

Duct Liner E•M

Submittal Date _____



Description

Knauf Duct Liner E•M is a flexible, mat-faced insulation made from inorganic glass fibers bonded by a thermosetting resin with an encapsulant edge coating. 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.

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

- Low thermal conductivity.
- Fire-resistant, non-corrosive, durable and resilient.
- Tough, tightly bonded mat facing.
- Excellent sound absorption.

Benefits

- 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."

Specification Compliance

In U.S.:

- ASTM C 1071; Type I
- ASTM D 5116
- ASTM G 21, G 22
- GREENGUARD Environmental Institute™
- California Title 24 (1.5 PCF, 1" and above)
- NFPA 90A and 90B
- SMACNA Application Standard for Duct Liners
- NAIMA Fibrous Glass Duct Liner Installation Standards
- State of Alaska IAQ Specifications
- State of Washington IAQ Specifications

In Canada:

- CAN/ULC S102-M88
- CAN/CGSB-51.11-92

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 255 and UL 723.

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).

Water Vapor Sorption (ASTM C 1104)

- Less than 3% by weight.

Microbial Growth (ASTM C 1338, G 21, G 22)

- Airstream surface mat facing is treated with an EPA-registered anti-microbial agent to aid in the prevention of fungal and bacterial growth.
- Does not promote or support the growth of mold, fungi or bacteria.

Application and Specification Guidelines

Storage

- Inside storage is recommended.

Fabrication and Application

- Fabricate in compliance with the latest edition of NAIMA's "Fibrous Glass Duct Liner Standard".
- Liner shall be folded and compressed in the corners of rectangular duct sections or shall be cut and fit to assure lapped, compressed joints. Longitudinal joints in duct liner should not occur except at the corner of ducts. Longitudinal joints in liner shall be coated with adhesive. All damaged areas of the airstream surface shall be repaired with an adhesive which conforms to ASTM C 916.
- Liner should be adhered to the duct with 90% minimum area coverage of an adhesive which conforms to ASTM C 916.
- Mechanical fasteners should not compress the insulation more than 1/8" (3 mm), and shall be installed perpendicular to the duct surface. All fasteners should comply with the guidelines of NAIMA's "Fibrous Glass Duct Liner Standard" and the "Mechanical Fastener's Standard-MF-1-1975".
- Metal nosings shall be securely installed over transversely oriented liner edges facing the airstream at fan discharge, at access doors and at any interval of lined duct preceded by unlined duct. In addition, where velocities exceed 4000 fpm (1219 mpm), metal nosing shall be used on upstream edges of liner at every transverse joint (See illustration, right.)

Limitations

- Knauf Duct Liner E•M should not be used in systems operating at velocities exceeding 6000 fpm (1829 mpm) or at temperatures above 250°F (121°C).

Fiber Glass and Mold

Fiber glass insulation will not sustain mold growth. However, mold can grow on almost any material when it becomes wet and contaminated with organic materials. 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. Air handling insulation used in the air stream must be discarded if exposed to water.

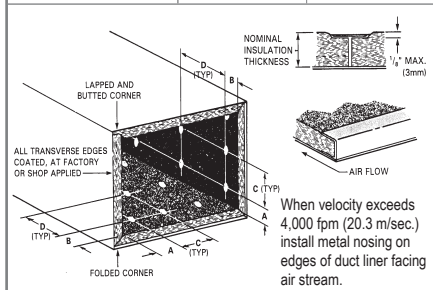
Notes

The chemical physical properties of Knauf Duct Liner E•M represent typical average values determined in accordance with accepted test methods. The data is subject to normal manufacturing and testing 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 sales representative to assure information is current.

Mechanical Fastener Location

Velocity/FPM (meters/second)	0-2500 (0-12.7)	2501-5000 (12.7-25.4)
A From corners of duct	4" (102 mm)	4" (102 mm)
B From transverse end of duct liner	3" (76 mm)	3" (76 mm)
C Across width of duct, on centers (min. 1/size)	12" (305 mm)	6" (152 mm)
D Across length of duct, on centers (min. 1/size)	18" (457 mm)	16" (406 mm)



Liner Interior Width

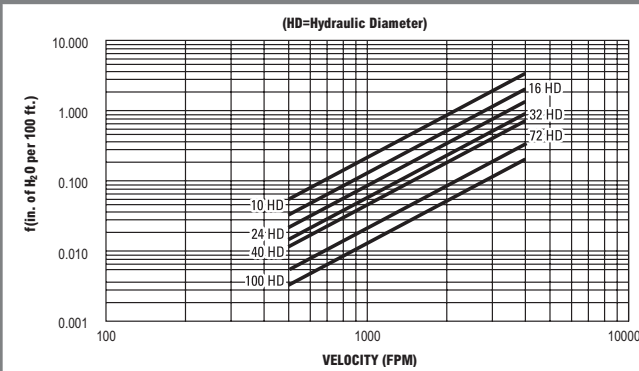
No. Pins	Inches	(mm)
0	≤ 8	≤ 203
2	9-16	229-406
3	17-28	432-711
4	29-40	737-1016
5	41-52	1041-1321
6	53-64	1346-1626
7	65-76	1651-1930
8	77-88	1956-2235
9	89-100	2261-2540

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Friction Loss (Inches of water per 100')



