Designation: C 1289 – 06

# Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board[1]

This standard is issued under the fixed designation C 1289; 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.

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

## 1. Scope

1.1 This specification covers the general requirements for faced thermal insulation boards composed of rigid cellular polyisocyanurate surfaced with other materials. The insulation boards are intended for use at temperatures between −40 and 200°F (−40 and 93°C). This specification does not cover cryogenic applications. Consult the manufacturer for specific recommendations and properties in cryogenic conditions. For specific applications, the actual temperature limits shall be agreed upon by the manufacturer and the purchaser.

1.2 This standard is intended to apply to rigid cellular polyurethane-modified polyisocyanurate thermal insulation board products that are commercially acceptable as non-structural panels useful in building construction. The term polyisocyanurate encompasses the term polyurethane. For engineering and design purposes, users should follow specific product information provided by board manufacturers regarding physical properties, system design considerations and installation recommendations.

1.3 The use of thermal insulation materials covered by this specification is typically regulated by building codes, or other agencies that address fire performance. Where required, the fire performance of the material shall be addressed through standard fire test methods established by the appropriate governing documents.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only. For conversion to metric units other than those contained in this standard, refer to IEEE/ASTM SI 10.

1.5 The following safety hazards caveat pertains only to the test methods, Section 11, in this specification. *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.*

## 2. Referenced Documents

2.1 The following documents, of the issue in effect on the date of material purchase, form a part of this specification to the extent specified herein:

2.2 *ASTM Standards:* [2]

C 168 Terminology Relating to Thermal Insulation

C 177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus

C 203 Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation

C 208 Specification for Cellulosic Fiber Insulating Board

C 209 Test Methods for Cellulosic Fiber Insulating Board

C 303 Test Method for Dimensions and Density of Preformed Block and Board–Type Thermal Insulation

C 390 Practice for Sampling and Acceptance of Thermal Insulation Lots

C 518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

C 550 Test Method for Measuring Trueness and Squareness of Rigid Block and Board Thermal Insulation

C 728 Specification for Perlite Thermal Insulation Board

C 1045 Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions

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

C 1114 Test Method for Steady-State Thermal Transmission Properties by Means of the Thin-Heater Apparatus

C 1177/C 1177M Specification for Glass Mat Gypsum Substrate for Use as Sheathing

C 1303 Test Method for Predicting Long-Term Thermal Resistance of Closed-Cell Foam Insulation

C 1363 Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus

D 1621 Test Method for Compressive Properties Of Rigid Cellular Plastics

[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.

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

E 84 Test Method for Surface Burning Characteristics of Building Materials

E 96/E 96M Test Methods for Water Vapor Transmission of Materials

IEEE/ASTM SI 10–Standard for Use of the International System of Units (SI): (The Modernized Metric System)

2.3 *ANSI Standard:*

Voluntary Product Standard PS 2–04 Performance Standard for Wood Based Structural Use Panels Performance Standard for Wood Based structural Use Panels [3]

2.4 *CAN/ULC Standard:*

CAN/ULC-S770-00 Standard Test Method for Determination of Long-Term Thermal Resistance of Closed-Cell Thermal Insulating Foams[4]

## 3. Terminology

3.1 For complete descriptions of terms used in this specification, refer to Terminology C 168.

3.2 The term polyisocyanurate encompasses the term polyurethane (see 1.2).

## 4. Classification

4.1 The faced thermal insulation boards composed of rigid cellular polyisocyanurate covered by this specification are classified as follows:

4.1.1 *Type I*—Faced with aluminum foil on both major surfaces of the core foam.

4.1.1.1 *Class 1*—Non-reinforced core foam.

4.1.1.2 *Class 2*—Glass fiber reinforced core foam.

4.1.2 *Type II*:

4.1.2.1 *Class 1*—Faced with glass fiber reinforced cellulosic felt or uncoated or coated polymer-bonded glass fiber mat facers on both major surfaces of the core foam.

