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PERMANENCE OF SET AND SHRINKAGE IN PARACHUTE FABRICS (BOILED WATER TEST METHOD)

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1. SCOPE

1.1 This method is intended for determining the percent shrinkage, air permeability and thickness of parachute fabrics.

2. TEST SPECIMEN

2.1 Specimens. Two 20 inch square specimens of the cloth shall be prepared.

3. NUMBER OF DETERMINATIONS

3.1 Unless otherwise specified in the procurement document, two specimens shall be tested from each sample unit.

4. APPARATUS

4.1 A steel vat/tank large enough to allow specimens to be suspended freely in boiling water for 15 minutes. The specimens shall not come in contact with the bottom of the vat/tank or the heat source.

4.2 A rod long enough to rest on the top of the vat/tank is used to suspend the specimen into the tank utilizing twine or non-rusting wire. A metal frame can also be used instead of the rod and twine set-up. Note: Each specimen requires a separate holder while testing.

4.3 The water in the steel vat/tank shall be heated with a heated jacket, a submersible electric water heater and/or live steam with pre-drilled holes to control the flow of steam into the water.

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4.4 A rod 1/4" by 21-22 inches long shall be used to weight the bottom of the specimen loop. The weight shall be 44.5 to 47.5 grams.

4.5 Horizontal screens shall be used to dry the specimens after testing.

4.6 A 20" x 20" and an 18" x 18" template shall be used to mark the specimen sizes for testing. An AATCC Shrinkage Scale (AATCC Part Number 8375) can be used as an alternate method in place of the 18" x 18" template for marking the specimens to determine the shrinkage after Permanence of Set Test.

5. PROCEDURE

5.1 Testing of specimens. Unless otherwise specified in the procurement document, testing shall be performed under standard conditions as specified in ASTM D 1776.

5.2 Preparation and testing of the specimens before Permanence of Set Test. After a minimum of 4 hours of conditioning (until the specimens reach equilibrium), use a template and indelible ink marker and mark an 18" square on each specimen for shrinkage testing. The specimens shall be subjected to the air permeability tests in accordance with ASTM D 737 (see paragraph 9 for "conditioning" of ASTM D 737) and the thickness shall be tested in accordance with ASTM D 1777.

5.2.1 The specimens shall be prepared by stapling or tacking the opposite sides of the specimen together to form a loop or "skein". One of the specimens will be prepared so that the warp yarns are parallel to the edges of the loop and the second specimen so that the fill yarns are parallel to the edges.

5.2.2 The specimens shall be attached to a rod which will rest on the top of the vat/tank using a twine or non-rusting wire. The wire/twine must be long enough to keep the specimen submerged in the water for the duration of the test but not so long that the specimen touches the bottom of the steel vat/tank.

5.2.3 A rod, 1/4 inch x 21-22 inches long, solid aluminum with a weight of 44.5 to 47.5 grams is placed in the bottom of the specimen loops to prevent the fabric from floating to the top of the water in the steel vat/tank.

5.2.4 The specimens are placed in the steel vat/tank containing water heated to $210 \pm 2^{\circ}\text{F}$ for 15 minutes. The water level in the steel vat shall be five inches from the top of the vat/tank. The specimen must be submerged in the water controlled within the temperature range for the entire 15 minutes.

5.2.5 Testing shall be performed in pairs-one warp and one fill. The specimens shall be suspended freely in the water and after the 15 minutes removed from the bath and allowed to drain.

5.2.6 The staples/tacks shall be removed from the specimens and the specimens shall be placed on a horizontal screen to air dry.