and resistance (R) values are derived from the material thermal conductivity (k) value. Tested in accordance with ASTM C518 and/or ASTM C177 at 75°F (24°C) mean temperature.



This chart is to be used in place of the standard friction loss chart published in the ASHRAE Handbook of Fundamentals. For conversion of round equivalents to rectangular sizes, use Table 2 "Equivalent Rectangular Duct Dimensions" from the same reference. Test conducted in accordance with TIMA AHS-152T.

6. AVAILABILITY AND COST

Manufactured and sold throughout the United States and Canada. For availability and cost, contact your local distributor or call CertainTeed Sales Support Group in Valley Forge, PA, at 800-233-8990.

7. WARRANTY

Refer to CertainTeed's Limited One-year Warranty for Ultra*Duct Black Duct Board (30-29-047).

8. MAINTENANCE

An inspection and maintenance program for the HVAC system is recommended to ensure optimum performance. Use NAIMA guidelines for duct cleaning methods and procedures.

9. TECHNICAL SERVICES

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

10. FILING SYSTEMS

- Sweet's Catalog Files, 230700/CES
- CertainTeed Pub. No. 30-36-081
- Additional product information available upon request.

Seal and Insulate with ENERGY STAR — LEARN MORE AT energystar.gov

HEALTH & SAFETY PARTNERSHIP PROGRAM NAIMA

Children & Schools GREENGUARD® Indoor Air Quality Certified

U.S. GREEN BUILDING COUNCIL MEMBER

ASK ABOUT OUR OTHER CERTAINTEED PRODUCTS AND SYSTEMS:

ROOFING • SIDING • TRIM • DECKING • RAILING • FENCE • FOUNDATIONS
GYPSUM • CEILINGS • INSULATION • PIPE

CertainTeed SAINT-GOBAIN

ProRox PS 960

NEW NAME

Old name: Rockwool 850

Application

ProRox PS 960 is a pre-formed stone wool pipe section. The sections are supplied split and hinged for easy snap- on assembly and are suitable for the thermal and acoustic insulation of industrial pipe work.

Compliance

ProRox PS 960 Pipe Sections full comply with the requirements as set by internationally recognized standards like EN14303, CINI 2.2.03, ASTM C547: Grade A for type I, II, IV.

Product properties

	Performance	Norms
Thermal conductivity	Tm (°C) 50 100 150 200 250 300 350 λ (W/mK) 0,040 0,046 0,054 0,064 0,077 0,092 0,111	EN ISO 8497 ASTM C335
Maximum Service Temperature	650°C (1200°F) 750°C (1382°F)	EN 14707 ASTM C411
Maximum surface performance	650°C (1200°F)	ASTM C447
Reaction to fire	EuroClass $A1_L$ Surface burning characteristics; Flame spread=passed, Smoke development=Passed	EN 13501-1 ASTM E84 (UL 723)
Nominal density	125 kg/m³ (7,8 lb/ft³)	EN 13470
Water leachable chloride content	Chloride content < 10 ppm (AS - Quality) Conforms to the stainless steel corrosion specification as per ASTM test methods C 692 and C 871 < 10 mg/kg (ph-value neutral to slightly alkaline)	EN 13468 ASTM C795 ASTM C871
Water Absorption	< 1 kg/m² Water vapour absorption (Vapor sorption) ± 0,02%vol	EN 13472 ASTM C1104/C1104M
Water vapour diffusion resistance	μ = 1	EN 14303
Air Flow Resistivity	> 80 kPa.s/m²	EN 29053
Designation code	MW EN 14303-T9(T8 if D_o<150)-ST(+)650-WS1-CL10	EN 14303

ProRox® SL 960NA

NEW NAME

Old name: ROXUL RHT® 80

Product description & application

ProRox® SL 960NA is a rigid mineral wool (stone wool) insulation board for high temperature industrial applications subject to light mechanical loads.

Product properties in accordance with ASTM C612

	Performance								Norms
Thermal conductivity	Tm (°F)	100	200	300	400	500	600	700	ASTM C177
	λ (BTU.in/hr.ft².°F)	0.24	0.29	0.35	0.41	0.47	0.56	0.68	
	Tm (°C)	38	93	149	204	280	316	371	
	λ (W/mK)	0.034	0.041	0.049	0.057	0.066	0.078	0.095	
Maximum Service Temperature	Hot Surface Performance: 1200 °F- (650 °C) Non-Combustible								ASTM C411 ASTM E136 / CAN4 S114
	Linear Shrinkage: ≤ 1 % at 1200 °F- (650 °C)								ASTM C356
Reaction to fire	Surface burning characteristics Flame spread index = 0 ; Smoke development index = 0								ASTM E84 (UL 723) CAN/ULC S102
Density	Actual Density = 5.8 lb/ft³ - (93 kg/m³) Nominal Density = 8.0 lb/ft³								ASTM C303
Corrosion resistance **	Stress Corrosion Cracking Tendency of Austenitic Stainless Steel = Passed Corrosion of Steel = Passed								ASTM C692 ASTM C665
Chemical Analysis **	(Salts: Cl^- , Fl^- , Na^+ , SiO_4^{4-}) Results fall within acceptability limits of ASTM C795								ASTM C795 / ASTM C871
Thermal Resistance	R-Value / inch @ 75 °F RSI value / 25.4mm @ 24 °C					4.2 hr. ft².°F/BTU 0.74 m² K/W			ASTM C518 (C177)
Water Absorption/ Vapor Sorption	< 1 % Weight								ASTM C1104
Compressive strength	≥ 167psf (8kPa) @ 10% compression								ASTM C165
Compliance	Complies with Type: IVB								ASTM C612
	ROXUL offers a wide range of facings, dimensions and thicknesses. Please contact ROXUL for further information.								

Surface Burning Characteristics: UL Listed to Canadian standard CAN/ULC S102 ; UL Classified to UL 723

NOTE: ** Provisions for lot testing may be requried,consult manufacturer.
As ROXUL® Inc has no control over installation design and workmanship, accessory materials or application conditions, ROXUL® Inc. does not warranty the performance or results of any installation containing ROXUL® Inc's products. ROXUL® Inc's overall liability and the remedies available are limited by the general terms and conditions of sale. This warranty is in lieu of all other warranties and conditions expressed or implied, including the warranties of merchantability and fitness for a particular purpose.

ULC LISTED

CLASSIFIED UL

ENERWRAP® MA 960NA

NEW NAME

Old name: ENERWRAP® 80

Product description & application

ENERWRAP® MA 960NA is a rolled and faced mineral wool (stone wool) insulation wrap/mat designed for high temperature industrial applications where flexibility is required.
Product is ideal for large diameter piping, vessels, ducts and equipment subject to light mechanical loads.

Product properties in accordance with ASTM C553

	Performance								Norms
Thermal conductivity	Tm (°F)	100	200	300	400	500	600	700	ASTM C177
	λ (BTU.in/hr.ft².°F)	0.25	0.30	0.34	0.40	0.48	0.58	0.68	
	Tm (°C)	38	93	150	204	260	316	371	
	λ (W/mK)	0.036	0.043	0.049	0.058	0.069	0.084	0.098	
Maximum Service Temperature	Hot Surface Performance: 1200 °F- (650 °C) Non-Combustible								ASTM C411 ASTM E136 / CAN4 S114
	Linear Shrinkage: ⩽ 2 % at 1200 °F- (650 °C)								ASTM C356
Reaction to fire	Surface burning characteristics Flame spread index = 0 ; Smoke development index = 0								ASTM E84 (UL 723) CAN/ULC S102
Density	Actual Density = 5.68 lb/ft³ - (91 kg/m³) Nominal Density = 8.0 lb/ft³								ASTM 167
Corrosion resistance **	Stress Corrosion Cracking Tendency of Austenitic Stainless Steel = Passed Corrosion of Steel = Passed								ASTM C692 ASTM C665
Chemical Analysis **	(Salts: Cl^- , Fl^- , Na^+ , SiO_4^{4-}) Results fall within acceptability limits of ASTM C795								ASTM C795 (C871)
Thermal Resistance	R-Value / inch @ 75 °F RSI value / 25.4mm @ 24 °C				4.2 hr.ft².°F/BTU 0.74 m² K/W				ASTM C518 (C177)
Water Absorption/ Vapor Sorption	< 1 % Weight								ASTM C1104
Compliance	Complies with Type: VII								ASTM C553
	ROXUL offers a wide range of facings, dimensions and thicknesses. Please contact ROXUL for further information.								