4.1.2.1.1 *Grade 1*—16 psi (110 kPa), min, compressive strength.

4.1.2.1.2 *Grade 2*—20 psi (138 kPa), min, compressive strength.

4.1.2.1.3 *Grade 3*—25 psi (172 kPa), min, compressive strength.

4.1.2.2 *Class 2*—Faced with coated polymer-bonded glass fiber mat facers on both major surfaces of the core foam.

4.1.2.3 *Class 3*—Faced with uncoated polymer-bonded glass fiber mat facers on both major surfaces of the core foam.

4.1.3 *Type III*—Faced with a perlite insulation board on one major surface of the core foam and a glass fiber reinforced cellulosic felt or uncoated or coated polymer-bonded glass fiber mat facer on the other major surface of the core foam.

4.1.4 *Type IV*—Faced with a cellulosic fiber insulating board on one major surface of the core foam and a glass fiber reinforced cellulosic felt or uncoated or coated polymer-bonded glass fiber mat facer on the other major surface of the core foam.

4.1.5 *Type V*—Faced with oriented strand board or waferboard on one major surface of the foam and a glass fiber reinforced cellulosic felt or uncoated or coated polymer-bonded glass fiber mat facer on the other major surface of the core foam.

NOTE 1—These general statements refer to generic composition descriptions of facer materials, bonded fibrous felts, and mats that are currently commercially accepted in the marketplace for these products, using terms common to these competing products. Felts are made with organic fibers, inorganic fibers, or mixtures of organic and inorganic fibers. Glass fiber mats are used uncoated, or coated.

4.1.6 *Type VII*—Faced with glass mat faced gypsum board on one major surface and glass fiber reinforced cellulosic felt or uncoated or coated polymer-bonded glass fiber mat facer on the other major surface of the core foam.

## 5. Ordering Information

5.1 Orders shall include the following information:

5.1.1 Title, designation, and year of issue of C 1289,

5.1.2 Quantity of material being ordered,

5.1.3 Product name and manufacturer's name, address, and telephone number,

5.1.4 Type or Class, or both, if Type 1; type, class, and grade or type and class, if Type II, (see Section 4),

5.1.5 R-value and specific thickness, as required (see 7.2),

5.1.6 Tolerance if other than specified (see 8.1),

5.1.7 Size(s) required (see 8.6),

5.1.8 Type of edge (see 8.3 and 8.4),

5.1.9 Sampling, if different (see 10.1),

5.1.10 If a certificate of compliance is required (see 10.2, 10.3, 10.4, Table 1 and Table 2),

5.1.11 If packaging is other than specified (see 13.1), and

5.1.12 If marking is other than specified (see 13.2).

## 6. Materials and Manufacture

6.1 *Cellular Material*—Rigid polyisocyanurate thermal insulation boards shall be based upon the reaction of an isocyanate with a polyol, or the reaction of an isocyanate with itself, or both, using a catalyst and blowing agents to form a rigid closed-cell-structured polyisocyanurate foam. The insulation foam core shall be homogeneous and of uniform density.

6.2 *Facing Materials*—The facing material incorporated into the design of the faced thermal insulation board shall be as follows:

6.2.1 *Aluminum Foil*—Aluminum foil is plain or coated aluminum foil, or foil laminated to a supporting membrane.

6.2.2 *Glass Fiber Reinforced Cellulosic Felt*—This felt shall consist of a cellulosic fiber felt containing glass fibers.

6.2.3 *Coated Polymer-Bonded Glass Fiber Mat*—The polymer-bonded glass fiber mat shall consist of fibrous glass mats bonded with organic polymer binders and coated with organic polymer, clay, or other inorganic substances.

6.2.4 *Uncoated Polymer-Bonded Glass Fiber Mat*—The polymer-bonded glass fiber mat shall consist of fibrous glass

[3] United States Department of Commerce, National Institute of Standards and Technology, Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402

[4] Available from Underwriter's Laboratories of Canada (ULC), 7 Crouse Road, Toronto, Ontario, M1R 3A9.

