

Submitted for recognition as an American National Standard

CLOTH, CHLOROPRENE (CR) COATED NYLON

1. SCOPE:

1.1 Form:

This specification covers one type of nylon coated with chloroprene (CR) rubber in the form of cloth.

1.2 Application:

This cloth has been used typically for manufacture of aircraft pneumatic lifting bags, but usage is not limited to such applications.

1.3 Safety - Hazardous Materials:

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards which may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The applicable issue of referenced publications shall be the issue in effect on the date of the purchase order.

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2.1 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 276 Identification of Fibers in Textiles
ASTM D 1682 Breaking Load and Elongation of Textile Fabrics
ASTM D 1777 Measuring Thickness of Textile Materials
ASTM D 3774 Width of Woven Fabric
ASTM D 3775 Fabric Count of Woven Fabric
ASTM D 3776 Mass per Unit Area (Weight) of Woven Fabric
ASTM D 4028 Solar Screening Woven from Vinyl-Coated Fiber Glass Yarn
ASTM D 4393 Strap Peel Adhesion for Reinforcing Cords or Fabrics to Rubber Compounds

2.2 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

P-P-1136 Packaging of Coated (Plastic, Rubber) and Laminated Fabrics
MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

3. TECHNICAL REQUIREMENTS:

3.1 Materials:

3.1.1 Cloth: Shall be plain woven from nylon yarn. The yarn shall be an 840 (R) denier, single ply, continuous filament, high tenacity nylon 6,6, having a melting point of $250\text{ }^{\circ}\text{C} \pm 6$ ($482\text{ }^{\circ}\text{F} \pm 11$), determined in accordance with ASTM D 276. Vendor shall submit a certification of conformance with each shipment or lot stating that this requirement has been met.

3.1.2 Coating: Shall be a suitably compounded chloroprene (CR) polymer applied equally on both sides of the fabric. Vendor shall submit a certification of conformance with each shipment or lot stating that this requirement has been met.

3.2 Properties:

Cloth shall conform to the requirements shown in Table 1, determined in accordance with specified test methods.

TABLE 1 - Properties

Paragraph	Property	Requirement	Test Method
3.2.1	Base Cloth:		
3.2.1.1	Weight, maximum	8.50 ounces/square yard (288 g/m ²)	ASTM D 3776
3.2.1.2	Yarns per inch (25.4 mm)		ASTM D 3775
3.2.1.2.1	Warp	34	
3.2.1.2.2	Filling	30	
3.2.1.3	Breaking Strength (Ravel Strip), minimum		ASTM D 1682
3.2.1.3.1	Warp	425 pounds force/inch (74.4 kN/m)	
3.2.1.3.2	Filling	375 pounds force/inch (65.7 kN/m)	
3.2.2	Coated Cloth:		
3.2.2.1	Width	As specified by purchaser	ASTM D 3774
3.2.2.2	Color	Black	Visual
3.2.2.3	Weight	41 ounces/square yard ± 1.5 (1390 g/m ²) ± 51	ASTM D 3776
3.2.2.4	Thickness	0.045 inch \pm 0.003 (1.14 mm \pm 0.08)	ASTM D 1777
3.2.2.5	Breaking Strength (Cut Strip), minimum		ASTM D 1682
3.2.2.5.1	Warp	575 pounds force/inch (101 kN/m)	
3.2.2.5.2	Filling	525 pounds force/inch (91.9 kN/m)	
3.2.2.5.3	Loss After Aging	10%	4.5.1
3.2.2.6	Coating Adhesion, [2-inches (51-mm) width], minimum		ASTM D 4393
3.2.2.6.1	Unaged	36 pounds force (160 N)	

TABLE 1 - Properties (Continued)

Paragraph	Property	Requirement	Test Method
3.2.2.6.2	After Heat Aging	30 pounds force (133 N)	4.5.1
3.2.2.7	Lap Shear Strength Single Specimen, minimum		4.5.2
3.2.2.7.1	Unaged	125 psi (862 kPa)	
3.2.2.7.2	After Heat/Humidity Aging	125 psi (862 kPa)	
3.2.2.8	Low-Temperature Resistance	No Cracking	4.5.3
3.2.2.9	Resistance to Blocking	No Blocking	ASTM D 4028

3.3 Quality:

Finished cloth, as received by purchaser, shall be evenly woven and free from foreign materials and from imperfections detrimental to usage of the cloth.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: (R)

The vendor of cloth shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the cloth conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for the following requirements are acceptance tests and shall be performed on each lot:

Weight of coated cloth (3.2.2.3)
 Breaking strength of coated cloth (3.2.2.5)
 Coating Adhesion (3.2.2.6)
 Lap shear strength of coated cloth (3.2.2.7)
 Quality (3.3)

4.2.2 Preproduction Tests: Tests for all technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of cloth to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2.1 For direct U.S. Military procurement, substantiating test data, and, when requested, preproduction test materials shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.