Surface Burning Characteristics: UL Listed to Canadian standard CAN/ULC S102 ; UL Classified to UL 723

NOTE: ** Provisions for lot testing may be requried,consult manufacturer.
As ROXUL® Inc has no control over installation design and workmanship, accessory materials or application conditions, ROXUL® Inc. does not warranty the performance or results of any installation containing ROXUL® Inc's products. ROXUL® Inc's overall liability and the remedies available are limited by the general terms and conditions of sale. This warranty is in lieu of all other warranties and conditions expressed or implied, including the warranties of merchantability and fitness for a particular purpose.

ProRox GRP 1000

NEW NAME

Old name: ProRox Rocktight & Fibertec

Product description

ProRox GRP 1000 is a fiberglass-reinforced 1-component polyester (GRP) watertight cladding system solution. In un-processed state the product is soft and malleable. The material contains resins, fiberglass and special fillers and is ready to use. ProRox GRP 1000 can be cut or trimmed into any shape which makes it easy to apply to the insulation. The polyester subsequently cures under the influence of ultraviolet (UV) light. After curing, ProRox GRP 1000 is absolutely watertight and is able to give optimal mechanical protection. Once cured, ProRox GRP 1000 has an extremely high level of hardness and mechanical strength compared to conventional polyester. In addition, ProRox GRP 1000 is impermeable and resistant to a large number of chemicals. The fire properties are unique in its class.

Application

ProRox GRP 1000 is the **ideal solution** for making insulation around pipes, storage tanks, installations, class divisions, etc. **sealed, watertight and damage-resistant.**

Product properties

Property	Performance	Standard
Color	Grey	-
Handling / Application temperature	min. 5°C - max. 45°C	-
Service temperature	min. -150°C - max. 90°C	-
Emissions (styrene)	< 20 ppm (MAC-value 25 ppm), safety data sheet upon request	-
Flashpoint (non-cured)	125°C	-
Reaction to fire	C_L-s1, d0 round	EN 13501-1
	C-s2, d0 flat	
	Surface burning characteristics; Flame spread = passed. Smoke development=passed	ASTM E84
	Low Surface flame Spread	IMO A.653
Density	1,840 kg/m³	ISO 1183
Thickness (after curing)	1.5mm - 2.0 mm	-
Weight	2.8 kg/m² - 3.7 kg/m²	-
Linear expansion coefficient	$25*10^{-6}$ K^{-1}	ISO 11359-2
Hardness	> 60 Barcol	ASTM D2583
Impact strength	57 kJ/m²	EN ISO 179
Tensile strength	65 MPa	EN ISO 527-4
Tensile Modus	9 GPa	EN ISO 527-4
Strain at break	1.7%	EN ISO 527-4
Flexural strength	150 MPa	EN ISO 14125
Flexural modus	9 Pa	EN ISO 14125
Compressive strength	150 MPa	EN ISO 14126
Compressive modulus	14 GPa	EN ISO 14126
Bending straing / Elongation at break	3.5%	-
Water absorption	0.2 mg/100hr.	EN ISO 62
Water vapour permeability	0.001 metric perms	ASTM E96
Chemical resistance	available upon request	-
Compliance	ProRox GRP 1000 conforms to CINI 3.2.11 "Weather resistant UV-curing fiberglass reinforced polyester (GRP)"	-

(Small divergencies from the declared values are not fully precluded)

Detailed installation instructions are available upon request

Hamfab Type 1000° Fiberglass Fittings


90° Weld Elbows


90° Copper Tube Elbows


90° Screwed & Socket Elbows


Weld & Screwed Tees


45° Weld Elbows


45° Screwed & Socket Elbows

ICA, Inc. in conjunction with Knauf Insulation is proud to introduce Hamfab Type 1000° Fiberglass Fittings


Copper Tube Tees

- Earthwool Insulation is made from inorganic glass fibers bonded with ECOSE Technology. ECOSE is a bio-based binder, which eliminates non-renewable petroleum based ingredients.
- Earthwool offers an extended temperature range, suitable for hot, cold, concealed and exposed piping systems operating at temperatures from 0˚- 1000˚F.
- Does not contain Phenol Formaldehyde, acrylics or artificial colors.
- Saves energy and lowers operating costs with excellent resistance to heat loss or gain. Once installed, the product continues to save energy and reduce carbon generation as long as it is in place.
- Earthwool fiberglass contains three primary ingredients:
  - Sand- one of the world's most abundant and renewable resources.
  - A minimum 60% recycled post-consumer glass content and UL Environment verification every 6 months.
  - ECOSE technology, which reduces binder embodies energy by up to 70%.
    - It is anticipated to reduce its Global Warming Potential (GWP) by approximately 4%, a significant reduction in our carbon footprint.

TECHNICAL DATA

Surface Burning Characteristics

- UL/ULC Classified
- Does not exceed 25 Flame Spread, 50 Smoked Developed when tested in accordance with ASTM E 84, CAN/ULC S102-M88, NFPA 255 and UL 723

Temperature Limitations (ASTM C 411 & ASTM C 447)

- Up to 1000˚F (538˚C) at a maximum recommended thickness of 6 inches

Corrosiveness (ASTM C 665)

- Does not accelerate corrosion on steel, copper or aluminum.

Corrosion (ASTM C 1617)

- The corrosion rate in mills/yr will not exceed that of 1 ppm chloride solution.

Microbial Growth (ASTM C 1338)

- Does not promote microbial growth

Water Vapor Sorption (ASTM C 1104)

- Less than 0.2% by volume

Linear Shrinkage (ASTM C 356)

- Negligible

HAMFAB TYPE 1000°

APPLICATIONS:

HAMFAB Type 1000° premolded insulators are designed to insulate heating, cooling or process piping systems operating at temperatures from 0° to 1000°*. The insulators are normally applied by placing two premolded matching half-sections over the pipe fitting, and joining them together using tape, wire, or adhesive (applied to the seams). After being joined, the fitting insulator is ready for jacketing, vapor barrier coating, or other finishes.

APPLICATION BENEFITS OF HAMFAB INSULATORS

Time and Labor Savings:

- Two-piece, pre-formed design minimizes guesswork in estimates of labor and fitting costs.
- Superior fiberglass thermal efficiency.
- Fast, economical application coverage.
- Eliminates costly blanket wrapping or mitering.
- All L.R. Weld Ells fit aluminum & plastic covers ***Must follow specs on our website***
- New design SR Screwed Ells designed to fit aluminum and plastic covers. ***Must follow specs on our website***

Insulation:

- Insulates Hot or Cold piping systems…provides superior safety from 0° to 1,000°
- Reduces noise levels in piping.
- Low, Stable K factor
- Allows damage-free expansion/contraction/deflection in fittings.

Superior Fit and Assembly:

- Available in sizes ½" to 24" pipe size.
- Precision cut for easy assembly with tie wire, tape or adhesive.
- Inner chamber dimensions allow easy assembly over pipe fittings.

Does Not Contain Phenol Formaldehyde!

- Two-piece unit permits easy removal for inspection purposes.
- Fine cut edges- mating and sealing of fitting halves and straight-run covering is precise.
- Superior smooth inner and outer surfaces- finish of close-knit bonded glass fibers will not separate…surface accepts fire-resistive vapor barrier and breather coating.

It makes sense to choose fiberglass, a proven performer, used safely in countless millions of applications, worldwide, for many years. More and more engineers and their customers recognize that installed cost and enduring dependable performance are the real measures of economy and profitable return. It makes sense to choose the fitting insulator that is a proven investment - HAMFAB Fitting Insulators. You can be sure if it's HAMFAB.

PHYSICAL PROPERTIES

HAMFAB custom-molded pipe fitting insulators are molded in two matching half sections, using fine, inert fibered glass of uniform density, utilizing a thermosetting resin. Sections match as pre-molded units with no handwork, and are resilient and light in weight.

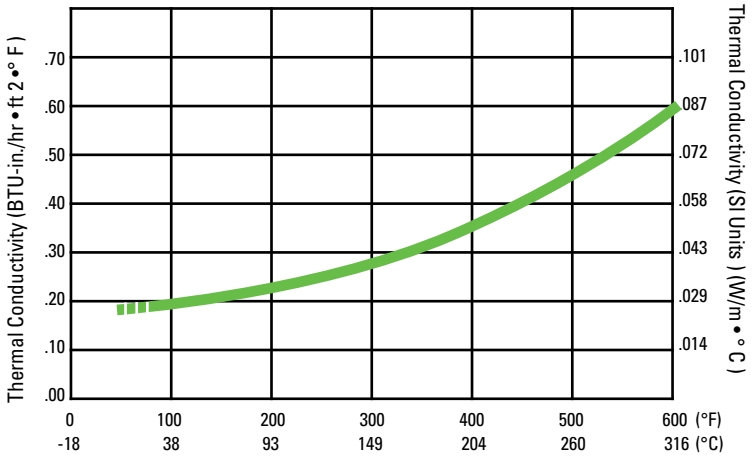
Density:	4-6 lb./cu. Ft.
Moisture absorption:	0.2% by volume, 96 hrs. At 120°F and 96% RH
Shrinkage/expansion:	None. Dimensionally stable
Temperature application:	0° to 1,000°F

OTHER

Incombustible. Immune to rot, corrosion, odors, insects, oxidation. Resists aging and thermal shock. Good water and solvent resistance. Damage- resistant molded half sections can take more than expected on-site abuse and spring back to shape and no loss of physical insulating properties.