FPM	Hydraulic Diameter						
Velocity	10"	16"	24"	32"	40"	72"	100"
500	.054	.030	.018	.012	.009	.005	.003
600	.077	.042	.025	.018	.013	.007	.004
700	.104	.057	.034	.024	.018	.009	.006
800	.134	.074	.044	.031	.023	.011	.008
900	.169	.093	.056	.039	.029	.014	.010
1000	.207	.114	.068	.048	.036	.018	.012
2000	.806	.443	.266	.186	.141	.069	.046
3000	1.797	.988	.594	.415	.315	.153	.103
4000	3.179	1.748	1.050	.734	.557	.271	.181
5000	4.952	2.724	1.636	1.143	.867	.422	.283

Standard Sizes

Thickness	Width	Length
1.5 PCF 1" (24 kg/m ³ 25 mm)	35.5**, 46.25", 47", 47.5", 48", 56", 56.25", 56.5", 59", 59.5", 60" (902, 1175, 1194, 1207, 1219, 1422, 1428, 1435, 1499, 1511, 1524 mm)	100' (30.48 m)
1.5 PCF 1" (24 kg/m ³ 25 mm)	47" (1194 mm)	50' (15.24 m)
1.5 PCF 1.5" (24 kg/m ³ 38 mm)	47", 48" (1194, 1219 mm)	50' (15.24 m)
1.5 PCF 2" (24 kg/m ³ 51 mm)	47", 48" (1194, 1219 mm)	50' (15.24 m)
2.0 PCF .5" (32 kg/m ³ 13 mm)	35.5**, 47", 47.5", 48", 59", 59.5" (902, 1194, 1207, 1219, 1499, 1511 mm)	100' (30.48 m)
2.0 PCF 1" (32 kg/m ³ 25 mm)	47.5", 48" (1207, 1219 mm)	50' (15.24 m)

**Widths of 34"-36" not available with edge coating.

Sound Absorption Coefficients (ASTM C 423 Type A Mounting)

Type	1/3 Octave Band Center Frequency (cycles/sec.)						
	125	250	500	1000	2000	4000	NRC
1.5 PCF 1" (24 kg/m ³ 25 mm)	.18	.36	.59	.86	.95	.90	.70
1.5 PCF 1.5" (24 kg/m ³ 38 mm)	.35	.51	.83	.93	.97	.96	.80
1.5 PCF 2" (24 kg/m ³ 51 mm)	.34	.64	.96	1.03	1.00	1.03	.90
2.0 PCF .5" (32 kg/m ³ 13 mm)	.09	.14	.40	.60	.73	.82	.45
2.0 PCF 1" (32 kg/m ³ 25 mm)	.25	.35	.69	.89	.96	1.01	.70
2.0 PCF 1.5" (24 kg/m ³ 38 mm)	.27	.55	.87	.99	1.00	.98	.85

Coefficients determined per ASTM E 795 Type A Mounting.
NOTE: ASHRAE Handbook for HVAC Applications—Sound and Vibration Control contains insertion loss values for lined sheet metal ducts.

Thermal Conductance "C"¹ and Resistance "R"² (ASTM C 177)

Mean Temperature 75°F (24°C)		
Product	Conductance "C"	Resistance "R"
1.5 PCF 1" (24 kg/m ³ 25 mm)	.24 (1.42)	4.2 (.74)
1.5 PCF 1.5" (24 kg/m ³ 38 mm)	.17 (.97)	6.0 (1.06)
1.5 PCF 2" (24 kg/m ³ 51 mm)	.13 (.74)	8.0 (1.41)
2.0 PCF .5" (32 kg/m ³ 13 mm)	.48 (2.73)	2.1 (.37)
2.0 PCF 1" (32 kg/m ³ 25 mm)	.24 (1.36)	4.2 (.74)
2.0 PCF 1.5" (32 kg/m ³ 38 mm)	.16 (.91)	6.3 (1.11)

¹ The lower the value, the better the performance. ² The higher the value, the better the performance.

"C" Units: $\frac{\text{BTU}}{\text{ft}^2 \cdot \text{hr} \cdot ^\circ\text{F}} \left(\frac{\text{W}}{\text{m}^2 \cdot ^\circ\text{C}} \right)$ "R" Units: $\frac{\text{ft}^2 \cdot \text{hr} \cdot ^\circ\text{F}}{\text{BTU}} \left(\frac{\text{m}^2 \cdot ^\circ\text{C}}{\text{W}} \right)$

Made-to-Order Sizes

Density	Thickness	Width**	Length
1.5 PCF (24 kg/m ³)	1" (25 mm)	34"- 36** (864 mm - 915 mm)	50' (15.24 m)
			100' (30.48 m)
1.5 PCF (24 kg/m ³)	1.5", 2" (38, 51 mm)	46" - 48" (1168 mm - 1219 mm)	50' (15.24 m)
			100' (30.48 m)
2.0 PCF (32 kg/m ³)	.5" (13 mm)	56" - 60" (1422 mm - 1524 mm)	50' (15.24 m)
			100' (30.48 m)
2.0 PCF (32 kg/m ³)	1", 1.5" (25, 38 mm)		50' (15.24 m)

*Widths of 34"-36" not available with edge coating.
**Non-standard widths for all .5", 1", 1.5", and 2" products from 34"-36", 46"-48" and 56"-60" are available in 0.25" (6.35 mm) increments of minimum order quantity.