



Data Sheet

CI-RK-DS 12-15

## Earthwool® Redi-Klad® 1000° Pipe Insulation

Knauf Insulation Earthwool Redi-Klad 1000° pipe insulation is a multi-purpose, molded, heavy-density, one-piece glass mineral wool insulation bonded with ECOSE® Technology. Earthwool Redi-Klad insulation comes with factory applied 5-ply weather and abuse resistant jacketing with self-sealing lap. Earthwool Redi-Klad insulation 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, Earthwool Redi-Klad jacket provides a zero permeability rating. Earthwool Redi-Klad insulation 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® Redi-Klad® 1000° Pipe Insulation

## 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

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, petrochemical, pulp and paper, institutional, and educational construction projects, operating at temperatures from 0°F to (-18°C) to 1000°F (538°C).

## FEATURES AND BENEFITS

- Offers excellent resistance to heat loss or gain, which saves energy and lowers operating costs
- A low thermal conductivity of 0.23 at 75°F (24°C mean temperature)
- 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.
- Properly installed, Earthwool Redi-Klad jacket provides a zero perm vapor barrier.

## SUSTAINABILITY

- Knauf Insulation insulation products used for thermal insulating purposes are carbon negative, meaning they 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 glass mineral wool insulation 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 also reduces its Global Warming Potential (GWP) by approximately 4%, a significant reduction in our carbon footprint.

## SPECIFICATION COMPLIANCE

### Earthwool Glass Mineral Wool Pipe Insulation

#### In U.S.:

- ASTM C547; Type I, Type IV
- ASTM C585
- ASTM C795
- HH-I-558C; Form D, Type III, Class 12; Class 13 (to 1000°F, 538°C): replaced by ASTM C592
- NFPA 90A and 90B
- ASTM C795
- 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)

### Indoor Air Quality

- UL Environment GREENGUARD Gold certified
- UL Environment validated to be formaldehyde free
- Tested and certified to meet all requirements of EUCEB
- IgCC Section 806.6 compliant



## TECHNICAL DATA

### Earthwool® Glass Mineral Wool Pipe Insulation

#### Surface Burning Characteristics

- Does not exceed 25 Flame Spread, 50 Smoke Developed when tested in accordance with ASTM E84, CAN/ULC S102-M88, NFPA 90A and 90B, NFPA 255 and UL 723

#### Temperature Range (ASTM C411)

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

#### Resists Microbial Growth

(ASTM C1338, G21)

- Does not promote microbial growth

#### Corrosiveness (ASTM C665)

- Does not accelerate corrosion on steel, copper or aluminum

#### Corrosion (ASTM C1617)

- Corrosion rate in mils/yr will not exceed that of the 5 ppm chloride solution.

#### Water Vapor Sorption (ASTM C1104)

- Less than 0.2% by volume

#### Linear Shrinkage (ASTM C356)

- Negligible

### 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)
- Application temperature -10°F to 300°F (-23°C to 149°C)

#### Water Vapor Permeability (ASTM E96-05)

- Zero-perm.

#### Puncture Resistance (ASTM D1000)

- 35.4 kg, 189.3 N

#### Tear Strength (ASTM D624)

- 4.3 lb., 19.4 N

#### Thickness

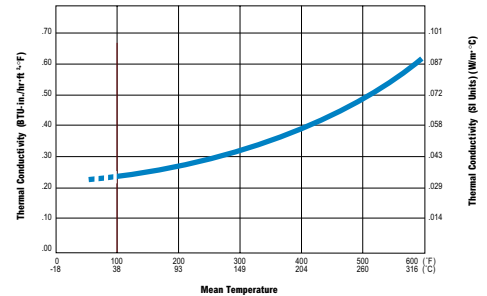
- 14.5 mils (0.0145")

#### Tensile (PSTC-31)

- 68 lb./inch width, 306 N (31 kg)/25 mm

### Thermal Efficiency (ASTM C335)

Mean Temperature	k	k (SI)
75°F (24°C)	0.23	.033
100°F (38°C)	0.24	.035
200°F (93°C)	0.28	.040
300°F (149°C)	0.34	.049
400°F (204°C)	0.42	.061
500°F (260°C)	0.51	.074
600°F (316°C)	0.62	.089



### 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 (in.)				
	Conductivity Range BTU-in./hr-ft²-°F	Mean Temperature Rating, °F	<1	1 to <1½	1½ to <4	4 to <8	≥8
<b>Heating and Hot Water Systems (Steam, Steam Condensate, Hot Water Heating and Domestic Water Systems)<sup>b,c</sup></b>							
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	0.22-0.28	100	1	1	1½	1½	1½
<b>Cooling Systems (Chilled Water, Brine, Refrigerant)<sup>d</sup></b>							
40-55	0.21-0.27	75	½	½	1	1	1
Below 40	0.20-0.26	50	½	1	1	1	1½

<sup>a</sup> 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./hr-ft²-°F); and k=the upper value of the conductivity range listed in this table for the applicable fluid temperature.