Thermal Efficiency (ASTM C 335)

Mean Temperature	k	k (SI)
75°F (24°C)	.23	.033
100°F (38°C)	.24	.035
200°F (93°C)	.28	.040
300°F (149°C)	.34	.049
400°F (204°C)	.42	.061
500°F (260°C)	.51	.074
600°F (316°C)	.62	.089

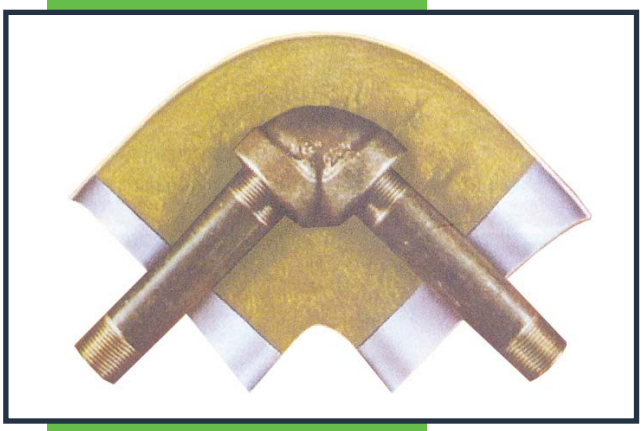


ICA M.W. 1200° HI-TEMP PIPE INSULATORS

ICA M.W. 1200°

Long-radius weld-L half section highlighting smooth interior and exterior contours and close tolerance to pipe arc.

View of fitting demonstrating the precise match of the two-piece unit.



Short-radius screwed fitting schedule 80 in ICA M.W. 1200° and conformance to aluminum cover.

Dual-Temperature, Premolded, Top Quality, Two-Pieced Thermal-Acoustical Pipe Fitting Insulators

TECHNICAL DATA

The ICA M.W. 1200° is a unique product in the realm of high-temperature preformed insulation for pipe fitting areas.

The ICA M.W. 1200° pipe fitting insulator is serviceable to 1200°F and was designed to be utilized in conjunction with any high temperature straight-run insulation of equal surface temperature capabilities. ICA M.W. 1200° pipe fitting insulators have been employed successfully in mineral wool, calcium silicate, and expanded perlite systems.

ICA's molding process yields a fitting insulator which is completely different from the routed fitting insulators which have been extensively marketed in the past. In a routed nsulator the finished product is cut from a section of block insulation with comprising fibers being oriented in a single direction, hence, extreme fragility in the finished product. In contrast, the ICA product is molded under extreme heat and pressure from uncured green felt which is impregnated with a thermo-setting resin. Thus the ICA M.W. 1200° fitting insulator is composed of fibers that are interbonded and intermeshed in many different directions; the resulting strength means that the ICA insulation cover can be and is produced in fitting sizes never before realized.

Unlike a routed insulator, the ICA fitting insulator will not readily delaminate. When coating of the fitting's exterior surface is desired or required, fibers will not dust or fuzz up. This remarkably durable insulator exhibits superior load-bearing characteristics when compared to previous applications, for fitting areas. Extensive on-the-job loss due to breakage is a thing of the past. The ICA M.W. 1200° is actually strong enough to be utilized on line, removed for inspection or maintenance purposes. and utilized once again.

ICA M.W. 1200° pipe fitting insulator are molded in two half sections, matching the density and thickness standards of the adjoining pipe covering. All fitting insulators are currently manufactured in weld, screwed, socket, and copper tubing types; all in 90° and 45° and tee configurations. For pipe sized presently unavailable and for further speciality application requirements, consult with ICA's Research and Development Department regarding our design and engineering capabilities.

ICA M.W. 1200°

APPLICATIONS:

Since the ICA M.W. 1200° is not a mitered or segmented unit, there are no cracks or voids to fill on the exterior surface. The fitting insulators are simply and quickly applied by placing two premolded matching half sections over the pipe fitting and joining them together using tape, wire or adhesive.

BENEFITS OF USING PRE-FORMED ICA M.W. 1200° FITTING COVERS:

- Two-piece, pre-formed design minimizes guess work in estimates of labor and fitting costs.
- **Insulation can be applied prior to pressure of the mechanical systems, thus saving weeks of delay in application time.** Where necessary, fitting insulators can be removed, the testing completed, and the same covered wired back on the system intact.
- Superior tensil strength and load bearing qualities.
- Excellent K factor. Mineral wool has always been a known performer in regards to thermal efficiency.
- Easy to handle and install in the field - resulting in fast, economical application.
- Eliminates costly blanket wrapping or mitering.
- Composite system provides a natural expansion joint. Allows damage free expansion/contraction/deflection in fittings and covering.
- All interior surfaces are stamped with the ICA "H" and the proper pipe and thickness size for quick field indentification.

PHYSICAL PROPERTIES:

Service Temperature Limit, °F	1200°
ASTM E84 Flame Spread/Smoke Development	5/0
ASTM E136/CAN4-S114-M	Noncombustible
ASTM C585	Complies
Density, Lbs./Cu. Ft. (Nominal)	9.0±1.0
Moisture Absorption	Non-hydroscopic
Linear Shrinkage, % (@1200°F)	Less than 2%
pH	Approximately neutral
Mold Resistence	Does not support mold growth

ASBESTOS FREE

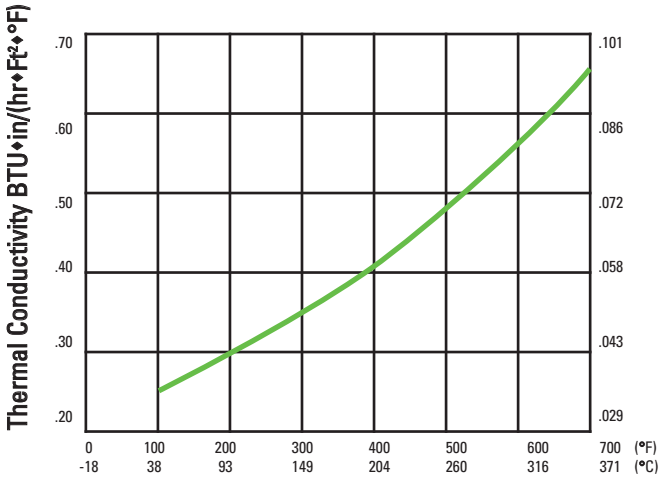
AVAILABILITY CHART

Pipe Fitting Covers Available For...

Type	Pipe Size	Insulation Thickness
Screwed & Socket 90° & 45° Elbows	1/2" through 4"	1"-1 1/2"-2"-2 1/2"-3-3 1/3"
Screwed & Weld Tees*	1/2" through 6"	1"-1 1/2"-2"-2 1/2"-3-3 1/3"
Long Radius Weld 90° & 45° Elbows	1/2" through 24"	1"-1 1/2"-2"-2 1/2"-3-3 1/3" 4"-4 1/2"-5"-5 1/2"-6"-6 1/2"

**Larger T's up to 12" available in the near future.*

THERMAL CONDUCTIVITY ("k")



Mean Temperature	°F	75	100	200	300	400	500	600	700
	°C	24	38	93	149	204	260	316	371
Btu•in/(hr•ft²•°F)		.23	.25	.30	.35	.41	.48	.56	.65
W/m•°C		.033	.036	.043	.050	.059	.069	.081	.094

Thermal conductivity and physical properties based on unfaced mineral wool fittings. Technical data as supplied by Eagle-Pitcher.

SPECIFICATION COMPLIANCE:

ASTM Specifications	MIL Specifications
ASTM E84	MIL-22344-B
ASTM C585	MIL-24244-B*
NRC Specifications	Federal Specifications
NRC 1.36*	HH-I-558B, Type III, Form E, Class 17

*Please contact ICA Headquarters before order placement, refernce compliance to NRC reg. guide 1.36 and MIL-24244B for special handling.

