



Product Information from NAIMA:

Fibrous Glass Duct Liner

In this issue, we address the specific uses, performance characteristics, ASTM thermal and acoustical property requirements, and installation recommendations for fibrous glass duct liner.

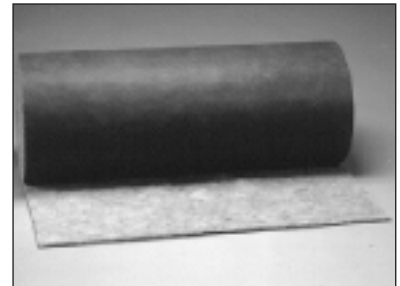
Uses

Fibrous glass duct liner insulation is designed for application to the interiors of commercial and residential sheet metal heating, ventilating, and air-conditioning ducts operating at internal air temperatures not exceeding 250°F (121° C). Duct liner helps to attenuate noise generated by central air handling equipment, air movement within the ducts, and occupant cross-talk. It also serves to reduce heat loss or gain through sheet metal duct surfaces, and helps to prevent the formation of water vapor condensation both inside the duct and on its exterior surface. Fibrous glass duct liner insulation is fabricated along with the sheet metal ductwork in the shop, providing quality workmanship under controlled conditions.

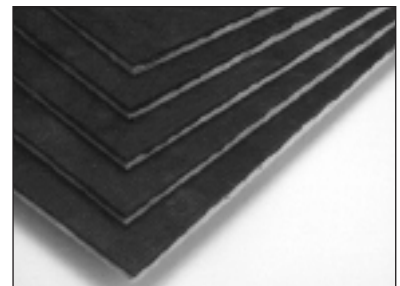
Description

Fibrous glass duct liner insulations are manufactured from glass fibers bonded with thermosetting resin. They are dimensionally stable, withstand abuse, and provide a cleanable, fire-resistant interior surface designed to minimize air friction loss. The interior air surface treatment may be in the form of a coating and/or a mat facing. Two forms of duct liner are available. Both are designed to meet physical property requirements of ASTM C 1071, *Standard Specification for Duct Lining Insulation (Thermal and Sound Absorbing Material)*:

- Type I - Flexible blankets, supplied in roll form; thicknesses of ½ to 2 in. (13 mm to 51 mm) in ½ in. (13 mm) increments.
- Type II - Rigid boards, supplied in sheet form; thicknesses of 1 to 2 in. (25 mm to 51 mm) in ½ in. (13 mm) increments.



Fibrous glass duct liner, Type I (flexible)



Fibrous glass duct liner, Type II (rigid)

Features and Benefits

Acoustically effective

Fibrous glass duct liner absorbs fan and air turbulence noise, reduces noises caused by expansion, contraction and vibration typical of sheet metal ducts.

Thermally efficient

Factory controlled insulation thickness assures that specified R-values will be met when installed in accordance with manufacturers' instructions.

Mat-faced or coated airstream surface

Fibrous glass duct liner minimizes air friction loss while enabling the insulation to withstand the duct cleaning process when NAIMA recommendations are followed.

Factory-applied edge coating

This coating saves fabricators the time and cost involved in coating transverse joints to meet industry requirements.

Bacteria and fungus resistant

Fiber glass insulations are inorganic and inert and do not support mold growth or act as nutrient for mold growth. For additional information, see *Insulation Facts #34. The Facts About Mold Growth*. Fibrous glass duct liners resist fungal and bacterial growth when subjected to microbial attack as described in ASTM C 1338, as required by ASHRAE 62.1 for HVAC system airstream surfaces. In addition, duct liners are tested in accordance to ASTM G 21-96 (fungus) and G22-96 (bacteria) as required by ASTM C 1071.

Code compliance

Fibrous glass duct liners meet the physical property requirements of ASTM C 1071 as well as meeting the fire safety requirements of NFPA 90A and 90B including limited combustibility. They also comply with all requirements listed in the ICC codes. The airstream surface is labeled as required by ICC codes.



Shop fabricating fibrous glass duct liner

Other Properties Established by Specification ASTM C 1071

Corrosiveness

Fiber glass duct liner shall not corrode steel in contact with duct liner to an extent greater than sterile cotton.