<sup>b</sup> These thicknesses are based on energy efficiency considerations only. Additional insulation is sometimes required relative to safety issues/surface temperature.

<sup>c</sup> 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".

<sup>d</sup> 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.

<sup>e</sup> 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.

## Earthwool® Redi-Klad®

### Product Forms and Sizes

Produced in 3' (914 mm) sections:

- For iron pipe from 3/4" to 24" nominal pipe size (51 mm to 610 mm)
- For copper tube from 1 1/8" to 6 1/8" (54 mm to 156 mm)
- Wall thicknesses from 1" to 6" (39 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
- Color coded labels

## 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 (56°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 during initial start-up.
- 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

- Earthwool Redi-Klad jacket acts as a continuous vapor barrier on piping operating below ambient temperatures.
- Seal all joints, surfaces, seams and fittings to prevent condensation.
- Exposed ends of insulation shall be sealed with vapor barrier mastic installed per the mastic manufacturer's instructions. Vapor seals at the butt joint shall be applied at 12' to 21' intervals; at the Engineer's discretion on straight piping 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.

### Earthwool Redi-Klad

- Keep adhesive and contact surfaces free from dirt and water, and seal immediately once adhesive is exposed. Earthwool Redi-Klad 1000° pipe insulation should be installed in dry conditions with no moisture present.

- Apply when ambient and insulation surface temperatures are between 0°F and 130°F (-18°C and 54°C).
- If stored below 0°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 Earthwool Redi-Klad closure system, make sure the longitudinal and circumferential joints are properly sealed by rubbing the closure firmly with a squeegee.
- When using Earthwool Redi-Klad 1000° pipe insulation, the surface temperature of the insulation should be between -20°F and 150°F (-29°C and 66°C) during the life of the insulation.

### Fittings and Hangers

- Use metal or PVC fitting covers. For below ambient piping systems, caution should be taken to prevent punctures, tears, or rips in Earthwool Redi-Klad vapor barrier. Additionally, all fitting insulation surfaces must have independent, field applied vapor barriers. Prior to installing fitting insulation, all exposed ends of pipe insulation sections must be vapor sealed.
- 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

## FACTS AT A GLANCE

- For indoor or outdoor applications from 0°F to 1000°F
- Excellent thermal performance
- Superior fabrication properties
- Manufactured in ISO 9001:2000 certified plant
- Zero Perm
- Weather Resistant
- Lightweight
- No sharp edges for a safer installation

### 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.
- 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 4" (102 mm) wide butt strip.
- All piping should have continuous insulation.
- Position longitudinal lap at top to minimize dirt and moisture accumulation.
- Do not expose pipe insulation to excessive vibration or physical abuse.
- Insulation thickness must be adequate to assure 300°F (149°C) exterior surface temperature maximum.

### 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® Redi-Klad® 1000° pipe insulation with ECOSE® Technology represent typical 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 assure information is current.



# KNAUF INSULATION

*it's time to save energy*



Knauf Insulation, Inc.  
One Knauf Drive  
Shelbyville, IN 46176

Sales (800) 825-4434, ext. 8300

Technical Support (800) 825-4434, ext. 8512

Fax (317) 398-3675

Information [info.us@knaufinsulation.com](mailto:info.us@knaufinsulation.com)

Website [www.knaufinsulation.us](http://www.knaufinsulation.us)

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



#### 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.



#### UL Environment GREENGUARD Gold

Knauf Insulation achieved UL Environment GREENGUARD Gold Certification.

#### UL Environment Product Declarations

EPD Certification is documentation fully disclosing a product's environmental impact as well as other information regarding human toxicity, risk, and social responsibility.

#### UL Environment Validated Formaldehyde Free

Earthwool products are formaldehyde free.

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



## 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.

This product is covered by one or more U.S. and/or other patents.  
See patent [www.knaufinsulation.us/patents](http://www.knaufinsulation.us/patents)