***NOTE* Consult ICA regarding further specification information.**

ALUMINUM ROLL JACKETING
(cladding)

DESCRIPTION

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

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

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

COMPOSITION

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

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

Composition Differences in Aluminum Alloys (%)

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

COMPLIANCE TO STANDARDS

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

RECOMMENDED USES

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

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

LIMITATIONS ON USE

Aluminum Jacketing is not appropriate for the following applications:

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

POLYFILM MOISTURE BARRIER

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

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

ALUMINUM ROLL JACKETING (cladding)

RECOMMENDED THICKNESS

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

EMITTANCE

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

- Bare aluminum (oxidized in service) = 0.1

SURFACE FINISHES

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

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

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

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

FLAMMABILITY

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

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

(Tested with exterior metal surface exposed to the flame)

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

ALUMINUM ELBOW COVERS

DESCRIPTION

ITW Insulation Systems Aluminum Elbow Covers are made in two precision formed matching halves to cover and weatherproof insulated 45° and 90° pipe elbows. These elbow covers are also known under the ITW Pabco and Childers brand names as Sure-Fit and Ell-Jacs, respectively.

Like ITW Aluminum Jacketing, Aluminum Elbow Covers are a premier protective outer surface for mechanical insulation systems on pipe and are an excellent performing and critical accessory to compliment the aluminum jacketing. ITW Aluminum Elbow Covers protect the insulation and underlying pipe/tank from physical damage, UV exposure, corrosive atmospheres, and water and reduce the labor necessary to install the metal jacketing system.

The ITW standard Aluminum Elbow Covers have a gold colored acrylic or polyester painted moisture barrier on the interior surface to help reduce interior surface corrosion. They also have a factory applied and baked on finish of highly durable hard film clear acrylic or polyester paint on the exterior surface to help resist external corrosion and to raise the emittance.

The special paints used on the interior and exterior of ITW Aluminum Elbow Covers are chalk and fade resistant. They exhibit better resistance to oxidation and to the effects of various corrosive environments than bare aluminum jacketing. This painted surface also resists water and fingerprint staining.

COMPOSITION

ITW Aluminum Elbow Covers are made from the commercially pure (>99% aluminum) and highly corrosion resistant 1100 aluminum alloy.

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

Composition of Aluminum 1100 Alloy (max %)

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

SIZE SELECTION AND INSTALLATION

For details on ITW Aluminum Elbow Cover sizes, their fit on insulation, and installation, see the ITW data sheet on Aluminum Elbow Sizes and Installation.

FIT

ITW Aluminum Elbow Covers are available to fit:

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

*ITW Aluminum Elbow Covers are available for some insulation thicknesses at NPS > 12". Not all combinations of NPS, insulation thickness, radius, and elbow angle are available. See your ITW sales representative for details.

THICKNESS

ITW Aluminum Elbow Covers are 0.024" in thickness to allow the elbows to be formed in the press.

RECOMMENDED USES

ITW Aluminum Elbow Covers are recommended for use anywhere aluminum jacketing is used on the associated straight sections of pipe.

ALUMINUM ELBOW COVERS

LIMITATIONS ON USE

ITW Aluminum Elbow Covers are not appropriate for the following applications:

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

MOISTURE BARRIER

ITW Aluminum Elbow Covers have a painted moisture barrier on the interior surface. When coupled with the ultrapure 1100 alloy used in these elbows, this moisture barrier helps to prevent pitting/crevice and galvanic corrosion of the interior surface of the elbow cover and the underlying pipe.

EMITTANCE OF ALUMINUM ELBOWS

ITW Aluminum Elbow Covers have an outer surface emittance as measured by ASTM C1371 and specified by ASTM C1729 of:

- Standard clear coated = 0.5
- White painted = 0.8
- Bare aluminum (oxidized in service) for comparison = 0.1

FLAMMABILITY

ITW Aluminum Jacketing with a 3 mil polysurlyn moisture barrier has been tested for flammability using the industry standard ASTM E84 test method. The results are shown below. ITW would expect Aluminum Elbow Covers to have flammability performance as good as or better than our aluminum jacketing since the elbows have no organic film present.

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

(Tested with exterior metal surface exposed to the flame)

SURFACE FINISHES

Due to the pressing process during elbow formation, ITW Aluminum Elbow Covers have a smooth (mill) finish.

COMPLIANCE TO STANDARDS

All Aluminum Elbow Covers from ITW Insulation Systems comply with the applicable requirements of ASTM C1729 (Aluminum Jacketing Material Standard), Type III, Grade 3, Class D, which includes the strength and chemical composition requirements for compliance to ASTM B209 (Aluminum Alloy Standard).

EXTERIOR COLORS

The standard exterior color for ITW Aluminum Elbow Covers is a clear paint which reveals the natural aluminum color. ITW Aluminum Elbow Covers are also available via special order with a white or gray painted exterior surface to match the colors of our standard painted aluminum jacketing or other colors.

SEALING OF JOINTS

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

RAMCO **THERMOKOTE**

HIGH TEMPERATURE INSULATING CEMENT

THERMOKOTE* 1

"1-FW" FAST SETTING "WHITE" ONE COAT CEMENT

"1-GP" NORMAL SETTING ONE COAT CEMENT

"1-MWP" NORMAL SETTING ONE COAT FLATWORK CEMENT

"1-GPFF" NORMAL SETTING "WHITE" ONE COAT CEMENT

"1-V" NORMAL SETTING ONE COAT FINISH CEMENT

THERMOKOTE "1-FW" is fast-setting, white one coat cement which should always be mixed in quantities that can be used within one hour, preferably in a "mudbucket" - DO NOT USE EXCESSIVE WATER. This cement is specially designed for application over small, curved and irregular insulated or metal surfaces.

THERMOKOTE "1-GP" is a normal-setting one coat cement designed for mixing in a mortar-box on large installations when servicing a crew of workmen. This cement will take its initial set in from 2½-3½ hours. Retempering or the use of excessive water will result in cracking.

THERMOKOTE "1-MWP"is a normal-setting one coat cement designed for use on large flat or curved insulated or metal surfaces. It is ideal for use in patching or filling of voids in insulated or refractory surfaces. When the temperature of the equipment will change during the operating cycle, on large surfaces, provision should be made for the expansion and contraction of the surface to which it is applied. It is also recommended that on large flat or curved surfaces, the cement be reinforced internally with 1" mesh galvanized, stainless steel or monel hexagonal wire mesh or with expanded metal lath tightly stretched and laced into place.

THERMOKOTE "1-GPFF" is a normal-setting "white" one coat cement similar to GP but dries to a lighter color finish.

THERMOKOTE "1-V" is a normal-setting one coat cement specially designed for pointing and skim or finish coating over insulated surfaces or can be applied directly to the metal surfaces of the equipment. It has exceptionally good adhesive qualities and can be palmed or troweled to a feather edge.

The shrinkage of these cements are negligible, either volumetric or linear, but will vary depending upon the rate of drying. After having firmly set, they will not soften when exposed to light rain or unusual atmospheric conditions, and the finished surface can be readily canvassed, painted or weatherproofed.

DOES NOT CONTAIN ASBESTOS FIBERS

WARNING: DUST PARTICLES OF THIS CEMENT IN DRY FORM MAY BE HARMFUL TO YOUR HEALTH - WE RECOMMEND THE USE OF DUST RESPIRATORS.

RAMCO
SUPERTEMP 1900
PKI SUPER STIK

A high temperature product composed of mineral fiber, binders, and corrosion inhibiting agents. Blended to give maximum coverage with minimal shrinkage. Excellent adhesion leads to ease of application.

Supertemp 1900 and SUPER STIK are highly efficient, durable, all purpose, high temperature insulating cements for temperatures up to 1900°F. These cements are formulated from mineral wool fibers prepared by a proprietary process into a resilient pellet and blended with high temperature inorganic refractory minerals.

	SPECIFICATIONS
ASTM	C-195-64
FEDERAL	SS-C-160 Type III, GRADE U
MILITARY	MIL-C-2861 C MIL-I-24244*
COMM. STD.	CS-117-49

"K" FACTOR

MEAN TEMP.	**"K"**
200°F	0.51
400°F	0.64
600°F	0.78
800°F	0.99

*requires certification and chemical analysis

PHYSICAL AND MECHANICAL CHARACTERISTICS

Service Temperature	Up to 1900°F
Coverage (Dry)	Approx. 40 bd. ft/100 lbs.
Density (Installed	27 lbs. per cu. ft.
Volumetric Shrinkage (Wet to Dry)	Less than 25%
Water/Cement Ratio (By Weight)	1½ / 1 (9 to 10 gal./50 lb.)
Compressive strength (At 10% Deformation)	10 psi
Corrosion (Steel)	None - Rust Inhibited
Fire Resistance	Non-combustible
Fire Hazzard Classifications do not exceed:	
Flame Spread	25
Fuel Contributed	50
Smoke Developed	50

Tested in accordance with ASTM E-84

Packaging - Multi-wall paper bags	45 lbs.