Temperature resistance

The air stream surface shall have no evidence of flaming, glowing, smoldering, visible smoke, or delamination, cracking, deformation or reduction in thickness at a minimum temperature of 250°F (121°C) as tested in accordance to ASTM C 411.

Table 1 - Maximum Thermal Conductivity Values (ASTM C 518)

ASTM C 1071 establishes the following maximum thermal conductivity values for fibrous glass duct liners at 75°F (24°C):

Apparent Thermal Conductivity	k, (Btu•in/hr•ft ² •°F)	λ (W/m•°C)
Type I, flexible	0.31	0.045
Type II, rigid	0.27	0.039

Thermal values are for insulation only as determined by ASTM C 518 at 75° F (24° C) mean temperature and do not include air films or reflective surfaces. Values are subject to normal testing and manufacturing tolerances.

Table 2 - Maximum Sound Absorption Coefficients (ASTM C 423)

When tested in accordance with ASTM C 423, Mounting A, fibrous glass duct liner insulation shall have sound absorption coefficients not less than those in the table below:

Type	Thickness		Sound absorption coefficients at octave band center frequencies, Hz						
	in.	(mm)	125	250	500	1000	2000	4000	NRC
TYPE I	1/2	(13)	.02	.07	.18	.37	.52	.67	.30
	1	(25)	.04	.19	.35	.55	.69	.72	.45
	1 1/2	(38)	.08	.31	.58	.75	.82	.81	.60
TYPE II	2	(51)	.16	.42	.76	.85	.85	.83	.70
	1	(25)	.02	.20	.52	.72	.82	.84	.55
	1 1/2	(38)	.05	.40	.77	.88	.88	.86	.75
	2	(51)	.12	.57	.90	.95	.95	.92	.85

Consult individual manufacturers for specific acoustical performance and/or data on thicknesses not listed.

Erosion resistance

The insulation shall not break away, flake off, or show evidence of delamination or continued erosion when air is passed through sections at 2½ times rated air velocity (same as UL 181).

Odor emission

The insulation shall have no detectable odor of objectionable nature as determined by an odor panel.

Moisture vapor sorption

Moisture vapor sorption shall not exceed 3% by weight.

Fabrication and Installation

Industry standard published by SMACNA and NAIMA help the contractor to provide reliable long term system performance. Fibrous glass duct liner insulations are applied to interior surfaces using adhesives complying with the property requirements of ASTM C 916, Standard Specification for Adhesives for Duct Thermal Insulation, plus mechanical fasteners designed specifically for this purpose, spaced as shown in Figure 1 below. All joints and seams in the sheet metal ductwork should be tightly sealed. Corner joints are made as shown in Figure 2 (following page).

Short Form Field Inspection Check List		YES	NO
Has duct liner been installed with air stream surface printing visible?		<input type="checkbox"/>	<input type="checkbox"/>
Is the proper thickness (R-value) selected to meet condensation and energy conservation requirements?		<input type="checkbox"/>	<input type="checkbox"/>
Does duct liner completely cover all inside surfaces of the system, including fittings?		<input type="checkbox"/>	<input type="checkbox"/>
Is the duct liner free of visible damage (tears, punctures, abrasions?)		<input type="checkbox"/>	<input type="checkbox"/>
Is duct liner certified to comply with ASTM C 1071?		<input type="checkbox"/>	<input type="checkbox"/>
Has duct liner been adhered to sheet metal with adhesive meeting ASTM C 916?		<input type="checkbox"/>	<input type="checkbox"/>
Are fasteners of the proper type and properly installed perpendicular to sheet metal?		<input type="checkbox"/>	<input type="checkbox"/>
Are fastener washers cupped or beveled and installed so as not to cut into duct liner?		<input type="checkbox"/>	<input type="checkbox"/>
Are fasteners spaced correctly for system air velocity?		<input type="checkbox"/>	<input type="checkbox"/>
Do fastener heads or washers compress duct liner no more than 1/8 in. (3 mm)?		<input type="checkbox"/>	<input type="checkbox"/>
Are leading edges and transverse joints factory-coated or are they field-coated with adhesive meeting requirements of ASTM C 916?		<input type="checkbox"/>	<input type="checkbox"/>
Are transverse joints firmly butted, with no gaps or open seams?		<input type="checkbox"/>	<input type="checkbox"/>
Are all corner joints compressed and overlapped or folded?		<input type="checkbox"/>	<input type="checkbox"/>
Are longitudinal joints at corners unless duct size or product dimensions prohibit?		<input type="checkbox"/>	<input type="checkbox"/>
Are top panels of duct liner board supported by side panels?		<input type="checkbox"/>	<input type="checkbox"/>
Are all leading edges finished with sheet metal nosing if air velocity requires it?		<input type="checkbox"/>	<input type="checkbox"/>
If installation is two layer, is second layer securely bonded to first layer?		<input type="checkbox"/>	<input type="checkbox"/>
Are all sheet metal joints sealed to prevent air leakage?		<input type="checkbox"/>	<input type="checkbox"/>
Has construction debris been blown or removed from ducts?		<input type="checkbox"/>	<input type="checkbox"/>
Are sources of potential moisture controlled in order to keep duct liner dry?		<input type="checkbox"/>	<input type="checkbox"/>