4.3 Sampling and Testing:
(R)

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient cloth shall be taken from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in Table 2 or, if not specified therein, not less than three.

TABLE 2 - Determinations per Sample Unit and Reporting Results

Property	Requirement Paragraph	Number of Determinations per Sample Unit	Report Results as Pass or Fail	Report Results Numerically to the Nearest
Base Cloth:				
Weight, ounces/square yards (g/m ²)	3.2.1.1	5	-	0.1 ounce (3 grams)
Yarns per inch (25.4 mm)	3.2.1.2	5	-	whole number
Breaking Strength (Ravel Strip), pounds force/inch (kN/m)	3.2.1.3	5	-	0.1 pound force/inch (0.4 N/m)
Yarn:				
Identification as Nylon	3.1.1	1	X	-
Melting Point	3.1.1	2	-	1 °C
Coated Cloth:				
Width	3.2.2.1	5	-	1/16 inch (1.6 mm)
Color	3.2.2.2	1	X	
Weight	3.2.2.3	5	-	0.1 ounce/square yard (3.4 g/m ²)
Thickness	3.2.2.4	5	-	0.001 inch (0.025 mm)

TABLE 2 - Determinations per Sample Unit and Reporting Results (Cont'd.)

Property	Requirement Paragraph	Number of Determinations per Sample Unit	Report Results as Pass or Fail	Report Results Numerically to the Nearest
Breaking Strength (Cut Strip)	3.2.2.5	5	-	5 pounds force/inch (876 N/m)
Loss After Heat Aging	3.2.2.5.3	5	-	0.5%
Coating Adhesion	3.2.2.6	3	-	0.1 pound force/2-inches width (0.4 N/51-mm width)
After Heat Aging	3.2.2.6.2	3	-	0.1 pound/force-2 inches width (0.4 N/51 mm width)
Lap Shear Strength	3.2.2.7	3	-	1 pound force/square inch (0.007 MPa)
Low-Temperature Resistance	3.2.2.8	1	X	-
Resistance to Blocking	3.2.2.9	3	X	-

4.3.1.1 A lot shall be all cloth produced in a single production run under the same fixed conditions and presented for vendor's inspection at one time.

4.3.1.2 The sample unit for the base cloth shall be 2 yards (1.8 m) in length, full width. The sample size (number of units) shall be as shown in Table 3. If a lot contains less than three rolls, each roll in the lot shall be examined. The lot size shall be expressed in units of 1 yard (1 m). The lot shall be unacceptable if the number of sample units failing to meet any requirement specified exceeds the acceptance number.

TABLE 3 - Sample Size

Yards in Lot		Meters in Lot		Sample Size	Acceptance Number
	Up to 1,200, incl		Up to 1,097, incl	3	0
Over	1,200 to 3,200, incl	Over	1,097 to 2,926, incl	5	0
Over	3,200 to 10,000, incl	Over	2,926 to 9,144, incl	8	0
Over	10,000 to 35,000, incl	Over	9,144 to 32,004, incl	13	0
Over	35,000 to 150,000, incl	Over	32,004 to 137,160, incl	20	1
Over	150,000	Over	137,160	32	2

4.3.1.3 (R) Yard-by Yard (Meter-by-Meter) Examination: The required length of each roll shall be inspected on one side only; however, the side examined shall be alternated on every other roll. The visual imperfections shall be classified in accordance with Table 4 and shall be counted regardless of their proximity to each other, except where two or more imperfections represent a single local condition of the cloth, in which case only the more serious imperfection shall be counted. The sample unit shall be 1 linear yard (1 linear m). The inspection level shall be in accordance with MIL-STD-105, Level II. The number of rolls from which the sample is selected shall be in accordance with Table 3. An approximately equal length shall be examined in each roll sampled.