DOES NOT CONTAIN ASBESTOS FIBERS

WARNING: DUST PARTICLES OF THIS CEMENT IN DRY FORM MAY BE HARMFUL TO YOUR HEALTH - WE RECOMMEND THE USE OF DUST RESPIRATORS.

FyreWrap® Elite™ 1.5 Duct Insulation – Grease Duct Single-Layer System

Introduction

Unifrax's FyreWrap® Elite™ 1.5 Duct Insulation is a single-layer flexible enclosure for 1- and 2-hour fire-rated commercial kitchen grease ducts and hazardous exhaust ducts including chemical fume ducts. This slim, compact design offers the lightest system available and results in significant weight, space and labor savings when compared to traditional fire-rated shafts or competitive wrap systems. The system was tested per UL 1978 and complies with pre-2006 editions of the International Mechanical Code (IMC). FyreWrap Elite 1.5 provides the following features:

- Zero clearance to combustibles at all locations on wrap
- 1- and 2-hour fire endurance rating
- Alternate to fire-rated shaft enclosure
- Saves weight, space, labor
- Thinnest, lightest system available
- High-temperature, biosoluble insulation
- GREENGUARD listed for Microbial Resistance

Product Components

Core Material: FyreWrap Elite 1.5 incorporates Insulfrax® Thermal Insulation as its core material. Insulfrax is a high-temperature insulation made from a calcia, magnesia, silica chemistry designed to enhance biosolubility. It provides excellent insulation in a noncombustible blanket product form.

Encapsulating Material: The core insulation blanket is completely encapsulated in an aluminum foil fiberglass reinforced scrim covering. This scrim provides additional handling strength as well as protection from grease and moisture absorption and tearing.

FyreWrap® Elite™ 1.5 Duct Insulation

Typical Product Parameters

Thickness	1.5"
Nominal Density	6pcf
Standard Product Form	Scrim Encapsulated
Product Availability	24"w x 25LF
	48"w x 25LF

Complies with: NFPA® 96 2001 Edition

Typical System Properties

Intertek Laboratories (OPL) Listed	File 14870, Design Nos. UNI/FRD 120-09, UNI/FRD 120-10, UNI/FRD 120-16, UNI/FRD 120-11, Large Duct Size: 52" x 52" (UL1978), 70" x 70" (ASTM E-814)	
California State Fire Marshal Listing	No: 2440-1478:100	
UL 1978 Internal Grease Duct Test (June 2002)	Zero Clearance to Combustibles at All Locations on Wrap	
ASTM E-119 Full Scale Engulfment Test	2-hour Fire Endurance Rating	
ASTM E-814 Through-Penetration Firestop Test	F-Rating = 2 hrs.; T-Rating = 2 hrs	
ASTM E-84/UL 723	Unfaced Blanket	Encapsulated
Flame Spread Rating:	Zero	<25
Smoke Developed Rating:	Zero	<50
ASTM E-136 Non-combustibility Test	Passes	
ASTM C-518 Durability Test	Passes	
ASTM C-518 Thermal Resistance	R value = 6.19 (4.13 per inch)	
ASTM D-6329-03 Microbial Resistance	Resistant to Mold Growth	
ASTM C-411 Hot Surface Performance	Passes	

Omega Point Laboratories Listed

Complies with : NFPA 96 (up through 2001 Edition), 90A, 90B, 101; 2000 and 2003 International Mechanical Code (IMC), 2000 and 2003 International Building Codes (IBC), BOCA National Building Code/1999, 1999 Standard Building Code, 1997 Standard Mechanical Code, and 1997 Uniform Building Code (UBC).

IFC Member International Firestop Council

Installation

The FyreWrap Elite 1.5 Duct Insulation consists of a single-layer system applied directly on to the duct surface. Only encapsulated blanket should be utilized to ensure the outer surface of the insulation is protected. The insulation system may be installed at zero clearance to combustibles at all locations on the wrap, at material overlaps, and in the field between overlaps. Install insulation with a 3" minimum overlap on all joints. Seal all cut edges with aluminum foil tape. The transverse overlap of adjacent blanket may be installed using the following three techniques. See Figure 1 for details.

Telescoping Overlap Wrap Technique:

This wrap technique is the most common method of installing FyreWrap Elite 1.5 where each adjacent blanket has one edge exposed and one edge covered by the next blanket.

Checkerboard Overlap Wrap Technique:

This installation uses a 3" overlap pattern with both edges of each alternating blanket covered by each adjacent blanket whose edges are exposed. The overlap joints in alternate layers of blanket resemble a checkerboard pattern in the completed installation. This technique is often utilized when a small section of duct wrap must be repaired.

Butt Splice with Collar Wrap Technique:

This wrap technique permits installation with the blanket edges butted together and a 6" wide collar of blanket that is centered over the butt splice, overlapping each adjacent blanket 3". The collar can be field fabricated from FyreWrap Elite 1.5 rolls or purchased separately.

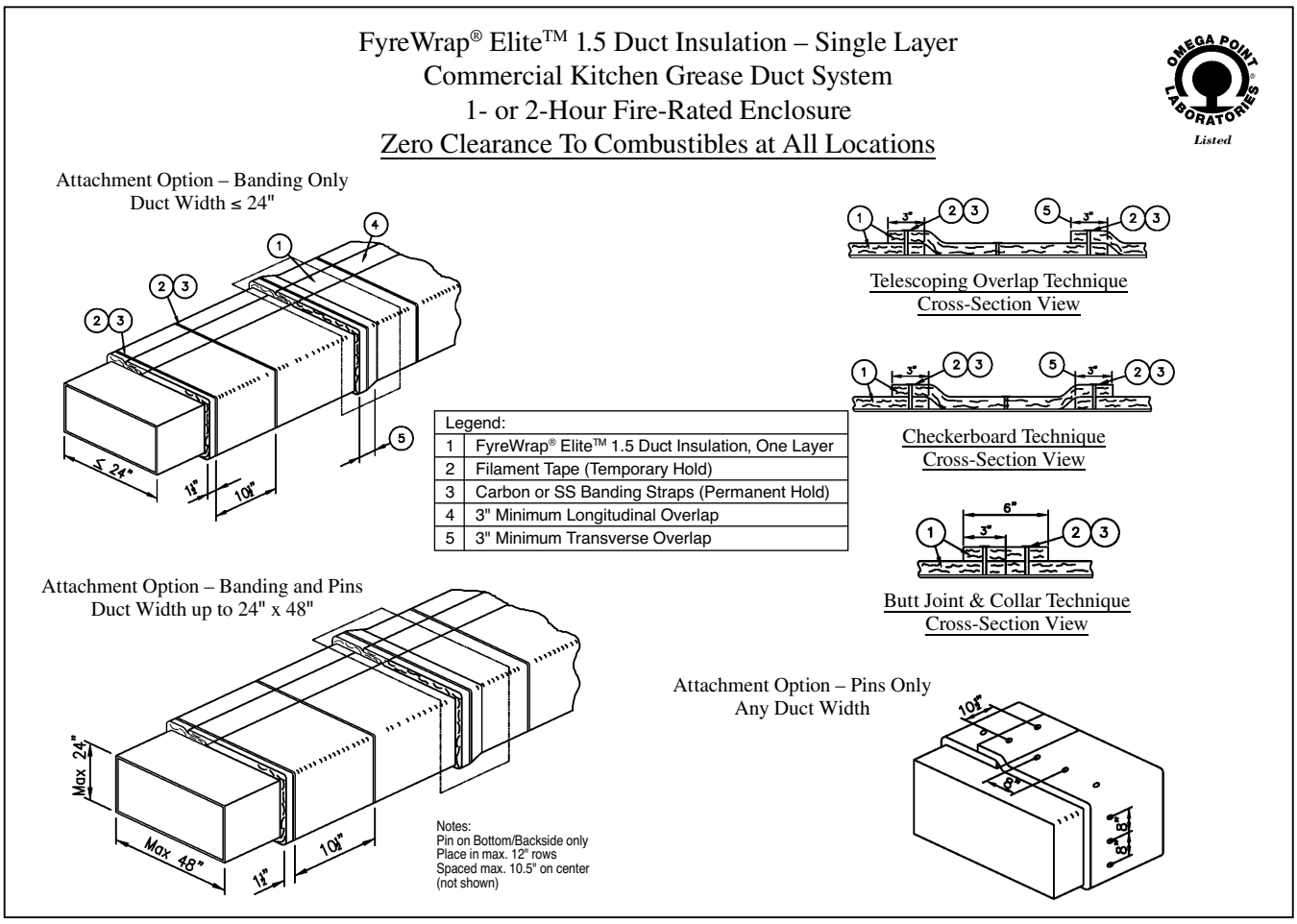


Figure 1. FyreWrap Elite™ 1.5 Single-Layer Installation Techniques

Form C-1494
Effective 11/08

Fiberfrax® Blanket and Mat Products

Introduction

The Fiberfrax® blanket and mat product family is a group of lightweight, thermally efficient ceramic fiber insulating materials that combine the advantages of dimensional stability at high temperatures with complete resistance to thermal shock. Featuring a broad range of thermal capabilities and physical characteristics, this product family provides proven and effective solutions to a variety of heat processing applications.

