

§ 164.007-1 Applicable specification and referenced material.

(a) *Specification.* The following specification of the issue in effect on the date of manufacture of the structural insulation shall form a part of the regulations of this subpart (see §§2.75-17 through 2.75-19 of subchapter A (Procedures Applicable to the Public) of this chapter:

(1) Coast Guard specification:

Subpart 164.009 of this part, Incombustible Materials for Merchant Vessels.

(b) *Guidance.* For guidance you may use the following technical reference: ASTM E 119-98, Standard Test Methods for Fire Tests of Building Construction and Materials. You may obtain it from The American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

(c) *Copies on file.* A copy of the specification listed in paragraph (a) of this section shall be kept on file by the manufacturer, together with the certificate of approval and this specification. It is the manufacturer's responsibility to have the latest issue of the specification on hand together with the certificate of approval and approved plans when manufacturing under this specification subpart.

(1) The Coast Guard specification may be obtained from the Commandant (G-MSE), U.S. Coast Guard, Washington, DC 20593-0001.

[CGFR 69-72, 34 FR 17498, Oct. 29, 1969, as amended by CGD 82-063b, 48 FR 4783, Feb. 3, 1983; CGD 88-070, 53 FR 34537, Sept. 7, 1988; CGD 95-072, 60 FR 50467, Sept. 29, 1995; CGD 96-041, 61 FR 50734, Sept. 27, 1996; USCG-1999-5151, 64 FR 67185, Dec. 1, 1999]

§ 164.007-2 Purpose.

The purpose of this specification is to set forth tests necessary to measure the insulation value of structural insulation specimens under fire exposure conditions. The tests are not intended to measure the integrity of structural components of an assembly. Insulation meeting this specification is adequate to limit the average temperature rise of a steel bulkhead to 139 °C. (250 °F.) at the end of a 60-minute standard fire test.

§ 164.007-3 Conditions of approval.

(a) Structural insulation shall be of such quality as to successfully meet the requirements for an incombustible material as set forth in subpart 164.009 of this part.

(b) Structural insulation shall be of such quality and thickness as to successfully pass all of the tests set forth in §164.007-4, and the retests required by §164.007-8.

(c) The product shall be so marked as to be readily identifiable to an inspector in the field. The marking shall include the Coast Guard approval number.

§ 164.007-4 Testing procedure.

(a) *Tests.* All tests, including the retests, shall be conducted at the National Bureau of Standards or other laboratories designated by the Coast Guard.

(b) *Test of physical properties.* (1) Density measurement: The smallest sample for density measurements of solid materials shall be 30 cm × 30 cm (12"×12") by the submitted thickness. Length and width measurements shall be made to the nearest 1 mm. ($\frac{1}{32}$ "), thickness to the nearest 0.25 mm. (0.01"), allowance being made of any nonflatness of the major surfaces of the specimen. Measurements of dimensions of fibrous insulations shall be made to the nearest 1.5 mm. ($\frac{1}{16}$ ") on a nominal 30 cm. (12") cube assembled from sheets of thickness as received. The average of at least four measurements of each dimension shall be reported. The weight shall be determined with a scale or balance sensitive and accurate to 0.5 percent or less of the total weight. The dimensional and weight measurements shall not be made until the sample has been conditioned 1 week, or longer if required to reach constant weight, in an atmosphere at 23° ±1 °C. (73 °F. ±2°) and 50 percent relative humidity.

(2) Transfer to a previously dried and weighed wide-mouth weighing bottle provided with a glass stopper. Remove the stopper and heat the bottle and sample at 105° ±5 °C. (221° ±9 °F.) for 4 hours, insert the stopper, cool and weigh. Calculate the content of moisture and other volatiles as percent of the final dry weight of the sample.

(c) *Preparation of fire test specimens.* (1) The fire test specimens shall be conditioned to approximately constant weight with air being maintained at a relative humidity of 40 to 70 percent and a temperature of 15° to 25 °C. (50° to 77 °F.). After conditioning, but before testing, the temperature of the specimens shall not exceed 40 °C. (104 °F.).

(2) Representative samples of the structural insulation, of a thickness or thicknesses and density as specified in §164.007-9(a)(5), shall be tested as part of an assembly which forms a portion of a vertical wall of a furnace. The assembly shall be at least 100 cm. × 150 cm. (40"×60") in size. More than one sample may be tested, see §164.007-7.

(3) The specimens shall be attached to a 5 ±0.3 mm. (3/16") thick steel plate and mounted in the furnace with the steel plate forming the exterior wall of the furnace. Any stiffening members on the steel plate shall be installed on the face not adjacent to the insulation. Spacer strips of asbestos cement board or similar material, up to 5 cm. (2") in width, shall be installed around the periphery of the panel. For fibrous insulations, the attachment to the steel plate shall be made by means of 5 mm. (0.19") diameter steel pins on 30 cm. (12") centers covered by 18-gage, 4 cm. (1½") mesh expanded metal. Alternate methods will be given consideration. For other materials, typical installation practice shall be used.

(d) *Furnace control.* (1) The furnace temperature shall be determined by at least four mineral insulated thermocouples having rapid response, and distributed so as to represent fairly the furnace temperature and to insure as uniform heating as possible. The thermocouples shall be arranged so that the hot junction is approximately 10 cm. from the nearest point of the specimen.

(2) The furnace temperature shall be continuously controlled so as to follow the standard time-temperature curve within the accuracy specified in paragraph (d)(4) of this section.

