



# Standard Test Method for Determining the Water Retention (Repellency) Characteristics of Fibrous Glass Insulation (Aircraft Type)<sup>1</sup>

This standard is issued under the fixed designation C1511; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers a laboratory procedure for evaluating the water absorption potential of blanket insulation for aircraft, thereby providing a measure of potential weight increase due to water retention in an aircraft.

1.2 The water repellency (or retention) characteristics of materials can be affected by conditions such as contamination or temperature of the water. Values obtained as a result of this test method does not adequately describe the water repellency characteristics of materials subject to these conditions.

1.3 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.

1.4 *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:*<sup>2</sup>

C168 Terminology Relating to Thermal Insulation

C390 Practice for Sampling and Acceptance of Thermal Insulation Lots

C800 Specification for Fibrous Glass Blanket Insulation (Aircraft Type)

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

## 3. Terminology

3.1 *Definitions*—Terminology C168 shall be considered as applying to the terms used in this specification.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C16 on Thermal Insulation and is the direct responsibility of Subcommittee C16.33 on Insulation Finishes and Moisture.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## 4. Summary of Test Method

4.1 The insulation is weighed then submerged in de-ionized (or distilled) water for 15 min; it is drained for 60 s and reweighed. The amount of water retained is the difference in specimen weights and is expressed in grams.

## 5. Significance and Use

5.1 The water retention of the insulation can result in an increase in weight and a resultant potential degradation in the properties of the insulation.

## 6. Apparatus

6.1 The water repellency test apparatus is shown in Fig. 1.

6.2 *Scale*, accurate to 0.1 g.

## 7. Sampling, Test Specimens, and Test Units

7.1 Three specimens shall be tested, taken from across the width of a representative package. Sampling techniques shall be in accordance with Practice C390.

7.2 The specimens shall be 10- by 10-in. (254- by 254-mm) by full sample thickness; samples shall be no thicker than 4-in. (100-mm)

7.3 The insulation shall be tested without facing or jacketing.

## 8. Conditioning

8.1 No conditioning of the specimen is required.

## 9. Procedure

9.1 Weigh each specimen to the nearest 0.1 g.

9.2 Float each specimen on the surface of a vat of de-ionized (or distilled) water at  $70 \pm 4^\circ\text{F}$  ( $21 \pm 2^\circ\text{C}$ ). Lay a 0.25-in. (6.4-mm) mesh rigid screen on top of each specimen and slowly submerge it to a level that is 5 in. (127 mm) below the surface of the water. Fix the screen in position as shown in Fig. 1. After  $15 \pm 1$  min, release the screen and raise the specimens slowly until they float. Remove the screen. Grip each specimen on one corner with a spring clamp and hang it in a vertical position for  $60 \pm 5$  s. Reweigh each specimen and record.

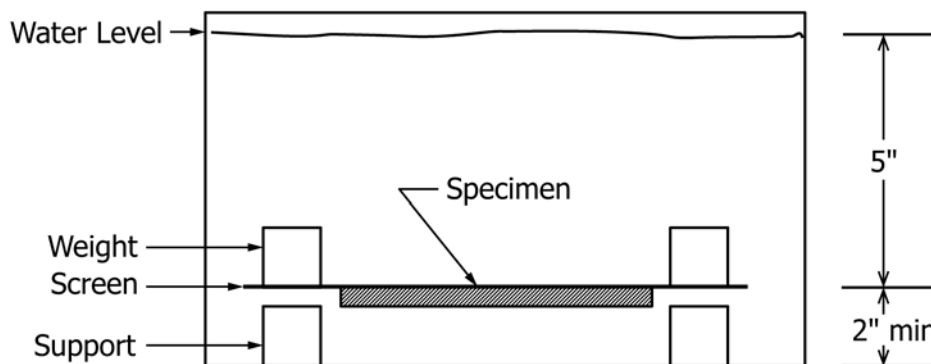


FIG. 1 Water Repellency Test Apparatus

## 10. Calculation or Interpretation of Results

10.1 Determine water retained by each specimen by subtracting the original specimen weight from the final specimen weight. Calculate water repellency by averaging the results of the three specimens.

## 11. Report

- 11.1 The report shall include the following:
- 11.2 Name and any additional identification of the material tested,
- 11.3 Thickness of the material,
- 11.4 Number of specimens tests, and
- 11.5 Average weight gain of the specimens.

## 12. Precision and Bias

12.1 *Interlaboratory Test Program*—An interlaboratory comparison was run in which randomly selected test specimens of one material were tested for water repellency. Four laboratories participated, with each laboratory testing three specimens. Practice E691 was followed for the design and analysis

of the data. All of the test specimens were provided by a single laboratory. The details are given in ASTM Research Report: C16-1017.<sup>3</sup>

12.2 *Test Results*—The following information on precision, in units of measurement noted, is for the comparison of one material and is based on an average of three tests.

12.3 *Precision*—Water repellency interlaboratory comparison statistical results using Practice E691:

|                |        |
|----------------|--------|
| x              | 13.0 g |
| s <sub>x</sub> | 2.1    |
| s <sub>r</sub> | 4.1    |
| s <sub>R</sub> | 4.1    |
| r              | 11.5   |
| R              | 11.5   |

12.4 *Bias*—There is no accepted reference material suitable for determining the bias for this procedure. Bias has not been determined.

## 13. Keywords

13.1 aircraft; aircraft insulation; fibrous glass insulation; water repellency

<sup>3</sup> Available from ASTM Headquarters, request RR:C16-1017.

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