TABLE 4 - Classification of Imperfections

Imperfection	Extent of Imperfection	Major	Minor
Blisters, lumps, or delamination of coating	Covering any areas 1/8-inch (3.2-mm) square or greater	X	
Crease	Permanent, that cannot be corrected by manual pressure	X	
Light area or window (due to poor blending of pigmentation only)	More than five in a linear yard (linear m)		X
Narrow width	Width less than minimum specified		X
Pinhole, cut, or tear (4.3.1.3.1)	Any size	X	

TABLE 4 - Classification of Imperfections (Cont'd)

Imperfection	Extent of Imperfection	Major	Minor
Stain or streak	Coating compound stain or streak clearly noticeable at a distance of 6 feet (1.8 m)		X
Uneven coating	Any of these areas, where the coating compound is missing or insufficient	X	
	Any heavily coated areas, clearly noticeable at a distance of 6 feet (1.8 m)		X

4.3.1.3.1 The cloth shall be run over a bank of lights having sufficient intensity to show the imperfection through the coated cloth at an inspection distance of 2 feet (610 mm).

4.3.1.4 Overall Examination: The sample unit for this examination shall be one piece. The pieces examined shall be those selected for the yard-by-yard (meter-by-meter) examination. The acceptance number shall be as shown in Table 3. The cloth shall be unacceptable if it has an objectionable odor, overall uncleanliness, or is tacky (the coating will not adhere to the base cloth and will not readily unroll).

4.3.1.5 Examination for Length:

4.3.1.5.1 Individual: The sample unit shall be one roll. The number of rolls to be examined and the acceptance number shall be in accordance with Table 3. The following conditions shall be considered imperfections:

4.3.1.5.1.1 Any roll having gross length less than the minimum or more than the maximum specified.

4.3.1.5.1.2 Any roll having gross length more than 2 yards (1.8 m) less than the gross length marked on the ticket.

4.3.1.5.1.3 Any roll containing more than two pieces.

4.3.1.5.1.4 Any piece in the roll under 40 yards (36.6 m) in length.

4.3.1.5.2 Total Length: The roll examined shall be those selected for examination of individual rolls (4.3.1.5.1). The lot shall be unacceptable if the total of the gross lengths of the rolls in the sample is less than the total of the gross lengths marked on the tickets.

4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

- 4.4.1 Sample cloth shall be approved by purchaser before cloth for production use is supplied, unless such approval be waived by purchaser. Results of tests on production cloth shall be essentially equivalent to those on the approved sample.
- 4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production cloth which are essentially the same as those used on the approved sample. If necessary to make any change in ingredients and/or processing, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and, when requested, sample cloth. Production cloth made by the revised procedure shall not be shipped prior to receipt or reapproval.

4.5 Test Methods:

Shall be in accordance with Table 1 and the following:

- 4.5.1 Heat Aging: Specimen size shall be as specified in ASTM D 1682 (Cut Strip) and ASTM D 4393. The specimens shall be aged in an oven at $70\text{ }^{\circ}\text{C} \pm 5$ ($158\text{ }^{\circ}\text{F} \pm 9$) for 120 hours ± 2 . Upon removal from the oven, the specimens shall be conditioned at $21\text{ }^{\circ}\text{C} \pm 1$ ($70\text{ }^{\circ}\text{F} \pm 2$) and $65\% \pm 2$ relative humidity for 24 hours ± 1 , and tested for breaking strength and for coating adhesion. The percent loss in breaking strength from the unaged specimens shall be reported.
- 4.5.2 Lap Shear Strength: A 1-inch (25-mm) wide specimen of the coated fabric shall be overlapped not less than 1 inch (25 mm) on another 1-inch (25-mm) wide specimen of coated fabric. The two surfaces shall be cemented or vulcanized together using conditions similar to those under which the seams would be made in the manufacture of the intended end use item, such as an aircraft lifting bag. Six specimens shall be prepared with three specimens being exposed to $70\text{ }^{\circ}\text{C} \pm 5$ ($158\text{ }^{\circ}\text{F} \pm 9$) at 95 to 100% relative humidity for 120 hours ± 2 prior to testing.
- 4.5.3 Low-Temperature Resistance: A 2 by 5-inch (51 by 127-mm) specimen of coated fabric, a smooth steel rod nominally 1/8 inch (3.2 mm) in diameter, and the test jib described in Figure 1 shall be placed in an atmosphere of $-55\text{ }^{\circ}\text{C} \pm 3$ ($-67\text{ }^{\circ}\text{F} \pm 5$). After 24 hours ± 1 of exposure and without removing the specimen, rod, and test fixture from the low temperature atmosphere, the specimens shall be bent sharply over the rod in order that the back of the specimen touches within 1/8 inch (3.2 mm) directly behind the rod. The specimen shall then be visually inspected for cracks.

4.6 Reports:

The vendor of cloth shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the cloth conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 3850A, vendor's material designation, and quantity.