

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

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Superseding AMS 3837C

CLOTH, TYPE "S" GLASS
181 Style Fabric, Finish No. HTS-904

1. SCOPE:

1.1 Form:

This specification covers "S" glass in one style of woven fabric with an HTS-904 finish.

1.2 Application:

This cloth has been used typically as a reinforcing material for structural plastic laminates, but usage is not limited to such applications. Cloth is also suitable for use with phenolic and epoxy resin matrices.

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 123 Terminology Relating to Textile Materials
ASTM D 579 Greige Woven Glass Fabrics
ASTM D 1777 Measuring Thickness of Textile Materials
ASTM D 2410 Finish Content of Woven Glass Fabric, Cleaned and After-Finished
with Chrome Complexes, for Plastic Laminates
ASTM D 3775 Fabric Count of Woven Fabric
ASTM D 3776 Mass per Unit Area (Weight) of Woven Fabric

2.2 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-2073-1 DOD Materiel, Procedures for Development and Application of Packaging Requirements

3. TECHNICAL REQUIREMENTS:

3.1 General:

3.1.1 Color: Cloth shall be essentially white to light straw in color.

3.1.2 Finish: Immediately after filaments have been drawn from "S" glass, they shall be coated with HTS-904 finish to yield a product meeting the requirements of 3.1.1. The HTS-904 finish shall aid in wetting the fabric with resin and shall provide an intermediate chemical bond between the fabric and resin.

3.1.3 Yarn: Cloth shall be woven from SCG 150-1/2 yarn.

3.1.4 Weave: The weave shall be an eight-harness, satin weave in which each warp and fill yarn goes under one, and over seven, then under one, and repeat. The interweaving of the warp and fill yarns shall be staggered; i.e., the No. 1 warp yarn shall go under the No. 1, No. 9, No. 17, and subsequent fill yarns, and the No. 2 warp yarn shall go under the No. 2, No. 10, No. 18, and subsequent fill yarns.

3.2 Properties:

Cloth shall conform to requirements shown in Table 1.

TABLE 1 - Properties

Paragraph	Property	Requirement	Test Method
3.2.1	Weight	8.35 to 9.05 ounces/yard (283 to 307 g/m ²)	ASTM D 3776
3.2.2	Nominal Thickness	0.009 to 0.015 inch (0.23 to 0.38 mm)	ASTM D 1777
3.2.3	Fabric Count		ASTM D 3775
	Warp	55 to 59 ends per inch (25.4 mm)	
	Fill	52 to 56 ends per inch (25.4 mm)	
3.2.4	HTS-904 Finish	0.75 to 2.25%	ASTM D 2410-82 (Specimen drying not required for this binder)
3.2.5	Breaking Strength, min		
	Warp	500 pounds force/inch (88 kN/m) of width	ASTM D 579 (Specimen drying not required for this binder)
	Fill	450 pounds force/inch (79 kN/m) of width	

3.3 Quality:

Cloth, as received by purchaser, shall be uniform in quality and condition, smooth, and free from foreign materials and from imperfections detrimental to usage of the cloth.

- 3.3.1 Imperfections: In any 100 yards (91 m) of fabric supplied, there shall be (R) no more than 10 major, or equivalent minor (2 minors = 1 major) imperfections, based on the imperfection classification shown in Table 2. Definitions of terms used herein are given in ASTM D 123. The terms "clearly noticeable" and "noticeable" shown in Table 2 shall be interpreted to mean clearly visible at normal inspection distance of approximately 1 yard (0.9 m)

TABLE 2 - Imperfection Classification

Imperfection	Description and Limitation	Classification
Bias or bowed filling	Distorted from horizontal by over 3 inches (76 mm) for 38-inch (965-mm) widths and proportionately for all other widths	Minor
Baggy, ridgy, or wavy cloth	Clearly noticeable	Major
Cut or tear	2 inches (51 mm) or over in combined directions	Major
	Under 2 inches (51 mm) but over 1/4 inch (6.4 mm) in combined directions	Minor
Hole	1/2 inch (12.7 mm) or over in diameter	Major
	Under 1/2 inch (12.7 mm) in diameter	Minor