Durablanket® ceramic fiber products are high strength, needled insulating blankets that are made from spun Fiberfrax ceramic fibers. The extra-long spun fibers, cross-locked through a unique forming process, produce a blanket with exceptional handling strength. The Durablanket product family is completely inorganic and available in a variety of temperature grades, densities, and sizes.

Fibermat® Mat, PH blanket, and Moist Pak-D® insulation provide additional options for specific application requirements ranging from high-temperature filtration to hot gas velocity resistance.

Fibermax® Mat is a high-temperature, flexible mat product entirely composed of Fibermax polycrystalline mullite fibers, making it an extremely lightweight, highly resilient insulator that is virtually free of unfiberized ("shot") particles.

Having excellent chemical stability, Fiberfrax blanket and mat products are unaffected by most chemicals except hydrofluoric and phosphoric acids and concentrated alkalies. If wet by water or steam, thermal and physical properties remain unaffected after drying.

Durablanket® S

Fiberfrax Durablanket S insulation is a strong, lightweight, flexible needled blanket that is made from spun ceramic fibers. Available in a wide variety of thicknesses, widths and densities, Durablanket S insulation provides an array of proven solutions for a broad spectrum of application problems.

Durablanket® HP-S

Fiberfrax Durablanket HP-S insulation is a needled blanket made from spun Fiberfrax ceramic fibers. Durablanket HP-S insulation combines all of the physical characteristics offered by Durablanket S insulation in a product with a high-purity chemistry. The chemistry of Durablanket HP-S provides improved performance and service life in applications where fluxing or chemical attack occurs.

Durablanket® 2600

Fiberfrax Durablanket 2600 insulation extends the high-temperature performance of the Durablanket product line. The product is made from high-purity alumina, zirconia, and silica spun ceramic fibers. This chemical composition, manufactured in a unique fiber-making process, imparts Durablanket 2600 insulation with extremely low shrinkage characteristics at elevated temperatures.

Refer to the product Material Safety Data Sheet (MSDS) for recommended work practices and other product safety information.

FyreWrap® 0.5 Plenum Insulation

FyreWrap 0.5 Plenum Insulation

Introduction

Unifrax's FyreWrap® 0.5 Plenum Insulation is a high-temperature insulation blanket specifically designed to provide a single layer, flexible enclosure around combustible items located within fire-rated return air plenums. New construction, building renovations or modifications to the electrical and mechanical systems may result in the installation of plastic pipe or plastic-coated cables that cannot meet the minimum combustibility requirements defined in the Mechanical Code. FyreWrap 0.5 Plenum Insulation provides fire protection for these installed items by preventing flame propagation and smoke development in the plenum area. FyreWrap 0.5 Plenum Insulation offers the following product features:

- Lightweight, flexible product form
- Scrim encapsulated
- Easy to cut, fabricate, wrap around pipes or cables
- Thin, single layer design
- High-temperature, biosoluble fiber

Product Components

Core Material: FyreWrap 0.5 Plenum Insulation incorporates Insulfrax® Thermal Insulation as its core material. Insulfrax is a high-temperature insulation made from a calcia, magnesia, silica chemistry designed to enhance biosolubility. It provides excellent insulation in a noncombustible blanket product form.

Encapsulating Material: The core insulation blanket is completely encapsulated in an aluminum foil, fiberglass reinforced scrim covering. This scrim provides additional handling strength as well as protection from moisture absorption and tearing.

Typical System Properties

Intertek Laboratories (OPL) Listed	Applied Fire Protection, File 16341-3	
UL 1887 – modified results	Passes; OPL Design No. PP102, PP103	
Plastic Pipe and Cable Sheathing	PVC, CPVC, PB, PE, PP, PVDF and ABS	
Plastic Pipe Size (minimum)	1" or larger individual pipes or pipe bundles	
Plastic Coated Cable Groupings	3 or more multi-stranded telecommunication wires, each containing a min. 26 strands, min. 24-gauge	
ASTM E-136 Non-combustibility	Passes	
ASTM E-84/UL 723 Surface Burning Characteristics	UL File No. R14514	
	Unfaced Blanket	Encapsulated
Flame Spread Rating:	Zero	<25
Smoke Developed Rating:	Zero	<50

Omega Point Laboratories Listed

IFC Member International FireStop Council

Data are average results of tests conducted under standard procedures and are subject to variation. Results should not be used for specification purposes.

Refer to the product Material Safety Data Sheet (MSDS) No. M0200 for recommended work practices and other product safety information.

Typical Product Parameters

Thickness	½"
Density	8pcf
Covering	Scrim Encapsulated
Product Availability	24"w x 25LF
	48"w x 25LF

Installation

FyreWrap 0.5 Plenum Insulation consists of a single layer system applied directly on to the surface of the combustible item. Cut the insulation to a length sufficient to wrap around the combustible item(s) plus provide a minimum 1" perimeter overlap. Seal all cut edges with aluminum foil tape to ensure there is no exposed fiber. Cut the adjacent piece of Plenum Insulation long enough to wrap around the circumference of the item plus a 1" perimeter overlap. This piece shall also be installed with a minimum 1" longitudinal overlap on to the previously installed piece.

To temporarily secure the Plenum Insulation, optional use of 1" wide filament tape is permitted. Space the tape within ½" of the blanket edge and approximately 11" on center. Stainless steel tie wire or banding should be utilized as a permanent attachment. Locate the wire or banding ½" from the blanket edge and on 11½" centers. Twist tension the wire or tighten banding to firmly hold the wrap system in place, but not so tight as to cut or damage the blanket. Hand tightening of wire is adequate.

Installation drawings are provided below for additional illustration.

Unifrax has a wide range of FyreWrap fire protection materials available to provide passive fire protection solutions in a variety of applications in the commercial building, industrial facility and transportation industries.

For additional information about product performance or for assistance identifying the recommended product for your fire protection application, please contact the Unifrax Application Engineering Group at 716-278-3888.

FyreWrap® 0.5 Plenum Insulation System

Figure 1: Single Plastic Pipe

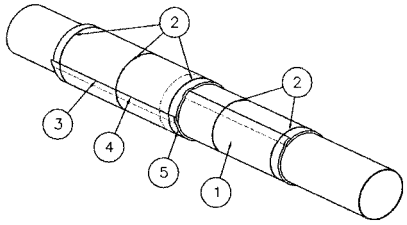


Figure 2: Plastic Pipe Bundle

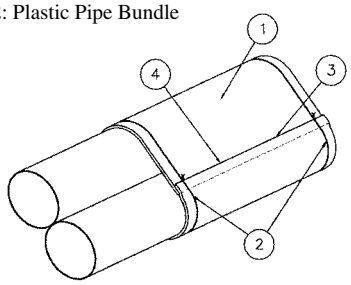


Figure 3: Plastic Pipe or Cable Bundle

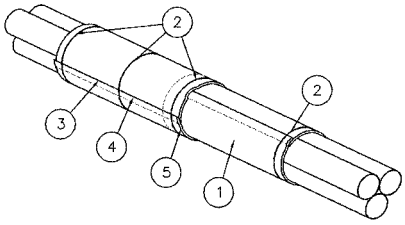
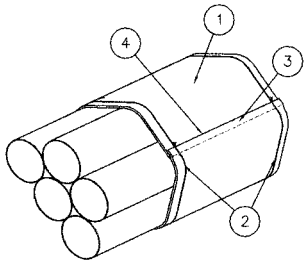


Figure 4: Plastic Pipe or Cable Bundle



Legend:	
1	FyreWrap® 0.5 Plenum Insulation, One Layer
2	SS Tie wire or banding
3	Aluminum foil tape to seal cut edges
4	Longitudinal overlap 1" min.
5	Perimeter overlap 1" min.

Note: Seal all cut edges with aluminum foil tape.