(3) The standard time-temperature curve is defined by a smooth curve drawn through the following points:

At the beginning of the test, 20 °C. (68 °F.)
At the end of the first 5 minutes, 538 °C. (1,000 °F.).

At the end of the first 10 minutes, 704 °C. (1,300 °F.).

At the end of the first 30 minutes, 843 °C. (1,550 °F.).

At the end of the first 60 minutes, 927 °C. (1,700 °F.).

For a further definition of the time-temperature curve, see Appendix I of the ASTM Standard E-119, "Fire Tests of Building Construction and Materials".

(4) The accuracy of the furnace control shall be such that the area under the mean time-temperature curve is within 15 percent of the area under the standard time-temperature curve during the first 10 minutes of the test, within 10 percent during the first one-half hour, and within 5 percent for any period after the first one-half hour. At any time after the first 10 minutes of the test the mean furnace temperature shall not differ from the standard curve by more than 100 °C. (180 °F.). Consideration will be given to adjusting the results for variation of the furnace exposure from that prescribed. If corrections are made, they shall be in accordance with the procedures set forth in the ASTM E-119.

(e) *Temperature of unexposed surface.* For the unexposed surface temperature measurement a thermocouple of 0.5 mm. (0.020") diameter wires shall be soldered centrally with high temperature solder to one surface of a disc of copper 12 mm. in diameter and 0.2 mm. thick. The discs shall be covered with an oven-dry asbestos pad 50 mm. × 50 mm. and 4 mm. thick. The disc and the pad may be fixed to the surface of the steel plate by pins, tape, or a suitable adhesive. The asbestos pad shall have a density of approximately 1,000 kg./m.³ and thermal conductivity of 0.11 kcal/m/hr. × °C. at 100 °C. (212 °F.).

(f) *Temperature observations.* (1) All observations shall be taken at intervals not exceeding 5 minutes. The surface temperature on the exterior side of the steel plate shall be measured by thermocouples located as follows:

(i) One thermocouple located approximately in the center of each quadrant of the steel plate (four thermocouples total).

(ii) One thermocouple close to the center of the steel plate.

(iii) One thermocouple in way of or as close as possible to one of the pins or other through metallic connections (if any) used for holding the insulation in place.

(iv) Further thermocouples at the discretion of the testing laboratory or Coast Guard for the purpose of determining the temperature at points deemed likely to give a greater temperature rise than any of the above-mentioned thermocouples.

(2) The average temperature rise on the unexposed surface shall be obtained by averaging the readings of the thermocouples mentioned in paragraphs (f)(1) (i) and (ii) of this section.

(g) *Other observations.* Throughout the test observations shall be made of all changes and occurrences, which are not criteria of performance, but which may create hazard in case of a fire; for example the emission of appreciable volumes of smoke or noxious vapors from the unexposed side of the test specimen. The specimen shall be examined after the test for changes that have taken place and the information shall be noted in the test report.

(h) *Duration of testing.* The test shall be continued for at least one hour or until the maximum surface temperature rise values noted in §164.007-5(a) have been reached, whichever occurs later.

§ 164.007-5 Test requirements.

The insulation value of the specimens for the full scale test shall be such that the average temperature of the thermocouples on the unexposed surface described in §164.007-4(f)(2) will not rise more than 139 °C. (250 °F.) above the initial temperature, nor will the temperature at any one point on the surface, including any through metallic connection, rise more than 181 °C. (325 °F.) above the original temperature at the end of 60 minutes. The results obtained on the small scale test 2'x2' (60 cm. x 60 cm.) shall be recorded.

§ 164.007-6 Test report.

(a) The test report required shall contain at least the following:

- (1) Name of manufacturer.
- (2) Purpose of test.
- (3) Test conditions and date of test.

(4) Description of the panel tested giving the details of the assembly comprising a steel plate, insulation (thickness and density) spacer strips and fastening and the method of mounting the panel assembly in the test furnace.

(5) Complete time-temperature data, including initial temperature, for each thermocouple together with curves of average temperature for the unexposed surface of the insulation and the thermocouple recording the highest temperature. In addition, for §164.007-9(g)(2), complete time-temperature data consisting of a numerical time-temperature table for each furnace and each surface of insulation thermocouple together with the initial temperature of each thermocouple.

(6) A log maintained by the owner relative to deflections, cracking or loosening of the insulation, smoke or gas emission, glow, flame emission, and any other important data. The time of each observation should be noted.

(7) Photographs of both sides of the panel before and after testing.

(8) Summary of test results.

(b) [Reserved]

§ 164.007-7 Analysis of results.

(a) When only one sample is tested, the results of the test shall be binding and no analysis by the Coast Guard will be undertaken.

(b) When more than one sample of the same density material is tested simultaneously and the results are not exact, the Coast Guard may analyze the results. Data from the tests may be analyzed to determine the minimum thickness to meet the requirements of §164.007-5(a).

(c) Consideration will be given to correction for inaccurate furnace control in accordance with §164.007-4(d)(4).

[CGFR 69-72, 34 FR 17498, Oct. 29, 1969; 34 FR 19030, Nov. 29, 1969]

§ 164.007-8 Retests.

(a) Manufacturers of approved structural insulation shall maintain quality control of materials used, manufacturing methods, and the finished product utilizing appropriate quality control testing so as to meet the requirements of this specification, and any