**TABLE 1 Physical Properties**[A]

| Product Type | Type I Class 1 | Type I Class 2 | Type II Class 1 | Type II Class 2 | Type II Class 3 | Type III | Type IV | Type V | Type VII |
|---|---|---|---|---|---|---|---|---|---|
| Facer covering one surface | aluminum foil | aluminum foil | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Coated polymer-bonded glass fiber mat | Uncoated polymer-Bonded glass fiber mat | Perlite insulation board | Cellulosic fiber insulating board | Oriented strand board or wafer-board | Glass mat faced gypsum board |
| Facer covering opposite surface | aluminum foil | aluminum foil | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Coated polymer-bonded glass fiber mat | Uncoated polymer-bonded glass fiber Mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat |
| Physical Property | | | | | | | | | |
| Compressive strength, psi (kPa), min | 16 (110) | 16 (110) | Grade 1 16 (110) Grade 2 20 (138) Grade 3 25 (172) | Grade 1 16 (110) Grade 2 20 (138) Grade 3 25 (172) | Grade 1 16 (110) Grade 2 20 (138) Grade 3 25 (172) | 16 (110) | 16 (110) | 16 (110) | 16 (110) |
| Dimensional stability | | | | | | | | | |
| Percent linear change, thickness, max | | | | | | | | | |
| –40°F (–40°C) amb, RH | 2.0 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 158°F (70°C)/ 97 % RH | 2.0 | 1.5 | 4.0 | 4.0 | 4.0 | 2.0 | 4.0 | 4.0 | 4.0 |
| 200°F (93°C)/ amb RH | 4.0 | 1.5 | 4.0 | 4.0 | 4.0 | 2.0 | 4.0 | 4.0 | 4.0 |
| Percent linear change, length and width, max | | | | | | | | | |
| –40°F (–40°C) amb, RH | 2.0 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| 158°F (70°C)/ 97 % RH | 2.0 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 | 4.0 | 4.0 | 4.0 |
| 200°F (93°C) amb, RH | 4.0 | 1.5 | 2.0 | 2.0 | 2.0 | 2.0 | 4.0 | 4.0 | 4.0 |
| Flexural strength (modulus of rupture) | | | | | | | | | |
| psi (kPa), min | 40 (275) | 40 (275) | 40 (275) | 40 (275) | 40 (275) | 40 (275) | 40 (275) | 40 (275) | 40 (275) |
| (Break load) lbf (N), min | 8 (35) | 8 (35) | 17 (75) | 17 (75) | 17 (75) | 17 (75) | 17 (75) | 17 (75) | 17 (75) |



mats bonded with organic polymer bonded binders.

**TABLE 1** *Continued*

| Product Type | Type I Class 1 | Type I Class 2 | Type II Class 1 | Type II Class 2 | Type II Class 3 | Type III | Type IV | Type V | Type VII |
|---|---|---|---|---|---|---|---|---|---|
| Facer covering one surface | aluminum foil | aluminum foil | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Coated polymer-bonded glass fiber mat | Uncoated polymer-Bonded glass fiber mat | Perlite insulation board | Cellulosic fiber insulating board | Oriented strand board or wafer-board | Glass mat faced gypsum board |
| Facer covering opposite surface | aluminum foil | aluminum foil | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Coated polymer-bonded glass fiber mat | Uncoated polymer-bonded glass fiber Mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat |
| Tensile strength, psf (kPa), min Perpendicular to board surface | 500 (24) | 500 (24) | 500 (24) | 500 (24) | 500 (24) | 500 (24) | 500 (24) | 500 (24) | 500 (24) |
| Water absorption 2h percent by volume, max | 1.0 | 1.0 | 1.5 | 1.5 | 2.0 | 2.0 | 2.0 | 1.0 | 1.0 |
| Water vapor transmission, perm (ng/Pa·s·m$^2$), max | 0.3 (17.2) | 0.3 (17.2) | 1.0 (57.2) | 4.0 (228.8) | 8.0 (457.6) | 8.0 (457.6) | [B] | [B] | |

[A] Because core foam thickness and facer type, thickness, and permeability can all influence the magnitude of values measured for these physical properties, a product with nominal 1 in. foam core has been described for referee purposes. Consult manufacturers regarding specific foam-facer composite products and other product thicknesses. When appropriate, physical property values as agreed between buyer and seller shall replace those listed in Table 1 as qualification requirements described in 10.3.