OMEGA POINT LABORATORIES
Listed

FyreWrap® DPS Insulation Dryer & Plenum Systems

FyreWrap® DPS Insulation – Dryer & Plenum Systems

Introduction

Unifrax's FyreWrap® DPS Insulation is a high-temperature insulation blanket specifically designed, UL tested and certified to provide a single layer, one-hour rated flexible enclosure around dryer and residential kitchen exhaust ductwork. The product also provides code compliant fire protection for combustible items, such as plastic pipes by preventing flame propagation and smoke development in the plenum area.

Dryer Exhaust Applications

FyreWrap DPS is a new and innovative product that provides a safe and cost-effective means to achieve a one-hour fire resistance rated zero clearance enclosure for routing dryer ductwork, from start to finish, through rated wood truss/joist construction as prescribed by the International Building and Mechanical Codes.

Plenum Applications

New construction, building renovations or modifications to the electrical and mechanical systems may result in the installation of plastic pipe or plastic-coated cables that cannot meet the minimum combustibility requirements defined in the Mechanical Code. FyreWrap DPS provides protection to these items by acting as a tested non-combustible enclosure.

FyreWrap DPS Insulation offers the following product features:

- Lightweight, flexible product form
- Scrim encapsulated
- Easy to cut, fabricate, wrap around ducts, pipes or cables
- Thin, single-layer design
- High-temperature, low biopersistance fiber

Product Components

Core Material: FyreWrap DPS Insulation incorporates Insulfrax® Thermal Insulation as its core material. Insulfrax is a high-temperature insulation made from a calcia, magnesia, silica chemistry designed to enhance biosolubility. It provides excellent insulation in a noncombustible blanket product form.

Encapsulating Material: The core insulation blanket is completely encapsulated in an aluminum foil, fiberglass reinforced scrim covering. This scrim provides additional handling strength as well as protection from moisture absorption and tearing.

Typical System Properties

ISO 6944	UL Assembly No. V-32	
UL 1479 (ASTM E814), CAN/ULC S115	UL Assembly Nos. F-C-7057, F-C-7058	
Intertek Laboratories (OPL) Listed	Applied Fire Protection, File 16341-3	
UL 1887 – modified results	Passes; Intertek Design Nos. UNI/BI 20-01, 20-02	
Plastic Pipe and Cable Sheathing	PVC, CPVC, PB, PE, PP, PVDF and ABS	
Plastic Pipe Size (minimum)	1" or larger individual pipes or pipe bundles	
Plastic Coated Cable Groupings	3 or more multi-stranded telecommunication wires	
ASTM E136 Noncombustibility Test	Passes	
ASTM E84, UL 723, ULC S102.2	UL File No. R14514	
	Unfaced Blanket	Encapsulated
Flame Spread Rating:	Zero	<25
Smoke Developed Rating:	Zero	<50

Data are average results of tests conducted under standard procedures and are subject to variation. Results should not be used for specification purposes.

Refer to the product Safety Data Sheet (SDS) No. M0456 for recommended work practices and other product safety information.

Typical Product Parameters

Thickness	½"
Density	8pcf
Covering	Scrim Encapsulated
Product Availability	16"w x 25LF
	48"w x 25LF

Installation

FyreWrap DPS Insulation consists of a single-layer system applied directly on to the surface of the duct or combustible item.

Dryer Applications

Install the insulation around the duct to provide a 1" longitudinal compression joint or overlap. Adjacent pieces of insulation should be installed with a 1" perimeter compression joint or material overlap. The 16" width DPS product facilitates linear installation around 4" diameter dryer ductwork without material cutting or scrap. To temporarily secure the insulation, optional use of foil tape is permitted. Seal all cut edges with aluminum foil tape to ensure there is no exposed fiber. 18 gauge steel tie wire should be utilized for permanent attachment. Locate the wire ½" from the blanket edge and on maximum 12" centers. Twist tension the wire to firmly hold the wrap system in place, but not so tight as to cut or damage the blanket. Installation details are provided below for additional illustration.

Plenum Applications

For plastic items, cut the insulation to a length sufficient to wrap around the combustible item(s) plus provide a minimum 1" perimeter overlap. Seal all cut edges with aluminum foil tape to ensure there is no exposed fiber. The adjacent piece of insulation should be long enough to wrap around the circumference of the item plus a 1" perimeter overlap. This piece shall also be installed with a minimum 1" longitudinal overlap on to the previously installed piece.

To temporarily secure the insulation, optional use of foil tape is permitted. 24 gauge steel tie wire or ½" steel banding should be utilized as a permanent attachment. Locate the wire or banding ½" from the blanket edge and on 11½" centers. Twist tension the wire or tighten banding to firmly hold the wrap system in place, but not so tight as to cut or damage the blanket. Hand tightening of wire is adequate.

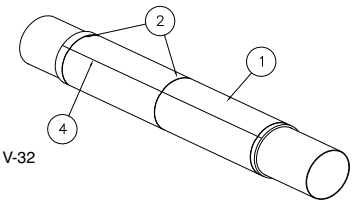
Unifrax has a wide range of FyreWrap fire protection materials available to provide passive fire protection solutions in a variety of applications in the commercial building, industrial facility and transportation industries.

For additional information about product performance or for assistance identifying the recommended product for your fire protection application, please contact Unifrax at 716-768-6500 and ask for Fire Protection Application Engineering.

FP-837

FyreWrap® DPS – Dryer & Plenum Systems

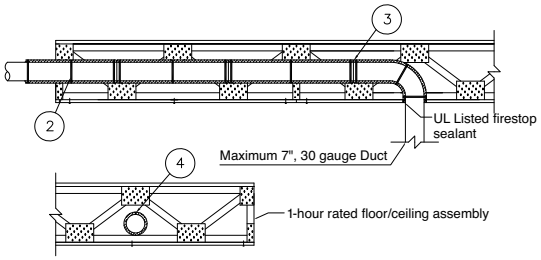
Figure 1: 4" Dryer Duct



UL Assembly No. V-32

NOTE: Minimum 1" compression butt joints or overlaps for material joints.

Figure 2: Tested Membrane Penetration Assembly



NOTE: Seal all cut edges with aluminum foil tape.

UL Assembly Nos. F-C-7057, F-C-7058

Legend:	
1	FyreWrap® DPS Insulation, One Layer
2	18 Gauge Steel Tie Wire or Banding, 12" on center
2a	24 Gauge Steel Tie Wire or Banding, 11.5" on center
3	Perimeter 1" Compression Butt Joint
3a	Perimeter Overlap 1" Min.
4	Longitudinal 1" Compression Butt Joint
4a	Longitudinal Overlap 1" Min.

Figure 3: Single Plastic Pipe/Cable Item

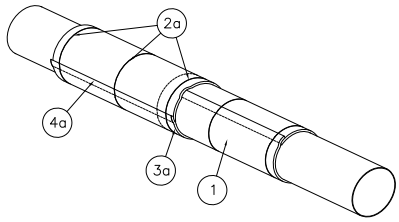
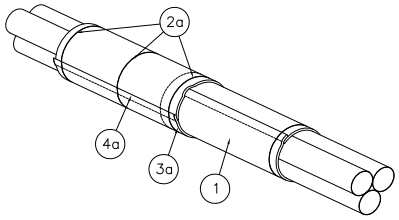


Figure 4: Plastic Pipe/Cable Bundle



Intertek Design Listing Nos. UNI/BI 20-01, 20-02

FyreWrap

Form C-1535
Effective 12/13

Johns Manville
Industrial Insulation Group

Super Firetemp® L
High-Temperature Insulation

PRODUCT DATA SHEET

Super Firetemp L

Super Firetemp L is an inorganic, non-combustible, high-temperature insulation for use in fire protection systems. It can be used in systems operating up to 1800°F (982°C). Composed primarily of lime, silica, and reinforcing fibers. This product is white, essentially dust-free, contains no asbestos, mercury or lead, and meets or exceeds ASTM C 656, Type II Grade 5.

THE ADVANTAGES

- Assured Fire Resistance
- Durable
- Economical

APPLICATIONS

Super Firetemp L has high strength as well as exceptional insulation qualities. It can be readily machined into component parts of many sizes and shapes. Uses include fire-rated enclosures around structural steel, tanks, equipment, fire-rated walls, high temperature ovens and refractory backup.

AVAILABLE FORMS AND SIZES

Thickness ¾", 1", 1½", 2", 2½", 3" (19, 25, 38, 51, 64, 76 mm)
Sheet Size ..... 4' x 4' (1.22m x 1.22m)
..... 4' x 8' (1.22m x 1.22m)

Super Firetemp L is available with a sanded finish on one or both sides. The sanded surfaces are smooth and easy to machine.

