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Standard Specification for Fibrous Glass Blanket Insulation (Aircraft Type)¹

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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 composition, size, dimensions, and physical properties of glass fiber blanket thermal and acoustical insulation for use up to 700°F (370°C) in aircraft applications. For specific applications, the maximum temperature shall be agreed upon between the supplier and the purchaser.

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 *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 ASTM Standards:²

- C167 Test Methods for Thickness and Density of Blanket or Batt Thermal Insulations
- C168 Terminology Relating to Thermal Insulation
- C177 Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus
- C390 Practice for Sampling and Acceptance of Thermal Insulation Lots
- C411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation
- C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
- C552 Specification for Cellular Glass Thermal Insulation

¹ This specification is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.23 on Blanket and Loose Fill Insulation.

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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.

- C1045 Practice for Calculating Thermal Transmission Properties Under Steady-State Conditions
- C1058 Practice for Selecting Temperatures for Evaluating and Reporting Thermal Properties of Thermal Insulation
- C1304 Test Method for Assessing the Odor Emission of Thermal Insulation Materials
- C1511 Test Method for Determining the Water Retention (Repellency) Characteristics of Fibrous Glass Insulation (Aircraft Type)
- C1559 Test Method for Determining Wicking of Fibrous Glass Blanket Insulation (Aircraft Type)
- D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
- E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method
- F1110 Test Method for Sandwich Corrosion Test

2.2 Other Standards

- 14 CFR FAR (Federal Aviation Regulations) 25.853 Appendix F, Part I³
- 14 CFR FAR (Federal Aviation Regulations) 25.856(a) Appendix F, Part IV³

3. Terminology

3.1 *Definitions*—Terminology C168 shall be considered as applying to the terms used in this specification. Definitions in Test Method C552 shall be considered as applying to the acoustical terms used in this standard.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *Wetting*—A condition where the water has penetrated into the insulation and fills the spaces between the fibers.

4. Classification

4.1 Fibrous glass blanket insulation covered by this specification shall be classified into Types based on temperature limits, Classes based on acoustical properties, Grades based on nominal density and Groups based upon thickness as shown in Table 1.

4.2 The insulation shall be either water repellent or non-water repellent.

³ Available from, National Archives and Records Administration 8601 Adelphi Road College Park, MD 20740-6001.

TABLE 1 Types, Classes, Grades and Groups

Type I— For Use to 450°F (232°C) ClassAA							
Nominal Density		Maximum Density		Color (unless otherwise specified)	Nominal Thickness		
Grade	lb/ft ³	kg/m ³	lb/ft ³ (kg/m ³)		Group	in.	(mm)
A	0.34	(5.5)	0.39 (6.33)	Medium gray	1	0.38	(9.5)
B	0.42	(6.7)	0.48 (7.71)	Amber	2	0.50	(13)
C	0.50	(8.0)	0.58 (9.2)	Medium gray	3	1.00	(25)
D	0.60	(9.6)	0.69 (11.0)	Green	4	1.50	(38)
E	1.20	(19)	1.38 (21.9)	Medium gray	5	2.00	(51)
F	1.50	(24)	1.73 (27.6)	Amber			
G	1.00	(16)	1.15 (18.4)	Orange			

Class B							
Nominal Density		Maximum Density		Color	Nominal Thickness		
Grade	lb/ft ³	kg/m ³	lb/ft ³ (kg/m ³)		Group	in.	(mm)
A	0.50	(8.0)	0.58 (9.2)	Amber	1	0.38	(9.5)
B	0.60	(9.6)	0.69 (11.0)	Amber	2	0.50	(13)
C	1.00	(16)	1.15 (18.4)	Amber	3	1.00	(25)
					4	2.00	(50)

Type II— For Use to 700°F (370°C)							
Class AA							
Nominal Density		Maximum density		Color	Nominal Thickness		
Grade	lb/ft ³	kg/m ³	lb/ft ³ (kg/m ³)		Group	in.	(mm)
A	0.60	(9.6)	0.69 (11.0)	White to light tan	1	0.38	(9.5)
B	1.00	(16)	1.15 (18.4)	White to light tan	2	0.50	(13)
C	3.00	(48)	3.45 (55.2)	White to light tan	3	1.00	(25)

5. Ordering Information

5.1 The type, class, grade, and group suited to the conditions of intended service shall be specified by the purchaser after consultation with the supplier. Type refers to service temperature, class refers to thermal/acoustical properties, grade refers to nominal density and group refers to thickness of insulation.

5.2 It shall also be specified whether the insulation is to be water repellent or non-water repellent.

6. Materials and Manufacture

6.1 Composition:

6.1.1 Fiber shall be glass processed from a molten state into fibrous form.

6.1.2 Binder shall be of a type and quantity to provide the properties and performance listed in this specification. Additives can be included to provide a degree of water repellency.

6.1.3 This product is typically supplied unfaced.

6.1.4 The basic product can also be obtained in uncured form for molding into special shapes other than blanket. However, not all requirements in this specification apply. The purchaser shall consult the supplier and agree on the portions of this specification and conditions that are applicable.

6.2 For sizes and densities other than those listed, the purchaser shall consult the material supplier.

7. Physical Requirements

7.1 The insulation shall conform to the requirements described in 7.2-7.11 and Tables 1-5.

7.2 *Density*—The insulation shall conform to the requirements shown in Table 1. The insulation shall have a maximum density tolerance when tested in accordance with 11.6 of +15%, with no minimum limit.

TABLE 2 Other Properties

Property	Requirement, max
<i>Wicking:</i>	
Before Aging and Before Leaching, in. (mm)	¼ (6.4)
After Aging, in. (mm)	¼ (6.4)
After Leaching, in. (mm)	¼ (6.4)
<i>Water Repellency, lb. (kg):</i> ^A	0.044 (0.020)

^A Average of three test specimens.

7.3 *Handleability*—Each piece of insulation shall be sufficiently coherent to permit transportation and installation as a unit.

7.4 *Burning Characteristics*—The insulation shall conform to the requirements in FAR 25.853, Appendix F, Part I and the encapsulated insulation blanket shall conform to the requirements in FAR 25.856(a) in accordance with 11.1. If required, unfaced blankets are tested with alternative methods or requirements recognized by airframe manufacturers to demonstrate and maintain product consistency.

7.5 *Wicking (water-repellent insulation only)*—The insulation shall conform to the requirements in Table 2, when test in accordance with 11.2.

7.6 *Odor Emission*—A detectable odor of objectionable nature recorded by more than two of the five panel members shall constitute failure of the material, when tested in accordance with 11.3.

7.7 *Service Temperature*—The insulation shall conform to the requirements in Table 1, when tested in accordance with 11.7.

7.7.1 Insulation shall be serviceable up to the maximum temperature limitations as long as limited mechanical properties are required. At maximum or near-maximum service