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Standard Specification for Cellulosic Fiber Insulating Board¹

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This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers the principal cellulosic fiber insulating board types, grades, and sizes. Requirements are specified for composition, construction, physical properties, tolerances, sampling procedures, and test methods.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 When the installation or use of thermal insulation materials, accessories, and systems may pose safety or health problems, the manufacturer shall provide the user appropriate current information regarding any known problems associated with the recommended use of the company's products and shall also recommend protective measures to be employed in their safe utilization. The user shall establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.

2. Referenced Documents

2.1 *ASTM Standards*:²

C165 Test Method for Measuring Compressive Properties of Thermal Insulations

C168 Terminology Relating to Thermal Insulation

C209 Test Methods for Cellulosic Fiber Insulating Board

C390 Practice for Sampling and Acceptance of Thermal Insulation Lots

C846 Practice for Application of Cellulosic Fiber Insulating Board for Wall Sheathing

D1037 Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials

D1554 Terminology Relating to Wood-Base Fiber and Particle Panel Materials

D2164 Methods of Testing Structural Insulating Roof Deck (Withdrawn 2005)³

E72 Test Methods of Conducting Strength Tests of Panels for Building Construction

2.2 *Federal Standard*:

4900.1 Rev-1 U.S. Dept. of Housing and Urban Development Minimum Property Standards, One and Two Family Dwellings⁴

3. Terminology

3.1 For definitions of terms used in this specification, see Terminology **C168** and Definitions **D1554**.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *cellulosic fiber insulating board*—a fibrous-felted, homogeneous panel made from ligno-cellulosic fibers (usually wood) and having a density of less than 31 lb/ft³ (497 kg/m³) but more than 10 lb/ft³ (160 kg/m³).

3.2.1.1 *Discussion*—Cellulosic fiber insulating board is characterized by an integral bond which is produced by interfelting of the fibers, but which has not been consolidated under heat and pressure as a separate stage in manufacture. Other materials may be added during manufacture to improve certain properties.

4. Classification

4.1 Insulating board covered by this specification consists of six types:

4.1.1 *Type I*—Sound deadening board, for use in wall assemblies to control sound transmissions.

4.1.2 *Type II*—Roof insulation board, for use in various roofing systems.

4.1.2.1 *Grade 1*—Primarily for use under built-up, and modified bitumen roof systems.

4.1.2.2 *Grade 2*—Primarily for use under single-ply, built-up, and modified bitumen roofing systems.

4.1.3 *Type III*—Ceiling tiles and panels.

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.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from the U.S. Department of Housing and Urban Development, Construction Standards Division, HUD Building, Washington, DC 20410.

4.1.3.1 *Grade 1*—Nonacoustical, for use as decorative wall and ceiling coverings.

4.1.3.2 *Grade 2*—Acoustical, for use as decorative, sound absorbing wall and ceiling coverings.

4.1.4 *Type IV*—Wall Sheathing.

4.1.4.1 *Grade 1*—Regular, for use as wall sheathing in frame construction.

4.1.4.2 *Grade 2*—Structural, for use as wall sheathing in frame construction. When installed in accordance with Practice C846, structural wall sheathing provides adequate racking resistance for use as exterior wall bracing.

4.1.5 *Type V*—Backer board, for use behind exterior finish in wall assemblies where there are no structural requirements.

4.1.6 *Type VI*—Roof deck, for use as roof decking for flat, pitched, or shed-type, open-beamed, ceiling-roof construction.

4.2 On occasion these products are used for other applications. The manufacturer and the purchaser shall agree upon any special requirements for such end uses.

5. Materials and Manufacture

5.1 Cellulosic fiber insulating board shall be manufactured from refined or partially refined ligno-cellulosic (usually wood) fibers, by a felting or molding process, into homogeneous panels. Other ingredients may be added to provide or improve certain properties such as strength and water resistance, in addition to surface finishes for decorative products and special coatings which impart resistance to flame spread. The material is subjected to such drying temperatures as to effect complete destruction of rot producing fungi.

