



Data Sheet

CI-PE-DS

06-17

# Earthwool® 1000° Pipe Insulation

*with ECOSE® Technology*

Knauf Insulation Earthwool 1000° pipe insulation is a molded, one-piece insulation made from inorganic glass mineral wool 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.

with **ECOSE®**  
TECHNOLOGY



# Earthwool® 1000° Pipe Insulation with ECOSE® Technology

## EARTHWOOL INSULATION

Earthwool insulation 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 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

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.

## PRODUCT FEATURES

### Energy Conservation

- Offers excellent resistance to heat loss or gain, which saves energy and lowers operating costs

### 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.

## 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.
- The SSL+ Advanced Closure System creates a strong and lasting bond.

## SUSTAINABILITY

Knauf Insulation's products used for thermal insulating purposes recover the energy that it took to make them in just hours or 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:

- Recycled glass content, verified every six months by UL Environment
- Sand, one of the world's most abundant resources
- Our green chemistry initiative ECOSE Technology, which is validated to be formaldehyde-free

## SPECIFICATION COMPLIANCE

### In U.S.

- ASTM C547; Type I, Type IV
- ASTM C585
- ASTM C1136 (jackets); Type I, II, III, IV, VIII
- HH-I-558C; Form D, Type III, Class 12; Class 13 (to 1000° F, 538° C)
- NFPA 90A and 90B
- MIL-I-2234D (except pH requirements)

- Conforms to Marine Equipment European 1408/13
- USCG 164.109/4/1

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

### In Canada

- CAN/ULC S102
- CGSB 51-GP-9M
- CGSB 51-GP-52M (jacket)

## INDOOR AIR QUALITY

- UL Environment
  - GREENGUARD Certified
  - GREENGUARD GOLD certified
  - Validated to be formaldehyde-free
  - UL/ULC Classified
- Product complies with Oregon Revised Statute 453.085 and contains less than 0.10% decabromodiphenyl ether (DecaBDE) by mass
- Tested and certified to meet all the requirements of EUCEB
- IgCC Section 806.6 compliant

## PRODUCT FORMS AND SIZES

### Produced in 3' (914 mm) sections

- For iron pipe from ½" to 24" nominal pipe size (15 mm to 610 mm)
- For copper tube from ⅝" to 6⅛" (16 mm to 156 mm)
- Wall thicknesses from ½" to 6" (13 mm to 152 mm) in single layer (for most sizes)
- All insulation inner and outer diameters comply with ASTM C585

### Packaging

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

## FACTS AT A GLANCE



SSL+ Advanced Closure System creates a strong and lasting bond.



Earthwool 1000° pipe offers an extended temperature range— for all applications from 0° F to 1000° F.



The Knauf Insulation rotary manufacturing process produces insulation with concentric inside diameters and consistent wall thicknesses.

## PRECAUTIONS

### Hot Pipe

- May be installed while the system is in operation, at all temperatures up to 1000° F (538° C).
- Knauf Insulation recommends, for insulation thicknesses greater than 6" (152 mm), the temperature must be increased from 500° F (260° C) to maximum temperature at a rate not exceeding 100° F (37.8° C) per hour.
- During initial heat-up to operating temperatures above 350° F (177° C), a slight odor and some smoke may be given off as a portion of the bonding material used in the insulation begins to undergo a controlled decomposition.
- If natural convection is not adequate in confined areas, forced ventilation should be provided in order to protect against any harmful fumes and vapors that might be generated.
- Care must also be taken when using sealants, solvents or flammable adhesive during installation.
- A maximum of 6" (152 mm) wall thickness is recommended.

### Cold Pipe

- Use a continuous vapor retarder on piping operating below ambient temperatures.
- Seal all joints, surfaces, seams and fittings to prevent condensation.
- On below freezing applications, and in high-abuse areas, the ASJ+ jacket shall be protected with a PVC vapor retarding outer jacket. In addition, exposed ends of insulation shall be sealed with vapor barrier mastic installed per the mastic manufacturer's instructions. Vapor seals at butt joints shall be applied at 12' to 21' intervals; at the Engineer's discretion and at each fitting to isolate any water incursion.
- On chilled water systems operating in high humidity conditions, it is recommended that the same guidelines be followed as listed above for below freezing applications.
- Exterior hanger supports are recommended.

### Outside Application

- Do not expose pipe insulation to weather. It must be covered with appropriate jacketing, mastic or vapor retardant coatings.
- All exposed surfaces must be protected. Proto® Indoor/Outdoor PVC Jacketing is recommended. See Knauf Insulation Guide Specifications for recommended PVC jacketing application guidelines.
- Apply jacketing, mastics or vapor retardant adhesives per manufacturer's instructions.
- For metallic jackets, factory-applied moisture retarders are recommended.