[B] Not applicable.



6.2.5 *Perlite Insulation Board*—The perlite insulation board shall conform to the material and physical property requirements specified in Standard Specification C 728, either type 1 or type 2 may be used. The perlite insulation board may be either the ½-in. board listed in Specification C 728, which has a *higher* core density and *modified* formulation (as agreed upon between buyer and seller) than the thicker products, or may be a ½-in. thickness (available only to manufacturers of laminated rigid foam products) of the ¾ to 3 in. formulation perlite board listed in Specification C 728.

6.2.6 *Cellulosic Fiber Insulation Board*—The cellulosic fiber insulating board shall conform to the material and physical properties requirements specified in Specification C 208.

6.2.7 *Oriented Strand Board and Waferboard*—The oriented strand board and waferboard shall conform to the material and physical properties requirements specified in U.S. Voluntary Product Standard PS 2–04.

6.2.8 *Glass Mat Faced Gypsum Board*—The glass mat faced gypsum board shall be ¼ in. (6.4 mm) thickness and shall conform to the material and physical properties requirements in Specification C 1177.

## 7. Physical Properties

7.1 The thermal insulation board shall conform to the properties stated in Table 1.

7.1.1 The physical properties stated in Table 1 shall not be used as design or engineering values unless this recommendation is made in writing by the product manufacturer. It remains the buyer's responsibility to specify design requirements and obtain supporting physical properties documentation from each product manufacturer and supplier.

7.2 *Thermal Resistance (R-value)*—When ordering, specify the R-value; thickness shall be specified if there is a specific thickness requirement and R-value is not specified. The values specified shall be for the faced insulation product only, and shall not include any additional thermal resistances from