Figure 1 – Mechanical Fastener Spacing for Fibrous Glass Duct Liner

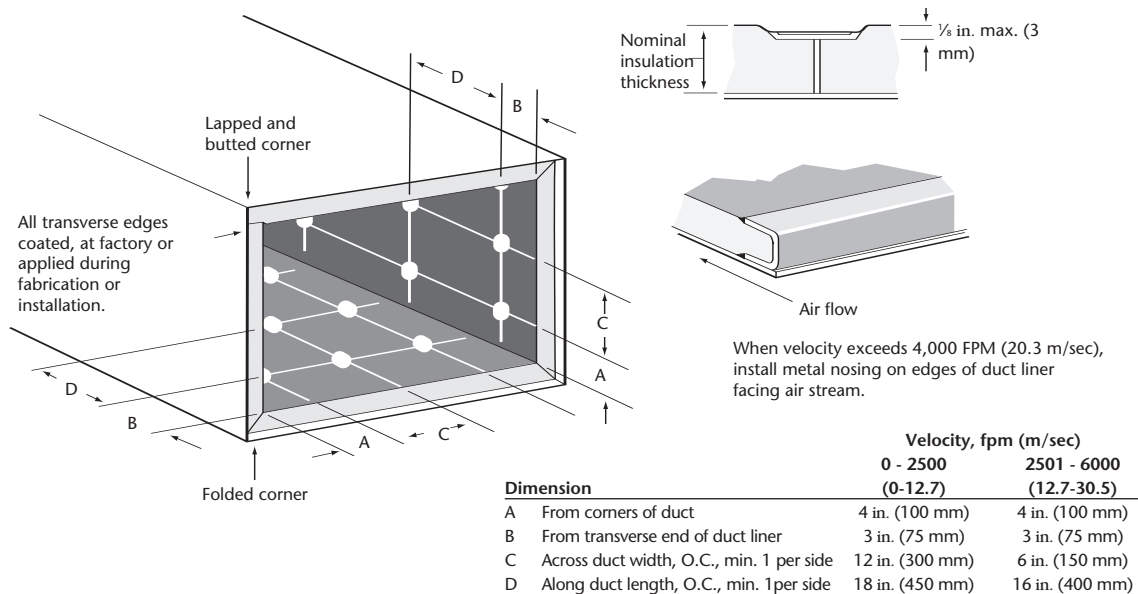
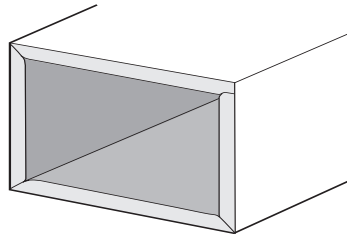
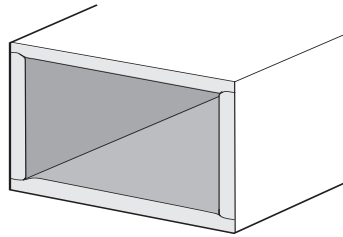


