Designation: D3738 – 16

Standard Specification for Rubber-Coated Cloth Hospital Sheeting[1]

This standard is issued under the fixed designation D3738; 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 rubber-coated cloth sheeting intended for use in the protection of mattresses on hospital beds.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 The following safety hazards caveat pertains only to the test methods portion, Section 9, of this specification. *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]

D573 Test Method for Rubber—Deterioration in an Air Oven

D751 Test Methods for Coated Fabrics

D3393 Specification for Coated Fabrics—Waterproofness

2.2 *U.S. Government Document:*[3]

Food and Drug Administration Code of Federal Regulations, Title 21, Parts 177 and 182

3. Ordering Information

3.1 Orders for rubber-coated cloth sheeting should specify in the contract or purchase order the following information:

3.1.1 Quantity of cloth per finished roll (6.1),

3.1.2 Sample size and frequency for testing (8.1),

3.1.3 Certification (11.1),

3.1.4 Marking necessity (12.1), and

3.1.5 Special packaging (13.1).

4. Materials and Manufacture

4.1 *Materials:*

4.1.1 The base cloth shall be woven or knitted from cotton yarn, synthetic yarn, or a blend of cotton and synthetic yarn.

4.1.2 The coating compound shall be natural rubber, synthetic rubber, or a mixture of natural and synthetic rubbers suitably formulated and colored with a white pigment to meet the requirements of this specification.

4.1.3 Compounding materials shall be permitted in accordance with Code of Federal Regulations, Title 21, Food and Drug Administration Part 177 (Indirect Food Additives: Polymers), particularly 21 CFR 177.2600 (Rubber Articles Intended for Repeated Use, or Part 182—Substances Generally Recognized as Safe (GRAS).

4.2 *Manufacture*—The base cloth shall be coated uniformly on both sides with equal amounts of the coating compound. The coated fabric may be dusted with a talc that does not support mildew growth. The coated cloth shall be vulcanized to meet the physical requirements of Table 1 and the performance requirements specified in Section 5.

5. Performance Requirements

5.1 *Resistance to Phenol and Isopropyl Alcohol*—Coated cloth shall show no evidence of softening, tackiness, hardening, peeling, or blistering when exposed to a 5 % phenol-water solution and a 70 % isopropyl alcohol-water solution in accordance with 9.7 and 9.8.

5.2 *Resistance to Heat Aging*—Coated cloth shall show no evidence of stiffness, brittleness, tackiness, or discoloration after exposure to heat in accordance with 9.9.

5.3 *Steam Sterilization*—Coated cloth shall show no evidence of softening, tackiness, hardening, peeling, or blistering when subjected to steam sterilization in accordance with 9.10.

6. Length of Roll

6.1 Unless otherwise specified in the contract or purchase order, cloth shall be furnished in rolls, 55 m (60 yd) of cloth per roll. The roll shall contain no more than three pieces and no piece shall be less than 5.5 m (6 yd) in length.

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[1] This specification is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.37 on Coated Fabrics, Rubber Threads and Seals.

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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.

[3] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

TABLE 1 Physical Properties

Characteristic	
Coating thickness:	
min, mm (in.)	0.33 (0.013)
max, mm (in.)	0.46 (0.018)
Breaking strength:	
Warp, N (lbf)	222 (50)
Fill, N (lbf)	222 (50)
Adhesion rubber to cloth, N/m (lbf/in.)	613 (3.5)
Waterproofness test	no leakage

7. Workmanship, Finish, and Appearance

7.1 Coated cloth shall not have any of the following defects:

7.1.1 Cuts, tears, or holes (including pinholes).

7.1.1.1 Pinholes shall be detected by holding the 3-m (3-yd) samples (8.1) in front of an illuminated bulb (60 W minimum) while examining the entire area for the defects described in 7.1.

7.1.2 Uncoated areas.

7.1.3 Thinly coated areas.

7.1.4 Separation of cloth from coating.

7.1.5 Cracked coating.

7.1.6 Lumps or blisters.

7.1.7 Color, not white and uniform.

7.1.8 Curled or rolled edges.

7.1.9 Dirt, spots, or stains.

7.1.10 Offensive odor.

7.1.10.1 Normal aromatic odors usually associated with cured-rubber coatings shall not be classified as offensive.

8. Sampling

8.1 Unless otherwise specified in the contract or purchase order, the number of rolls from which a 3-m (3-yd) full-width sample is to be selected should be in accordance with Table 2. Test specimens shall be prepared for the various tests from all samples.

9. Test Methods

9.1 *General*—Tests for coated-cloth bedding shall conform to Test Method D751 whenever applicable.

9.2 *Significance*—The phenol, alcohol, and steam-sterilization tests determine how well-coated rubber cloth resists chemical deterioration and are useful in predicting how the coated cloth will perform in actual service.