**TABLE 2 Thermal Resistance Properties[A,B]**

| Product Type | Type I Class 1 | Type I Class 2 | Type II Class 1 Grades 1, 2, 3 | Type II Class 2 | Type II Class 3 | Type III | Type IV | Type V | Type VII |
|---|---|---|---|---|---|---|---|---|---|
| Facer covering one surface | Aluminum foil | Aluminum foil | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Coated polymer-bonded glass fiber mat | Uncoated polymer-bonded glass fiber mat | Perlite insulation board | Cellulosic fiber insulating board | Oriented strand board or wafer-board | Glass mat faced gypsum board |
| Facer covering opposite surface | Aluminum foil | Aluminum foil | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Coated polymer-bonded glass fiber mat | Uncoated polymer-bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber matt | Glass fiber reinforced cellulosic felt or uncoated or coated polymer bonded glass fiber mat |
| Minimum Thermal Resistance @ 40± 2°F (4 ± 1°C) mean temp. $^{\circ F\ ft^2\ h}/_{Btu}$ ($Km^2/W$) | | | | | | | | | |
| 1 in. (25.4 mm) product | 6.6 (1.16) | 6.6 (1.16) | 6.2 (1.10) | 5.8 (1.02) | 5.5 (0.97) | Product Not Available | Product Not Available | Product Not Available | Product Not Available |
| 1.5 in. (38.1 mm) product | 9.9 (1.74) | 9.9 (1.74) | 9.2 (1.62) | 8.7 (1.53) | 8.25 (1.45) | 7.6 (1.34) | 7.5 (1.32) | 6.8 (1.32) | 7.7 (1.36) |
| 2 in. (50.8 mm) product | 13.2 (2.232) | 13.2 (2.232) | 12.3 (2.17) | 11.7 (2.06) | 11.0 (1.94) | 10.6 (1.85) | 10.5 (1.85) | 9.8 (1.73) | 10.8 (1.90) |
| Minimum Thermal Resistance @ 75± 2°F (24 ± 1°C) mean temp. $^{\circ F\ ft^2\ h}/_{Btu}$ ($Km^2/W$) | | | | | | | | | |
| 1 in. (25.4 mm) product | 6.0 (1.06) | 6.0 (1.06) | 5.6 (0.97) | 5.3 (0.93) | 5.0 (0.88) | Product Not Available | Product Not Available | Product Not Available | Product Not Available |
| 1.5 in. (38.1 mm) product | 9.0 (1.59) | 9.0 (1.59) | 8.4 (1.48) | 8.0 (1.41) | 7.5 (1.32) | 7.0 (1.23) | 6.9 (1.22) | 6.2 (1.09) | 7.0 (1.23) |
| 2 in. (50.8 mm) product | 12.0 (2.11) | 12.0 (2.11) | 11.2 (1.97) | 10.6 (1.87) | 10.0 (1.76) | 9.8 (1.73) | 9.7 (1.71) | 9.0 (1.59) | 9.8 (1.73) |
| Minimum Thermal Resistance @ 110± 2°F (43 ± 1°C) mean temp. $^{\circ F\ ft^2\ h}/_{Btu}$ ($Km^2/W$) | | | | | | | | | |
| 1 in. (25.4 mm) product | 5.4 (0.95) | 5.4 (0.95) | 5.0 (0.88) | 4.8 (0.85) | 4.5 (0.79) | Product Not Available | Product Not Available | Product Not Available | Product Not Available |
| 1.5 in. (38.1 mm) product | | | 7.6 (1.34) | 7.2 (1.26) | 6.75 (1.19) | 6.4 (1.13) | 6.3 (1.10) | 5.6 (0.99) | 6.3 (1.11) |
| 2 in. (50.8 mm) product | | | 10.1 (1.78) | 9.5 (1.67) | 9.0 (1.59) | 9.0 (1.59) | 8.9 (1.57) | 8.2 (1.44) | 8.9 (1.57) |

[A] Because core foam thickness and facer type, thickness, and permeability can all influence product R-values, three faced product thicknesses have been described for referee purposes. Consult manufacturers regarding specific foam-facer composite products and other thicknesses. When appropriate, thermal resistance values as agreed between buyer and seller shall replace those listed in Table 2 as qualification requirements described in 10.3.

[B] Determined in accordance with conditioning procedures in 11.1.2. Values for composite products are based on calculation using Type II Class 1 R-values and the R-value of the specific composite product used.

reflective facer surfaces and adjacent air spaces or from other components of the building system. The mean thermal resistance of the material tested shall not be less than the minimum relevant value prescribed in Table 2. The thermal resistances of individual specimens tested shall not be less than 90 % of the minimum value identified in Table 2. Values in Table 2 determined in accordance with Section 11.

NOTE 2—Thermal resistance of cellular plastics may be significantly influenced by installation and service-related variables such as age, encapsulation within gas barrier materials, environmental conditions, mechanical abuse, etc. and may be reduced from measured values after exposure to conditions of use. For specific design recommendations, consult the manufacturer or qualified professionals, such as architects or engineers.

7.2.1 *Long-Term Thermal Resistance (LTTR)*—Determine, and report values, in accordance with practice and details in Annex A1.

7.3 *Fire Characteristics*—Polyisocyanurate thermal insulation boards are combustible. They shall not be exposed to open flames or other ignition sources. The fire performance of the material shall be addressed through fire test requirements established by the appropriate governing authority, which are specific to the end use and occupancy.

7.3.1 *Surface Burning Characteristics*—Determine, if required, in accordance with Test Method E 84.