### ASJ+ SSL+

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

### Fittings and Hangers

- Use Proto 25/50 Rated (ASTM E84) PVC Fitting Covers, applying PVC fittings per Proto's Data Sheet.
- Fittings should be insulated to same thickness as the adjoining insulation.
- Apply fittings per manufacturer's instructions.
- When required by specification, a hard insert of sufficient length should be used to avoid compression of the insulation.

## ADDITIONAL PRECAUTIONS

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

## APPLICATION GUIDELINES

### Storage

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

### Preparation

- Apply only on clean, dry surfaces
- Pipe or vessel should be tested and released before insulation is applied.

### General Guidelines

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

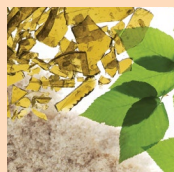
### Insulation Limited Warranty

- Where painting is necessary use common water, oil, or solvent-based paints. All paints should be tested for compatibility and adhesion before use.
- All piping should have continuous insulation.
  - Position longitudinal lap downward to avoid dirt and moisture infiltration.
  - Do not expose pipe insulation to excessive vibration or physical abuse.

## FACTS AT A GLANCE



Knauf Insulation's "wind-up" forming mandrel process prevents gaps and inconsistent densities, while making it easy to cleanly notch out sections.



ECOSE® Technology bio-based binder eliminates non-renewable petroleum-based ingredients. No formaldehyde, no phenol, no acrylics.



ASJ+ is cleanable with a wet cloth and soapy water.

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

**SSL+ Installation Instructions:**

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

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

**Butt Strip Installation Instructions:**

- To install Butt Strips, remove the kraft release liner by separating the butt strip from the kraft using the convenient, easy release kiss cut.
- Simply wrap the butt strip, centered around the joint, and apply firm pressure with a squeegee.

**NOTE:** After initial Butt Strip adhesive tack, it is critical that the closure is not re-opened and repositioned on the facing. Doing so will weaken the adhesive and diminish bond strength.

**Recommended Thicknesses (ASHRAE 90.1-2013)**

The minimum thicknesses are based on ASHRAE 90.1-2013 standards and do not necessarily represent the Economic Thickness of Insulation or the thickness required for proper condensation control. Rather, they serve as minimum recommendations for commercial applications. For recommended Economic Thickness, install according to Knauf Insulation or NAIMA 3E Plus programs or as specified.

**GLASS MINERAL WOOL AND MOLD**

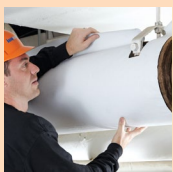
Glass mineral wool insulation will not sustain mold growth. However, mold can grow on almost any material when it becomes wet and contaminated. Carefully inspect any insulation that has been exposed to water. If it shows any sign of mold it must be discarded. If the material is wet but shows no evidence of mold, it should be dried rapidly and thoroughly. If it shows signs of facing degradation from wetting, it should be replaced.

**NOTES**

The chemical and physical properties of Knauf Insulation Earthwool® 1000° pipe insulation represent average values determined in accordance with accepted test methods. The data is subject to normal manufacturing variations. The data is supplied as a technical service and is subject to change without notice. References to numerical flame spread ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

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

**FACTS AT A GLANCE**

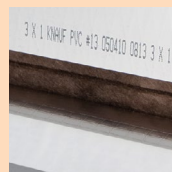


ASJ+ is moisture resistant to intermittent, short duration liquid water exposure such as precipitation during construction.\*

\*Earthwool 1000° pipe insulation with ASJ+ is not intended for unprotected outdoor use.



ASJ+ will provide a professional finished appearance: dimple and wrinkle resistant.



Size, wall thickness and Proto 25/50 rated PVC fitting cover identification are printed on the jacket.

