



Designation: C592 – 22a

Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type)¹

This standard is issued under the fixed designation C592; 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 U.S. Department of Defense.

1. Scope

1.1 This specification covers the composition, dimensions, and physical properties of mineral fiber (rock, slag, or glass) metal mesh covered and industrial type blanket and blanket-type pipe insulation (typically on 24 in. (610 mm) diameters or larger)). Its use is for cooled surfaces at temperatures operating below ambient to 0°F (–18°C) and on heated surfaces on expansion joints to large diameter vessels and tanks operating at temperatures up to 1200°F (649°C). Specific applications outside the actual use temperatures shall be agreed upon between the manufacturer and purchaser.

1.2 For satisfactory performance, properly installed protective vapor retarders or barriers shall be used on below ambient temperature applications to reduce movement of moisture/water vapor through or around the insulation towards the colder surface. Failure to use a vapor retarder can lead to insulation and system damage. Refer to Practice C921 to aid material selection. Although vapor retarder properties are not part of this specification, properties required in Specification C1136 are pertinent to applications or performance.

1.3 The orientation of the fibers within the blanket is primarily parallel to the heated surface. This specification does not cover fabricated pipe and tank wrap insulation where the insulation has been cut and fabricated to provide fiber orientation that is perpendicular to the heated surface.

1.4 This standard does not purport to provide the performance requirements of hourly-rated fire systems. Consult the manufacturer for the appropriate system.

1.5 See Supplementary Requirements for modifications to sections in this standard only when specified by purchaser in the contract or order from the U.S. Military specifications utilized by the U.S. Department of Defense, Department of the Navy, and the Naval Systems Command.

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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1.6 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.

1.7 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

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
- C356 Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat
- C390 Practice for Sampling and Acceptance of Thermal Insulation Lots
- C411 Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation
- C447 Practice for Estimating the Maximum Use Temperature of Thermal Insulations
- C518 Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

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.

TABLE 1 Physical Requirements

Properties	Type I	Type II	Type III	Type IV ^A
Maximum use temperature °F (°C) (see 6.2.1) (Excluding metal-mesh all facings and metal tie- wires/stitching)	850 (454)	1200 (649)	1200 (649)	1200 (649)
Apparent Thermal Conductivity ^B (Excluding all facings and metal tie-wires/stitching) max Btu, in./h ft ² °F (W/m K)				
Mean Temperature, °F (°C)				
25 (–4)	0.21 (0.030)	0.21 (0.030)	0.23 (0.033)	0.23 (0.033)
75 (24)	0.25 (0.036)	0.25 (0.036)	0.24 (0.035)	0.24 (0.035)
100 (38)	0.27 (0.039)	0.27 (0.039)	0.26 (0.038)	0.26 (0.038)
200 (93)	0.34 (0.049)	0.34 (0.049)	0.31 (0.045)	0.31 (0.045)
300 (149)	0.43 (0.062)	0.42 (0.060)	0.37 (0.053)	0.37 (0.053)
400 (204)	0.55 (0.079)	0.53 (0.076)	0.44 (0.063)	0.44 (0.063)
500 (260)	0.70 (0.101)	0.64 (0.092)	0.52 (0.075)	0.52 (0.075)
600 (316)		0.75 (0.108)	0.60 (0.087)	0.60 (0.087)
700 (371)		0.86 (0.124)	0.70 (0.101)	0.70 (0.101)
Linear Shrinkage, max % at maximum use temperature	4.0	4.0	4.0	4.0
Water Vapor Sorption, ^C max % by weight	5.0	5.0	1.25	1.25
Surface Burning Characteristics				
Maximum-flame spread index	25	25	25	25
Maximum smoke developed index	50	50	50	50
Density maximum, ^D lb/ft ³ (kg/m ³)	10 (160)	12 (192)	8 (128)	8 (128)

^A Type IV is for the Industrial Type, non-metal-mesh covered blankets only.

^B Values for apparent thermal conductivity are for insulation and do not include mesh and wire through insulation thickness. Therefore, Practice C680 or other heat loss analysis using these data are not possible without accounting for heat losses through attaching media.

^C Some water sorption characteristics will change after the product is subjected to elevated temperatures within normal service conditions.

^D The maximum density specified is for the weight design purpose only and includes weight for the facings. Additional density requirements including the density for the blanket without facing(s) are permitted to be specified by agreement between the purchaser and the manufacturer or seller.

C665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing

C680 Practice for Estimate of the Heat Gain or Loss and the Surface Temperatures of Insulated Flat, Cylindrical, and Spherical Systems by Use of Computer Programs

C795 Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel

C921 Practice for Determining the Properties of Jacketing Materials for Thermal Insulation (Withdrawn 2021)³

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

C1104/C1104M Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation

C1114 Test Method for Steady-State Thermal Transmission Properties by Means of the Thin-Heater Apparatus

C1136 Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation

C1304 Test Method for Assessing the Odor Emission of Thermal Insulation Materials

C1335 Test Method for Measuring Non-Fibrous Content of Man-Made Rock and Slag Mineral Fiber Insulation

C1338 Test Method for Determining Fungi Resistance of Insulation Materials and Facings

C1617 Practice for Quantitative Accelerated Laboratory Evaluation of Extraction Solutions Containing Ions Leached from Thermal Insulation on Aqueous Corrosion of Metals

E84 Test Method for Surface Burning Characteristics of Building Materials

E136 Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C

2.2 Other Document:

CAN/ULC-S102 Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies⁴

3. Terminology

3.1 Terminology **C168** shall be the terms used in this specification.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *mean temperature*—the sum of the cold surface temperature and the hot surface temperature divided by two.

3.2.2 *metal-mesh covered blanket*—mineral fiber thermal insulation held together by metal-mesh facings on one or both sides with heat-resistant metal ties attached through the blanket from one face to the other.

3.2.3 *metal-mesh covered blanket-type pipe*—mineral fiber thermal insulation sized to fit around a large Nominal Pipe Size

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

⁴ Available from Underwriters Laboratories (UL), 2600 N.W. Lake Rd., Camas, WA 98607-8542, <http://www.ul.com>.