TABLE 2 - (Continued)

Imperfection	Description and Limitation	Classification
Spots, streaks, or stains	Clearly noticeable 2 inches (51 mm) or over in combined directions	Major
	Clearly noticeable under 2 inches (51 mm) in combined directions	Minor
Tender or weak spot	Clearly noticeable 2 inches (51 mm) or over in combined directions	Major
	Clearly noticeable under 2 inches (51 mm) but over 1/4 inch (6.4 mm) in combined directions	Minor
Smash	3 inches (76 mm) or over in combined directions	Major
	Under 3 inches (76 mm) in combined directions	Minor
Broken or missing ends or picks	Three or more contiguous regardless of length or two contiguous over 36 inches (914 mm) in length	Major
	Two contiguous under 36 inches (914 mm) in length	Minor
Floats	2 inches (51 mm) or over in combined directions	Major
	Under 2 inches (51 mm) in combined directions	Minor
Coarse or light place	Over 1/2 inch (12.7 mm) in width causing thickness outside of limits specified in 3.2.2	Minor
Selvage defects	Cut or torn	Major
	Curled or folded under	Minor
Crease	Hard, embedded, and folded over on self	Major
Brittle or fused area	Any	Major
Uneven finish	Thin areas where finishing compound is missing or insufficient	Major

3.4 Tolerances:

The width shall be within $\pm 1/2$ inch (± 12.7 mm) from width ordered.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

(R)

The manufacturer of cloth shall supply all samples for required 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:

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

- 4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material 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; a lot shall be all cloth produced in a single production run under the same fixed conditions and presented for manufacturer's inspection at one time:

- 4.3.1 Visual Examination of Rolls: 100% of each roll

- 4.3.2 Fabric Tests: Samples for test shall be taken at random from each lot in accordance with Table 3. Except as noted in 4.3.2.1, the number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

TABLE 3A - Sample Sizes, Inch/Pound Units

Lot Size, Yards	Sample Size, Yards
Up to 3,200, incl	2
Over 3,200 to 22,000, incl	3
Over 22,000	5

TABLE 3B - Sample Sizes, SI Units

Lot Size, Meters	Sample Size, Meters
Up to 2,926, incl	1.8
Over 2,926 to 20,117, incl	2.7
Over 20,117	4.6

- 4.3.2.1 When a statistical sampling plan has been agreed upon by purchaser and supplier, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.2 and the report of 4.5 shall state that such plan was used.

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 Manufacturer 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 cloth. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, manufacturer 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 of reapproval.

4.5 Reports:

The supplier of cloth shall furnish with each shipment a report showing the results of tests to determine conformance to the technical requirements. This report shall include the purchase order number, lot number, AMS 3837D, manufacturer's material designation, and quantity.

4.6 Resampling and Retesting:

(R)

If any specimen used in the above tests fails to meet the specified requirements, disposition of the cloth may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the cloth represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

- 5.1.1 A lot of cloth may be packaged in small quantities and delivered under the (R) basic lot approval provided lot identification is maintained.
- 5.1.2 Each roll of cloth shall be packed in a sealed, vapor-tight bag of polyethylene not less than 0.004 inch (0.10 mm) thick to ensure that the cloth, during shipment and storage, will be protected against damage from exposure to moisture, weather, or any other normal hazard.
- 5.1.2.1 Once the bag is opened, if the roll is not totally consumed, the cloth shall be rebagged, desiccant added, and the bag resealed.
- 5.1.3 Each roll of cloth shall have attached a tag showing not less than the manufacturer's name or trademark and the phrase "CLOTH, Type "S" Glass, (181 Type), Fabric Finish No. HTS-904".