## Technical Data

Property (Unit)	Test	Performance
Corrosiveness	ASTM C665	Does not accelerate corrosion of steel (Insulation)
Corrosion	ASTM C1617	Pass (Insulation)
Maximum Service Temperature	ASTM C411 + ASTM C447	1000° F (538° C) (Insulation)
Water Vapor Permeance	ASTM E96, Procedure A	0.02 perms or less (ASJ+ facing)
Water Vapor Sorption (by volume)	ASTM C1104	Less than 0.2% (Insulation and ASJ+ facing)
Shrinkage	ASTM C356	Negligible (Insulation)
Mold Growth	ASTM C1338	Pass (Insulation)
Surface Burning Characteristics (flame spread/smoke developed)	ASTM E84, NFPA 255, UL 723, CAN/ULC S102	25/50 (Insulation and ASJ+ facing)

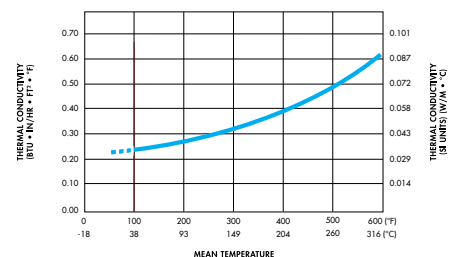
## Minimum Pipe Insulation Thickness (in.)<sup>a</sup> | (to meet ASHRAE 90.1-2013 Requirements)

Fluid Design Operating Temperature Range, °F	Insulation Conductivity		Nominal Pipe or Tube Size				
	Conductivity Range BTU-in./ (hr • ft <sup>2</sup> • °F)	Mean Temperature Rating, °F	<1"	1" - <1½"	1½" - <4"	4" - <8"	≥8"
<b>Heating and Hot Water Systems</b> (Steam, Steam Condensate, Hot Water Heating and Domestic Water Systems) <sup>b,c</sup>							
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
<b>Cooling Systems (Chilled Water, Brine, Refrigerant) <sup>d</sup></b>							
40-60	0.21-0.27	75	½	½	1	1	1
Below 40	0.20-0.26	50	½	1	1	1	1½

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 • ft<sup>2</sup> • °F)}; and k=the upper value of the conductivity range listed in this table for the applicable fluid temperature. These thicknesses are based on energy efficiency considerations only. For piping smaller than 1½" and located in partitions within conditioned spaces, reduction of these thicknesses by 1" shall be permitted (before thickness adjustment required in footnote a) but not to thicknesses below 1". These thicknesses are based on energy efficiency considerations only. Issues such as water vapor permeability or surface condensation sometimes require vapor retarders or additional insulation. The table is based on steel pipe. Non-metallic pipes schedule 80 thickness or less shall use the table values. For other non-metallic pipes having thermal resistance greater than that of steel pipe, reduced insulation thicknesses are permitted if documentation is provided showing that the pipe with the proposed insulation has no more heat transfer per foot than a steel pipe of the same size with the insulation thickness shown on the table.

## Thermal Efficiency | ASTM C335

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



# KNAUF INSULATION



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**UL Environment GREENGUARD Certification Program**  
Earthwool products are certified to UL Environment GREENGUARD standards for low chemical emissions into indoor air during product usage.

**UL Environment GREENGUARD Gold Certification Program**  
Knauf Insulation has achieved UL Environment GREENGUARD Gold Certification for Earthwool products.

**UL Environment Validated Formaldehyde Free**  
Knauf Insulation has achieved UL Environment validation that Earthwool products are formaldehyde free.

**UL Environment Certified EPD**  
Knauf Insulation has achieved an Environmental Product Declaration certification from UL Environment for Earthwool products. EPD Certification is documentation fully disclosing a product's environmental impact.

For more information, visit [ul.com/spot](http://ul.com/spot)

## Declare.



**Declare** is a voluntary self-disclosure program aiming to transform the building materials industry towards healthier and more ecological products through ingredient transparency.

**Participating in Declare** means this product has voluntarily self-disclosed all ingredients in order to promote transparency.

**Living Building Challenge Compliant** means this product meets the requirements of the Red-List Imperative of the Living Building Challenge due to a temporary exception.

**Living Building Challenge Red List Free** means this product does not contain any ingredients on the Living Building Challenge's Red List.



### LEED Eligible Product

Use of this product may help building projects meet green building standards as set by the Leadership in Energy and Environmental Design (LEED) Green Building Rating System.

### LEED v2009

MR Credit 4.1 - 4.2 Recycled Content  
MR Credit 5.1 - 5.2 Regional Materials

### LEED v4

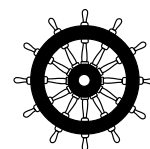
Knauf Insulation offers several products for both envelope and mechanical systems that have ingredient disclosure and transparency. Please contact [transparency@knaufinsulation.com](mailto:transparency@knaufinsulation.com) for products that currently contribute to MR credits.



Versions of this product have surface burning characteristics that are classified by Underwriters Laboratories and therefore subject to auditing for fire performance compliance.



This product has been tested and is certified to meet the EUCEB requirements.



This product has been tested and is certified to meet the US Coast Guard requirements.