5.2 The finished board may be either single or multiple ply. When multiple-ply boards are supplied, a suitable moisture-resistant adhesive shall be used to join the plies.

6. Physical Properties

6.1 The insulating board shall conform to the physical properties in Table 1.

6.2 Roof products with a thickness of 1 in., 1½ in., 2½ in., or greater, are post-laminated using thinner board stock whose properties are covered in Table 1. When laminated, tests shall be performed on the thin board stock.

7. Dimensions, Mass, and Permissible Variations

7.1 The materials covered by this specification are available in the sizes shown in Table 2.

7.2 *Length and Width Tolerances*—Unless otherwise specified, the tolerance for length and width of any size panel shall be + 0, - 1/16 in. per ft (+ 0, - 5.2 mm/m), but the total tolerance in any dimension shall not exceed + 0, - 3/8 in. (+ 0 mm, - 10 mm).

7.3 *Thickness Tolerance*—The thickness tolerances are shown in Table 3.

8. Workmanship, Finish, and Appearance

8.1 *Defects*—The insulating board shall have no defects that will adversely affect its service qualities. The surface shall be free of cracks, lumps, excessive departure from planeness, or other defects that affect performance or appearance.

TABLE 1 Physical Property Requirements for Cellulosic Fiber Insulating Board

Physical Requirements	Sound Deadening Board				Roof Insulation Board			
	½ in. (13 mm) thick	Grade 1			Grade 2			
		7/16 in. (11 mm) thick	½ in. (13 mm) thick	1 in. (25 mm) thick	2 in. (51 mm) thick	½ in. (13 mm) thick	1 in. (25 mm) thick	2 in. (51 mm) thick
Thermal conductivity (k), max, Btu·in./h·ft ² ·°F (W/m·K) at mean temperature of 75± 5°F (24 ± 3°C)	0.38 (0.055)	0.38 (0.055)	0.38 (0.055)	0.38 (0.055)	0.38 (0.055)	0.50 (0.072)	0.40 (0.058)	0.40 (0.058)
Transverse strength either direction, min, lbf (N)	12 (53.4)	7 (31.1)	7 (31.1)	14 (62.3)	28 (124.6)	12 (53.4)	24 (107)	36 (160)
Tensile strength parallel to surface, min, lbf/in. ² (kPa) ^B	150 (1034)	50 (345)	50 (345)	50 (345)	...	150 (1034)	150 (1034)	...
Tensile strength perpendicular to surface, min, lbf/ft ² (kPa)	600 (28.7)	500 (23.9)	500 (23.9)	500 (23.9)	500 (23.9)	600 (28.7)	600 (28.7)	600 (28.7)
Water absorption by volume, max, %	7	10	10	10	10	7	7	7
Linear expansion, 50–90 % RH, max, %	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Flame Spread Index, finish surface, max	...	...	...	...	...	...	...	...
Vapor permeance, grains/h·ft ² ·in. Hg pressure differential, (mg/s·m ² ·kPa) min	5 (0.287)	...	...	...	...	...	...	...
Modulus of rupture, min, lbf/in. ² (kPa)	240 (1655)	140 (965)	140 (965)	80 (552)	40 (276)	275 (1896)	140 (965)	70 (483)
Deflection at specified min load, max, in. (mm)	0.85 (22)	1.25 (32)	1.25 (32)	0.62 (16)	0.31 (8)	0.75 (19)	0.42 (11)	0.21 (5)
Modulus of Elasticity, min, lbf/in. ² × 10 ³ (mPa) ^F	...	...	...	...	...	...	...	...
Deflection Span Ratio, max ^F	...	...	...	...	...	...	...	...
Moisture content by weight, max, %	10	10	10	10	10	10	10	10
Racking Load ^G , min plf (N/m)	...	...	...	...	...	...	...	...
Compressive Strength ^H , min, lbf/in. ² (kPa)	...	14.5 (100)	14.5 (100)	14.5 (100)	14.5 (100)	15 (105)	15 (105)	15 (105)