DIMENSION TOLERANCES

Length and Width.....+/- 1/8" (3.2 mm)
Thickness.....+/- 1/8" (3.2 mm) Sanded One Side
..... +/- 1/16" (1.6 mm) Sanded Two Sides

LINEAR SHRINKAGE AFTER 24 HOURS AT TEMPERATURE, %

Temperature °F (°C)	Length	Width	Thickness	Weight Loss
1700°F (927°C)	1%	1%	2.1%	10%

THERMAL CONDUCTIVITY

Mean Temperature		"k"	
°F	°C	Btu • in/(hr • ft² • °F)	W/m • °K
200	93	0.54	0.078
400	204	0.61	0.088
600	315	0.67	0.097
800	427	0.73	0.105

ADDITIONAL INFORMATION AND SDS

SUPER FIRETEMP L®
OPERATING TEMPERATURE LIMIT: 1800°F (982°C)

SPECIFICATION COMPLIANCE

ASTM C656	Type II, Grade 5
ASTM C795 Corrosion	Passes
ASTM E72	Passes
ASTM E84 Surface Burning Characteristics	Flame Spread -0 Smoke Developed -0
ASTM E119 Building Fire Test	1,2,3,4 Hours
ASTM E136 Non Combustibility	Passes
ASTM E814	2 hours
UL 263	1,2,3,4 Hours
UL 1479	3 Hours
UL 1709	1,2,3,4 Hours
NFPA 251	1,2,3,4 Hours
Underwriters Laboratories, Inc. Design Numbers	U328, U446, X307, XR301
Underwriters Laboratories Canada Design Numbers	W420, W421, W422, Z200, Z202
Intertek Testing Design Numbers	GD 515 R, NBW 335, FS 586 W, FS 551 F, FS 555 F, FS 544 F
R-Value @ 75°F	2.0 per inch
Density (Avg.)	20 pcf (288 kg/m³)
Maximum Recommended Continuous Service Temp.	1800°F (982°C)
Flexural Strength (Avg.)	260 psi (1793 kPa)
Compressive Strength @10% deformation (Avg.)	450 psi (3103 kPa)
Moisture Content, Normal % of Dry Weight (Avg.)	4%

IND-103 01-15 (Replaces IIG-103 08-12)

Johns Manville
Industrial Insulation Group

Super Firetemp® M
High-Temperature Insulation

PRODUCT DATA SHEET

Super Firetemp M

Super Firetemp M is an inorganic, non-combustible, high-temperature insulation for use in fire protection systems. It can be used in systems operating up to 1800°F (982°C). Composed primarily of lime, silica and reinforcing fibers. This product is white, essentially dust-free, contains no asbestos, mercury or lead, and meets or exceeds ASTM C656, Type II Grade 6.

THE ADVANTAGES

- Assured Fire Resistance
- Durable
- Economical

APPLICATIONS

Since Super Firetemp M possesses both exceptional strength and insulation qualities, it can be readily machined into component parts of many sizes and shapes. Uses include fire-rated enclosures around structural steel, fire-rated walls, pipe supports, high temperature oven and refractory backup.

AVAILABLE FORMS AND SIZES

Thickness ½", ¾", 1", 1½", 2", 2½", 3" (13,19, 25, 38, 51, 64, 76 mm)
Sheet Size ..... 4' x 8' (1.22m x 2.44m)

Super Firetemp M is available with a sanded finish on one or both sides. The sanded surfaces are smooth and easy to machine.

DIMENSION TOLERANCES

Length and Width ..... +/- 1/8" (3.2 mm)
Thickness ..... +/- 1/8" (3.2 mm) Sanded One Side
..... +/- 1/16" (1.6 mm) Sanded Two Sides

LINEAR SHRINKAGE AFTER 24 HOURS AT TEMPERATURE, %

Temperature °F (°C)	Length	Width	Thickness	Weight Loss
1700°F (927°C)	0.9%	0.9%	2.3%	9.7%

THERMAL CONDUCTIVITY

Mean Temperature		"k"	
°F	°C	Btu • in/(hr • ft² • °F)	W/m • °K
200	93	0.61	0.088
400	204	0.66	0.095
600	316	0.73	0.105
800	427	0.80	0.115

ADDITIONAL INFORMATION AND SDS

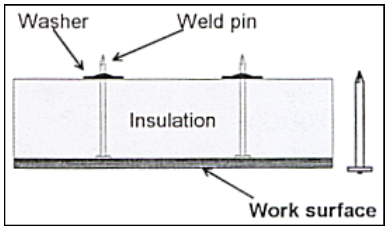
SUPER FIRETEMP M®
OPERATING TEMPERATURE LIMIT: 1800°F (982°C)

SPECIFICATION COMPLIANCE

ASTM C656	Type II, Grade 6
ASTM C795 Corrosion: Austenitic Stainless Steel	Passes
ASTM E72	Passes
ASTM E84 Surface Burning Characteristics	Flame Spread -0 Smoke Developed -0
ASTM E119 Building Fire Test	1,2,3,4 Hours
ASTM E136 Non-Combustible	Passes
ASTM E814	Passes
UL 263	1,2,3,4 Hours
UL 1479	3 Hours
UL 1709	1,2,3,4 Hours
NFPA 251	1,2,3,4 Hours
Underwriters Laboratories, Inc. Design Numbers	U328, U446, U447, X307, XR301
Underwriters Laboratories Canada Design Numbers	W420, W421, W422, Z200, Z202
UBC Minimum Thickness	
R-Value @ 75°F	1.7 per inch of thickness
Density (Avg.)	28 pcf (449 kg/m³)
Maximum Recommended Continuous Service Temp.	1800°F (982°C)
Flexural Strength (Avg.)	550 psi (3792 kPa)
Compressive Strength @10% deformation (Avg.)	900 psi (6206 kPa)
Moisture Content, Normal % of Dry Weight (Avg.)	4%

IND-104 01-15 (Replaces IIG-104 08-12)

Typical applications for GEMCO fasteners

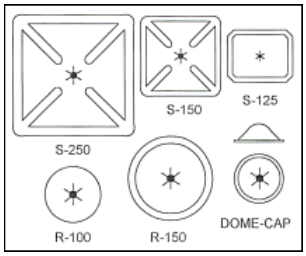


Insulation can also be held with perforated base hangers (use with TUFF-BOND Adhesive) ...

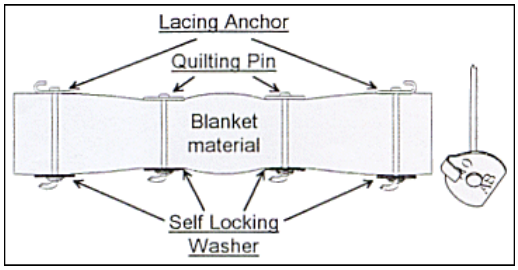
... or with self-adhering Peel & Press hangers.

Nylon hangers are used for cold storage insulation.

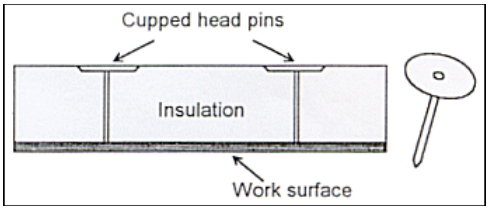
"Power-Point" pins are used on material that has rust or scale.



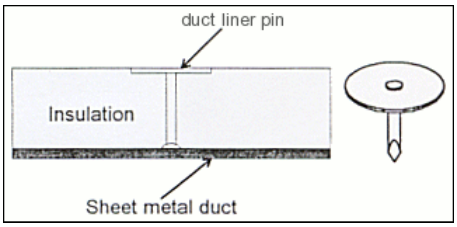
GEMCO washers (speed-clips) for all applications.



GEMCO lacing anchors and quilting pins are used in the manufacture of removeable blanket insulation.



GEMCO cupped head pins are welded directly through insulation.



GEMCO duct liner pins are used in the HVAC industry.

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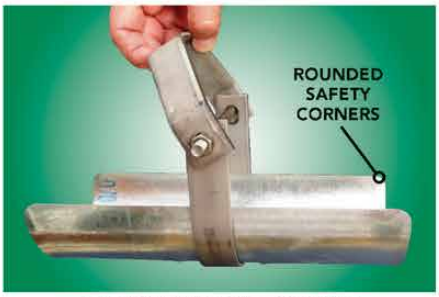

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Insulation Pro Utility Knife & Boning Knife
Leather Sheath for Insulation Knife

Pipe Sizing Caliper Tool

Industrial M/W Packing Wool (36# bag)

National Commercial & Industrial Insulation Standards Manual

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