## 8. Dimensions

8.1 *Dimensional Tolerances*—The length and width tolerances shall not exceed ±¼ in. (6.4 mm), the thickness tolerance shall not exceed ⅛ in. (3.2 mm), and the thickness of any two boards shall not differ more than ⅛ in. (3.2 mm) when measured in accordance with Test Method C 303.

8.2 *Board Squareness*—The thermal insulation boards shall not be out of square more than 1⁄16 in./ft (5.2 mm/m) of width or length, when examined in accordance with Practice C 550.

8.3 *Straight Edges*—Unless otherwise specified, the thermal insulation board shall be furnished with straight edges and edges shall not deviate more than 1⁄32 in./ft (2.6 mm/m) when examined in accordance with Practice C 550.

8.4 *Shiplap Edges*—When specified, the insulation board shall be fabricated with shiplap edges along its longest dimensions.

8.4.1 The nominal depth of each shiplap shall be the sum of its thickest facer dimension plus one half the thickness of its core foam dimension.

8.4.2 For boards 2 in. (50.8 mm) or greater in nominal thickness, the width of the shiplap shall be 1 in. (25.4 mm). For boards less than 2 in. (50.8 mm) in thickness, the nominal width of the shiplap shall be one half the thickness of the faced board product.

8.4.3 All fabrication tolerances shall provide for a dimensionally stable, smooth, and uniform shiplap joint in installation and in service.

8.5 *Flatness*—The thermal insulation boards shall not depart from absolute flatness more than ⅛ in./ft (10 mm/m) of length or width when examined in accordance with Practice C 550.

8.6 *Available Sizes*—The thermal insulation boards are normally supplied in sizes of 4 by 4 ft (1.22 by 1.22 m), and 4 by 8 ft (1.22 by 2.44 m) for use in roofing applications. For sheathing applications the thermal insulation boards are normally supplied in sizes of 4 by 8 ft (1.22 by 2.44 m), 4 by 9 ft (1.22 by 2.75 m), 4 by 10 ft (1.22 by 3.05 m) and 4 by 12 ft (1.22 by 3.66 m). Other sizes shall be agreed upon between the manufacturer and purchaser.

8.7 *Crushings and Depressions*—The thermal insulation boards shall have no crushed or depressed areas on any surface exceeding ⅛ in. (3.2 mm) in depth on more than 10 % of the total surface area.

## 9. Workmanship

9.1 The thermal insulation boards shall have no defects that will adversely affect their service qualities. The boards shall be of uniform texture and facer integrity, free from the accumulation of unexpanded materials, foreign materials, broken edges and corners, slits, delaminations, and objectionable odors.

## 10. Sampling

10.1 Unless otherwise specified, the product shall be sampled and inspected for acceptance of material in accordance with Criteria C 390.

10.2 The following physical requirements are defined as inspection requirements in accordance with Criteria C 390:

10.2.1 All dimension requirements as described in Section 8.

10.2.2 All workmanship, finish, and appearance requirements as described in Section 9.

10.3 The following physical properties are defined as qualification requirements in accordance with Criteria C 390.

10.3.1 Thermal resistance as described in Section 11.2 and Table 2.

10.3.2 Compressive strength as described in Section 11.3 and Table 1. Five equally spaced specimens are to be taken for testing along a cross-machine board traverse (perpendicular to the machine direction.

10.3.3 Dimensional stability as described in Section 11.4 and Table 1.

10.3.4 Flexural strength as described in Section 11.5 and Table 1.

10.3.5 Tensile strength perpendicular to board surface as described in Section 11.6 and Table 1.

10.3.6 Water absorption as described in Section 11.7 and Table 1.

10.3.7 Water vapor transmission as described in Section 11.8 and Table 1.

10.4 For lots of 150 units or less not subject to tightened inspection, the supplier's certificate of compliance or third-party's certificate of compliance shall be sufficient basis for acceptance of the lot. The certificate shall state that compliance to inspection requirements has been verified by actual inspection of material of the same type, class, size, and thickness manufactured within the same production period as the material offered.

## 11. Test Methods

11.1 *Conditioning*: