Earthwool® Insulation Board *with ECOSE® Technology*

Submittal Date _____

KNAUF INSULATION

DESCRIPTION

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. It is bonded with ECOSE Technology and is available plain or with a factory-applied foil-scrim-kraft (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 fiberglass 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 fiberglass products. Products using ECOSE Technology are formaldehyde-free and have reduced global warming potential when compared to our products of the past.

PRODUCT FEATURES

Energy Efficient

- Excellent thermal efficiency results in lower operating costs

Low-Cost Installation

- Lightweight, easy to handle and fabricate
- Fast, easy installation lowers labor costs

Health & Safety

- Low emitting for indoor air quality considerations

Significant Acoustical Benefits

- Excellent acoustical properties effectively reduce noise

Polished Appearance

- FSK and ASJ+ vapor-retardant facings provide a neat finished appearance

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.

Fiberglass 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.

- UL/ULC Classified (FSK, ASJ+)
- ASTM C612;
  - 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 C553; Type I, II, III (1.6 PCF)
- ASTM C1136 (facing);
  - Type I, II, III, IV, VIII, X (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
- **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-10M
- CGSB 51-GP-52M (facings)

INDOOR AIR QUALITY

- UL Environment
  - GREENGUARD certified
  - GREENGUARD Gold certified
  - Validated to be formaldehyde-free
- 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 Section 806.6 compliant

APPLICATION & SPECIFICATION GUIDELINES

Storage

- Protect material from water damage or other abuse. Cartons are not designed for outside storage. Vacuum packaged material can be stored outside if care is taken not to puncture the poly bag.

Preparation

- Apply the product on clean, dry surfaces. Metal ducts must be sealed before application. Pre-score rigid insulation board where necessary to conform to curved surfaces.

Application: General

- All insulation joints must be firmly butted. Insulation can be secured with mechanical fasteners or banded. Minimum compression is to be used to assure firm fit and still maintain thermal performance.
- Vapor retarders should overlap a minimum of 2" (51 mm) at all seams, and be sealed with appropriate pressure sensitive tape or mastic. When applying pressure sensitive tapes, the tape must be firmly rubbed with a proper sealing tool to make sure the closure is secure. Follow tape manufacturer's recommendations.
- Fasteners shall be located a maximum of 3" (76 mm) from each edge and spaced 12"–16" (305–406 mm) on center.
- Where vapor retarder performance is necessary, all penetrations and facing damage shall be repaired with tapes or mastic with a minimum of 2" (51 mm) overlap. Tapes should be applied using a sealing tool and moving pressure. Use on ducts, plenums, vessels, tanks and equipment operating at temperatures of 450° F (232° C) or less.
- Tapes and mastics (dry) should have a UL 723 rating of 25 flame spread, 50 smoke developed.

Ducts and Plenums

- Use of 3.0 PCF (48 kg/m³) insulation board in concealed areas is recommended.
- Use of 6.0 PCF (96 kg/m³) insulation board in exposed areas and outdoor applications is recommended.

Vessels, Tanks and Equipment

- For irregular surfaces, use 1.6 PCF (26 kg/m³) insulation board and band with minimum compression.
- For outdoor application, Earthwool Insulation Board must be covered with appropriate jacketing, mastic or other vapor retarder. All exposed surfaces must be protected.
- Apply jacketing, mastics and other vapor retarders in accordance with manufacturer's instructions.

Precaution

- 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.

CERTIFICATIONS

- UL Environment
  - GREENGUARD
  - GREENGUARD Gold
  - Formaldehyde-free
  - UL/ULC Classified
- Declare Red List Free
- EUCEB
- USGBC LEED

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. Vacuum packaging Knauf Insulation products will reduce some mechanical properties of the insulation. By ordering vacuum packaged products, the customer acknowledges these reduced properties and assumes responsibility for the fitness for use in their application.

FIBERGLASS AND MOLD

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

NOTES

The chemical and physical properties of Knauf Insulation Earthwool Insulation Board 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 ensure information is current.

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Submittal Sheet

Sound Absorption Coefficients | ASTM C423, Type A Mounting

Type	Facing	Thickness	Octave Band Center Frequency (cycles/sec.)						
			125	250	500	1000	2000	4000	NRC
1.6 PCF (26 kg/m³)	Plain	1½" (38 mm)	0.19	0.44	0.86	0.98	1.00	1.02	0.80
		2" (51 mm)	0.31	0.57	0.96	1.04	1.03	1.03	0.90
		2½" (64 mm)	0.43	0.82	1.12	1.07	1.04	1.03	1.00
		3" (76 mm)	0.47	0.92	1.17	1.06	1.06	1.04	1.05
2.25 PCF (36 kg/m³)	Plain	1" 25 mm)	0.05	0.24	0.59	0.86	0.97	1.00	0.65
		1½" (38 mm)	0.17	0.49	0.93	1.03	1.03	0.99	0.85
		2" (51 mm)	0.26	0.62	1.05	1.07	1.04	1.05	0.95
	FSK	1" (25 mm)	0.14	0.69	0.81	0.99	0.55	0.27	0.75
		2" (51 mm)	0.63	0.76	1.11	0.75	0.42	0.22	0.75
3.0 PCF (48 kg/m³)	Plain	1" (25 mm)	0.08	0.23	0.62	0.88	0.96	0.99	0.65
		1½" (38 mm)	0.09	0.39	0.89	1.03	1.06	1.01	0.85
		2" (51 mm)	0.29	0.65	1.11	1.13	1.06	1.03	1.00
		3" (76 mm)	0.54	1.01	1.18	1.07	1.07	1.04	1.10
		4" (102 mm)	0.95	1.11	1.17	1.07	1.07	1.06	1.10
	FSK	1" (25 mm)	0.21	0.63	0.84	0.93	0.51	0.22	0.75
		1½" (38 mm)	0.45	0.60	0.99	0.73	0.53	0.27	0.70
		2" (51 mm)	0.67	0.77	0.93	0.74	0.47	0.28	0.75
	ASJ+	1" (25 mm)	0.15	0.71	0.65	0.82	0.41	0.16	0.65
		1½" (38 mm)	0.42	0.55	0.91	0.69	0.40	0.23	0.65
		2" (51 mm)	0.75	0.71	0.80	0.66	0.41	0.24	0.65
4.25 PCF (68 kg/m³)	Plain	1" (25 mm)	0.06	0.24	0.69	0.99	1.05	1.02	0.75
	ASJ+	2½" (64 mm)	0.75	0.63	0.63	0.62	0.41	0.25	0.55
6.0 PCF (96 kg/m³)	Plain	1" (25 mm)	0.05	0.26	0.77	1.04	1.04	1.03	0.80
		1½" (38 mm)	0.13	0.58	1.01	1.05	1.00	1.01	0.90
		2" (51 mm)	0.32	0.81	1.08	1.06	1.03	1.04	1.00
	FSK	1" (25 mm)	0.23	0.65	0.39	0.48	0.47	0.32	0.50
		1½" (38 mm)	0.61	0.47	0.78	0.61	0.51	0.35	0.60
		2" (51 mm)	0.77	0.50	0.72	0.58	0.53	0.41	0.60
	ASJ+	1½" (38 mm)	0.60	0.46	0.62	0.48	0.47	0.31	0.50
		2" (51 mm)	0.77	0.44	0.60	0.50	0.41	0.30	0.50

Technical Data

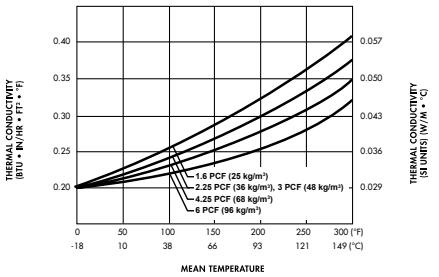
Property (Unit)	Test	Performance
Corrosiveness	ASTM C665	Does not accelerate corrosion of steel
Corrosion	ASTM C1617	Pass
Maximum Service Temperature	ASTM C411	450° F (232° C)
Puncture Resistance	TAPPI Test T803, Beach Units	FSK Facing: 25 ASJ+ Facing: 120
Water Vapor Permeance	ASTM E96, Procedure A	FSK and ASJ+ Facing: 0.02 perms
Water Vapor Sorption (by weight)	ASTM C1104	Less than 5%
Shrinkage	ASTM C356	Less than 0.3%
Mold Growth	ASTM C1338	Pass
Surface Burning Characteristics (flame spread/smoke developed)	ASTM E84, NFPA 255, UL 723, CAN/ULC S102, NFPA 90A and 90B	25/50

Forms Available*

Density	Thickness	R-Value (R-SI)
1.6 PCF (26 kg/m³)	1½" (38 mm)	R-6.3 (1.1)
	2" (51 mm)	R-8.3 (1.5)
	3" (76 mm)	R-12.5 (2.2)
2.25 PCF (36 kg/m³)	1" (25 mm)	R-4.3 (0.8)
	1½" (38 mm)	R-6.5 (1.1)
	2" (51 mm)	R-8.7 (1.5)
	3" (76 mm)	R-13.0 (2.3)
	4" (102 mm)	R-17.4 (3.1)
3.0 PCF (48 kg/m³)	1" (25 mm)	R-4.3 (0.8)
	1½" (38 mm)	R-6.5 (1.1)
	2" (51 mm)	R-8.7 (1.5)
	2½" (64 mm)	R-10.9 (1.9)
	3" (76 mm)	R-13.0 (2.3)
4.25 PCF† (68 kg/m³)	1" (25 mm)	R-4.3 (0.8)
	1½" (38 mm)	R-6.5 (1.1)
	2" (51 mm)	R-8.7 (1.5)
	2½" (64 mm)	R-10.9 (1.9)
6.0 PCF† (96 kg/m³)	1" (76 mm)	R-4.5 (0.8)
	1½" (89 mm)	R-6.8 (1.2)
	2" (102 mm)	R-9.1 (1.6)

*Available in widths of 24" (610 mm) and 48" (1219 mm) and lengths from 36" to 120" (915 mm to 3048 mm). †Cartons only.

Thermal Efficiency | ASTM C177



Mean Temperature	1.6 PCF		3.0 PCF		6.0 PCF	
	k	k(SI)	k	k(SI)	k	k(SI)
75° F (24° C)	0.24	0.035	0.23	0.033	0.22	0.032
100° F (38° C)	0.25	0.036	0.24	0.035	0.23	0.033
200° F (93° C)	0.33	0.048	0.29	0.042	0.27	0.039
300° F (149° C)	0.42	0.061	0.37	0.053	0.34	0.049

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