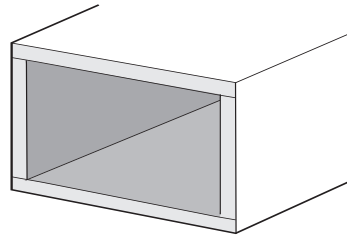
Figure 2 – Duct Liner Corner Joint Details



Type I duct liner: three corners folded, one corner lapped

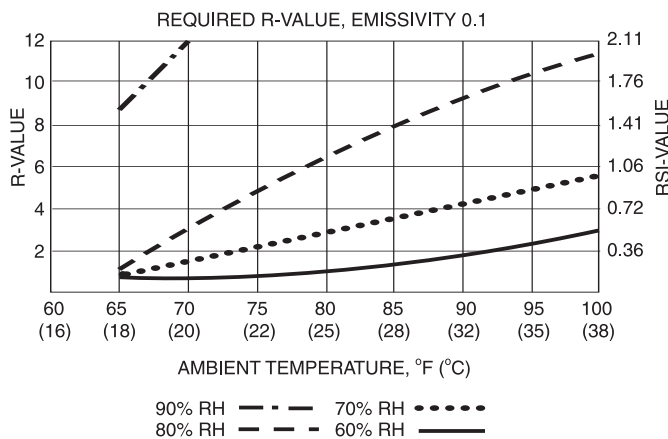


Type I duct liner: corners lapped and slightly compressed



Type II duct liner: corners lapped, side pieces supporting top piece

Figure 3 - Required R-Values to Prevent Moisture Condensation



Condensation Control

Figure 3 below shows the installed R-values of fibrous glass duct liner required to prevent moisture condensation on the outer duct surface under varying conditions of ambient temperature and relative humidity. Curves are based on internal air temperature of 55°F (13°C) and no air movement on the external surface. Note: R-values as required by ASHRAE 90.1 may not be sufficient for condensation control.

About NAIMA

NAIMA is the association for North American manufacturers of fiber glass, rock wool, and slag wool insulation products. Its role is to promote energy efficiency and environmental preservation through the use of fiber glass, rock wool, and slag wool insulation, and to encourage the safe production and use of these materials.

In May, 1999, NAIMA began implementing a comprehensive voluntary work practice partnership with the U. S. Occupational Safety and Health Administration (OSHA). The program, known as the Health and Safety Partnership Program, or HSPP, promotes the safe handling and use of insulation materials and incorporates education and training for the manufacture, fabrication, installation, and removal of fiber glass, rock wool, and slag wool insulation products.

For more information, contact:

NAIMA
 44 Canal Center Plaza, Suite 310
 Alexandria, VA 22314
 Phone: 703-684-0084
 Fax: 703-684-0427
 www.naima.org

For additional information on fibrous glass duct liners, contact one of the manufacturers listed below.

CertainTeed Corp.
 P. O. Box 860
 Valley Forge, PA 19482
 800-233-8990

Johns Manville
 P. O. Box 5108
 Denver, CO 80217
 800-654-3103

Knauf Insulation
 One Knauf Drive
 Shelbyville, IN 46176
 800-825-4434

Owens Corning
 One Owens Corning Parkway
 Toledo, OH 43659
 800-GET-PINK

Table 3 - Commonly Available Fibrous Glass Duct Liner R-Values

	Thickness in., (mm)	R-value, hr•ft ² •°F/Btu	RSI, m ² •°C/W
Type I:	½ (13)	1.9 – 2.2	0.34 – 0.38
	1 (25)	3.6 – 4.3	0.63 – 0.77
	1½ (38)	5.4 – 6.3	0.94 – 1.11
Type II:	2 (51)	7.1 – 8.3	1.26 – 1.47
	1 (25)	4.3	0.76
	1½ (38)	6.2 – 6.5	1.10 – 1.15
	2 (51)	8.3 – 8.7	1.47 – 1.53

Thermal values are for insulation only as determined by ASTM C 518 at 75° F (24° C) mean temperature and do not include air films or reflective surfaces. Values are subject to normal testing and manufacturing tolerances.