9.3 *Coating Thickness*—Determine the coating thickness on the cloth by measuring the thickness of the uncoated base cloth and then the thickness of the coated cloth. The micrometer used to measure the thickness shall have graduations not exceeding 0.02 mm (0.001 in.), and the pressure exerted by the foot on the specimen shall be 22 ± 5 kPa (3.2 ± 0.7 psi). The thickness of the coating shall conform to Table 1.

9.4 *Breaking Force*—Determine the breaking force in accordance with Procedure A of Test Method D751.

TABLE 2 Samples Required

Lot Size, Rolls	Samples Required
10 or less	2
11 to 350	3
351 and over	5

9.5 *Adhesion Test*—Determine the coating adhesion strength in accordance with Test Method D751.

9.6 *Waterproofness Test*—Test as in Specification D3393. Flex each specimen five times within 1 min by applying and releasing a pressure of 175 ± 15.0 kPa (25 ± 2 psi). After the fifth flex maintain the pressure at 175 ± 15.0 kPa for 5 min. No leakage shall occur. Leakage shall be defined as the appearance of water at one or more spots in the test area.

9.7 *Phenol Resistance Test:*

9.7.1 Cut a specimen 150 mm (6 in.) square from the test sample, wash with soap and water, rinse, and dry with a suitable absorbent material, such as filter paper. Place the specimen in a compatible container and cover with a 5 % phenol-water solution at 23 ± 2°C (73.4 ± 3.6°F) for 166 ± 1 h. Cover the container tightly to prevent evaporation.

9.7.2 At the end of immersion period, remove the specimen from the solution, rinse with water, and dry with a suitable absorbent material. Visually examine the specimen for evidence of softening, tackiness, hardening, peeling, or blistering.

9.8 *Alcohol Resistance Test:*

9.8.1 Cut a specimen 150 mm (6 in.) square from the test sample, wash with soap and water, rinse, and dry with a suitable absorbent material, such as filter paper. Place the specimen in a glass container and cover with a 70/30 % isopropyl alcohol-water-solution at 23 ± 2°C (73.4 ± 3.6°F) for 22 ± ¼ h. Cover the container tightly to prevent evaporation.

9.8.2 At the end of the immersion period, remove the specimen from solution, rinse with water, and dry with a suitable absorbent material. Visually examine the specimen for any evidence of softening, tackiness, hardening, peeling, or blistering.

9.9 *Accelerated Aging Test:*

9.9.1 Cut a specimen 200 by 100 mm (8 by 4 in.) from the test sample and place in an air circulating oven conforming to Test Method D573 at 70 ± 1°C (158 ± 2°F) for 7 days.

9.9.2 After completion of the aging, allow the sample to cool to room temperature, and visually examine the specimen for evidence of stiffness, brittleness, tackiness, or discoloration inappropriate for the application.

9.10 *Steam Sterilization Test:*

9.10.1 Cut a specimen 300 mm (12 in.) square from the test sample. Fold the specimen once to give a rectangle 300 by 150 mm (12 by 6 in.) and fold again to give a square 150 mm (6 in.).

9.10.2 Wrap the specimen in four or five layers of cotton gauze or cheesecloth and suspend or place the sample on a perforated shelf in the steam chamber. Admit the steam to the chamber at a rate that will raise the temperature within 5 min to 125 ± 2°C (257.8 ± 3.6°F). At this temperature the steam in the chamber shall not contain more than 1 volume of air per 1000 volumes of steam. Start the sterilization period at the time the chamber reaches the required temperature. The specimen shall remain at the required temperature for 20 ± ½ min. At the end of the sterilization period, remove the specimen from chamber and allow to cool for 20 min at room temperature. Repeat the steaming and cooling cycling a total of five times.

At the end of the fifth cycle, condition the sample at ambient laboratory conditions for 16 to 96 h. Visually examine the specimen for signs of stiffness, brittleness, tackiness, cracking, or discoloration.

10. Rejection and Rehearing

10.1 Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

11. Certification

11.1 When specified in the purchase order or contract, a producer's or supplier's certification shall be furnished to the purchaser that the material was manufactured, sampled, tested, and inspected in accordance with this specification and has been found to meet the requirements. When specified in the purchase order or contract, a report of the test results shall be furnished.

12. Product Marking

12.1 Unless otherwise specified in the contract or purchase order, cloth shall be marked on a label or tag with the manufacturer's name or trademark and the dimensions.

13. Packaging

13.1 Unless otherwise specified in the contract or purchase order, the coated cloth shall be protected for shipment and storage in accordance with the manufacturer's standard practice.

14. Keywords

14.1 hospital sheeting; rubber-coated cloth