



Designation: C 1126 – 00

Standard Specification for Faced or Unfaced Rigid Cellular Phenolic Thermal Insulation¹

This standard is issued under the fixed designation C 1126; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification applies to faced or unfaced, rigid cellular phenolic thermal insulation in either board or tubular form. It does not apply to field expanded cellular phenolic materials.

1.2 Materials covered by this specification are used as roof insulation; sheathing or rigid board for non-load bearing, building material applications; and pipe insulation for use between –40 and 257°F (–40 and 125°C). Type II Grade 1 and Type III Grade 1 materials with an appropriate vapor retarder covering on the warm surface can be used to a lower temperature limit of –290°F (–180°C). (See 7.2.)

1.3 The values stated in inch-pound units are to be regarded as standard. International Standard Units (SI) are given in parentheses.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see Section 16.

2. Referenced Documents

2.1 ASTM Standards:

- C 168 Terminology Relating to Thermal Insulating Materials²
- C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus²
- C 209 Test Methods for Cellulosic Fiber Insulating Board²
- C 236 Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot Box²
- C 335 Test Method for Steady-State Heat Transfer Property of Horizontal Pipe Insulations²
- C 390 Criteria for Sampling and Acceptance of Preformed Thermal Insulation Lots²
- C 518 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of

the Heat Flow Meter Apparatus²

C 550 Practice for Measuring Trueness and Squareness of Rigid Block Thermal Insulation²

C 585 Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System)²

C 976 Test Method for Thermal Performance of Building Assemblies by Means of a Calibrated Hot Box²

C 1045 Practice for Calculating Thermal Transmission Properties from Steady-State Heat Flux Measurements²

C 1058 Practice for Selecting Temperatures for Evaluating and Reporting Thermal Properties of Thermal Insulation²

C 1303 Test Method for Estimating Long-Term Change in the Thermal Resistance of Unfaced Rigid Closed Cell Plastic Foams by Slicing and Scaling Under Controlled Laboratory Conditions.²

D 1621 Test Method for Compressive Properties of Rigid Cellular Plastics.³

D 1622 Test Method for Apparent Density of Rigid Cellular Plastics.³

D 1623 Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics³

D 2126 Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging³

E 84 Test Method for Surface Burning Characteristics of Building Materials⁴

E 96 Test Methods for Water Vapor Transmission of Materials²

3. Terminology

3.1 The definitions and terms in Terminology C 168 shall apply to this specification.

4. Classification

4.1 The thermal insulation shall be of the following types and grades:

4.1.1 *Type I*—For use as roof insulation board.

4.1.2 *Type II*—For use as sheathing or rigid panel for non-load bearing applications.

4.1.3 *Type III*—For use as pipe insulation.

4.1.4 *Grade 1*—Foam for Type I of this grade will have an

¹ This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.22 on Organic and Nonhomogeneous Inorganic Thermal Insulations.

Current edition approved Nov. 10, 2000. Published February 2001. Originally published as C 1126 – 89. Last previous edition C 1126 – 98.

² Annual Book of ASTM Standards, Vol 04.06.

³ Annual Book of ASTM Standards, Vol 08.01.

⁴ Annual Book of ASTM Standards, Vol 04.07.

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average apparent thermal conductivity of 0.16 Btu·in./h·ft²·°F (0.023 W/mK) or less and foam for Types II and III of this grade will have an average apparent thermal conductivity of 0.13 Btu·in./h·ft²·°F (0.019 W/mK) or less at a mean temperature of 75°F (24°C) when aged in accordance with 13.6.1.

4.1.5 *Grade 2*—Foam of this grade will have an average apparent thermal conductivity of 0.23 Btu·in./h·ft²·°F (0.033 W/mK) or less at a mean temperature of 75°F (24°C).

NOTE 1—The average thermal conductivities shown in this section are for classification only, not for qualification purposes as indicated by Section 10.1.

5. Ordering Information

5.1 Orders for materials purchased under this specification shall include the following information:

- 5.1.1 Designation of this specification.
- 5.1.2 Product name, type, and/or grade.
- 5.1.3 Size and dimensions.

5.1.4 Quantity of material.

5.1.5 Special requirements for inspection and/or testing.

5.1.6 Pipe insulation jacketing (optional).

6. Materials and Manufacture

6.1 *Foam Core Chemical Composition*—The foam shall be produced by a chemical reaction of a phenolic resin, surfactant, blowing agent, and other additives as needed.

6.2 *Facings (Jackets)*—Facing or jackets, if required, shall be adhered to the core stock and suitable for the service intended. They shall be supplied as agreed upon between manufacturer and purchaser.

7. Physical Properties

7.1 The material shall conform to the requirements as shown in Table 1.

7.2 Not all physical properties at temperatures below −40°F (−40°C) have been fully tested, and the user should consult the

TABLE 1 Physical Properties

Property	Unit	Type I	Type II	Type III ^A
Density, min 16/ft ³ (kg/m ³)		N/A ^B	2 (32)	2 (32)
Compressive resistance, min (faced or unfaced)	psi (kPa)	16 (108)	18 (124)	18 (124)
Tensile strength, min (faced)	psf (Pa)	150 (7180)	N/A ^B	N/A ^B
Apparent Thermal Conductivity, max ^C (foam core):	Btu·in./h·ft ² ·°F (W/mK)			
Grade 1				
−250°F (−157°C) mean temp.		N/A ^B	0.10 (0.015)	0.10 (0.015)
−200°F (−129°C) mean temp.		N/A ^B	0.11 (0.016)	0.11 (0.016)
−150°F (−101°C) mean temp.		N/A ^B	0.12 (0.017)	0.12 (0.017)
−100°F (−73°C) mean temp.		N/A ^B	0.13 (0.019)	0.13 (0.019)
−50°F (−46°C) mean temp.		N/A ^B	0.13 (0.019)	0.13 (0.019)
−0°F (−17°C) mean temp.		N/A ^B	0.13 (0.019)	0.13 (0.019)
40°F (4°C) mean temp.		0.14 (0.020)	0.13 (0.019)	0.13 (0.019)
75°F (24°C) mean temp.		0.16 (0.023)	0.13 (0.019)	0.13 (0.019)
110°F (43°C) mean temp.		0.18 (0.026)	0.15 (0.022)	0.15 (0.022)
150°F (65°C) mean temp.		N/A ^B	N/A ^B	0.18 (0.026)
Grade 2				
40°F (4°C) mean temp.		0.21 (0.030)	0.21 (0.030)	0.21 (0.030)
75°F (24°C) mean temp.		0.23 (0.033)	0.23 (0.033)	0.23 (0.033)
110°F (43°C) mean temp.		0.25 (0.036)	0.25 (0.036)	0.28 (0.036)
150°F (65°C) mean temp.		N/A ^B	N/A ^B	0.28 (0.040)
Dimensional stability, 1 week ^D	% lin chg, max			
Exposure (foam core):				
257 ± 4°F (125 ± 2°C), ambient RH		N/A ^B	N/A ^B	2
−40 ± 6°F (−40 ± 3°C), ambient RH		2	2	2
158 ± 4°F (70 ± 2°C), 97 ± 3 % RH		2	2	2
Water absorption, max, (foam core):	% by volume			
Grade 1		3.0	3.0	3.0
Grade 2		8.0	8.0	8.0
Water vapor permeance, perms, (faced)	grains/h·ft ² ·in.·Hg (ng/s·m ² ·Pa)			
Grade 1		E	≤1.0 (57) ^F	<0.02 (1.15)
Grade 2		E	>3.0 (170)	<0.02 (1.15)
Water vapor permeability, max, perm-in. (foam core)				
Grade 1		0.15 (0.22)	0.15 (0.22)	0.15 (0.22)
Grade 2		>4.0 (5.8)	>4.0 (5.8)	>4.0 (5.8)
Flame spread index, max ^{G,H} (foam core)		25	25	25
Smoke developed index, max ^{G,H} (foam core)		50	50	50

^A Type III test samples shall be obtained from a free-rise block of foam, except where otherwise specified.

^B N/A = not applicable.

^C Thermal Conductivity tests shall be used for classification purposes only.

^D Dimensional stability data at lower temperature will be added when testing problem is complete.

^E No minimum or maximum values are required for Type I material. It is expected roof design will reflect actual building and environmental conditions. Under certain circumstances a vapor retarder may be required.

^F Consult manufacturer for application in cold climates where larger permeance values may be desirable.

^G This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk under actual fire conditions.

^H Facings used on composite products may cause the flame and smoke ratings of the composite to be significantly different than the foam core alone.