

CLOTH, GLASS  
Style 7781, Chrome-Silane Finish

1. SCOPE:

- 1.1 Form: This specification covers one type of woven glass cloth treated with a chrome-silane finish.
- 1.2 Application: Primarily for use as a reinforcing material for structural plastic laminates, particularly those having a polyester, epoxy, or phenolic resin matrix.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

- 2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods

- 2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D123 - Terminology Relating to Textiles Materials  
ASTM D374 - Thickness of Solid Electrical Insulation  
ASTM D578 - Glass Fiber Yarns  
ASTM D579 - Griage Woven Glass Fabrics  
ASTM D2410 - Finish Content of Woven Glass Fabric, Cleaned and After-Finished with Chrome Complexes, for Plastic Laminates  
ASTM D3775 - Fabric Count of Woven Fabric  
ASTM D3776 - Weight (Mass) per Unit Area of Woven Fabric

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2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes  
 MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Material:

3.1.1 Yarn: The cloth shall be woven from ECDE 75-1/0 yarn as defined in ASTM D578.

3.1.2 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, etc. 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, etc fill yarn, and the No. 2 warp yarn shall go under the No. 2, No. 10, No. 18, etc, fill yarn, etc.

3.1.3 Finish: The cloth shall have been suitably cleaned to remove all lubricating materials or binders, followed by a chrome-silane finish which will meet the requirements of 3.2.4. The chrome-silane finish shall aid in wetting the cloth with resin and shall provide an intermediate chemical bond between the cloth and resin when the cloth is used for reinforcing plastic laminates.

3.2 Properties: Cloth shall conform to the following requirements; tests shall be performed on the cloth supplied and in accordance with specified ASTM methods:

3.2.1	Weight Ø	8.1 - 9.2 oz per sq yd (275 - 310 g/m <sup>2</sup> )	ASTM D3776, Small Sample Method
3.2.2	Thickness	0.0085 in. + 0.001 (0.215 mm + 0.02)	ASTM D374, Method C
3.2.3	Thread Count Ø		ASTM D3775
	Warp	55 - 59 ends per in. (25.4 mm)	
	Fill	52 - 56 ends per in. (25.4 mm)	
3.2.4	Chrome-Silane Level, by weight	0.020 - 0.035%	ASTM D2410

3.2.5 Breaking Strength  
per unit of  
width, min

ASTM D579

Warp 210 lb per in. (37 kN/m)

Fill 195 lb per in. (34 kN/m)

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

3.3.1 Imperfections: In any 100 yd (90 m) of cloth supplied in nominal width of 38 in. (950 mm) there shall be no more than the equivalent of 10 major imperfections (2 minors = 1 major), based on the following imperfection classification; for nominal widths of 50 in. (1250 mm) and 60 in. (1500 mm) there shall be no more than the equivalent of 13 and 16 major imperfections, respectively. Definition of terms shall be in accordance with ASTM D123.

Imperfection	Description	Classification
Bias or bowed filling	Distorted from perpendicular to the selvage edge more than 3 in. (75 mm) for 38-in. (950-mm) width and proportionately for all other widths.	Minor
Baggy, ridgy, or wavy cloth	Clearly noticeable.	Major
Cut or tear	2 in. (50 mm) or over in combined directions.	Major
	Less than 2 in. (50 mm) but greater than 1/4 in. (6 mm) in combined directions.	Minor
	Any cut or tear less than 1/4 in. (6 mm)	Minor
Hole	1/2 in. (12.5 mm) or over in diameter.	Major
	Under 1/2 in. (12.5 mm) in diameter.	Minor
Spots, streaks, or stains	Clearly noticeable 2 in. or over (50 mm) in combined directions.	Major
	Clearly noticeable under 2 in. (50 mm) in combined directions.	Minor

# AMS 3823C

Imperfection	Description	Classification
Tender or weak spot	Clearly noticeable 2 in. (50 mm) or over in combined direction.	Major
	Clearly noticeable under 2 in. (50 mm) but over 1/4 in. (6 mm) in combined directions.	Minor
Smash	3 in. (75 mm) or over in combined directions.	Major
	Under 3 in. (75 mm) in combined directions.	Minor
Broken or missing ends or picks	3 or more contiguous regardless of length or 2 contiguous over 36 in. (900 mm) in length.	Major
	2 contiguous under 36 in. (900 mm) in length.	Minor
Floats and skips	2 in. (50 mm) or over in combined directions.	Major
	Under 2 in. (50 mm) in combined directions.	Minor
Coarse or light place	Over 1/2 in. (12.5 mm) in width causing thickness outside of limits specified in 3.2.2.	Minor
Selvage defects Ø	Cut or torn 1/4 in. (6 mm) or over in length.	Major
	Cut or torn under 1/4 in. (6.5 mm) in length.	Minor
	Curled or folded over.	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 Sizes and Tolerances: Standard lengths and widths and tolerances shall be as specified in 3.4.1 and 3.4.2.

3.4.1 Length of Roll: Shall be as agreed upon by purchaser and vendor.  
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3.4.2 Width: Shall be 38, 50, or 60 in. (950, 1250, or 1500 mm), as ordered, and shall be within  $\pm 1/2$  in. ( $\pm 12.5$  mm) of the ordered width.  
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#### 4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of cloth shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.5. 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.  
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4.2 Classification of Tests:  
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4.2.1 Acceptance Tests: Tests to determine conformance to requirements for weight (3.2.1), thickness (3.2.2), thread count (3.2.3), chrome-silane level (3.2.4), breaking strength (3.2.5), quality (3.3), imperfections (3.3.1), and sizes and tolerances (3.4) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of cloth to a purchaser, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.  
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4.2.2.1 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, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be as follows:

4.3.1 For Acceptance Tests:  
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4.3.1.1 Frequency of Sampling:

4.3.1.1.1 Examination of Rolls: 100% visual examination shall be performed on all lots.

4.3.1.1.2 Fabric Tests: Shall be in accordance with Table I.

TABLE I

SAMPLE SIZE FOR TESTS OF GLASS CLOTH

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 I (SI)

Lot Size, Metres	Sample Size, Metres
Up to 2,925, incl	1.8
Over 2,925 to 20,100, incl	2.7
Over 20,100	4.6

- 4.3.1.2 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. An inspection lot shall not exceed 5000 yd (4600 m). A lot may be packaged in smaller quantities under the basic lot approval provided lot identification is maintained.
- 4.3.1.3 When a statistical sampling plan and acceptance quality level (AQL) in accordance with MIL-STD-105 have been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1.1 and the report of 4.5.1 shall state that such plan was used.
- 4.3.1.4 For direct U.S. Military procurement, the entire yardage of each roll of cloth shall be examined on the face side for imperfections listed in 3.3.1.
- 4.3.1.4.1 All imperfections found shall be counted regardless of their proximity one to another except where two or more imperfections represent a single local condition in the end item, in which case only the more serious imperfection shall be counted. A continuous imperfection shall be counted as one imperfection. The sample unit shall be one yard. The sample size shall be in accordance with inspection level I of MIL-STD-105. Acceptance quality levels (AQL's) shall be 2.5 major and 6.5 total (major and minor combined) imperfections per hundred units.
- 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 cloth. If necessary to make any change in ingredients, in type of equipment for processing, or in manufacturing procedures, vendor shall submit for reapproval a statement of the proposed changes in material, processing, or both and, when requested, sample cloth. Production cloth made by the revised procedure shall not be shipped prior to receipt of reapproval.

**4.5 Reports:**

- 4.5.1 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 fabric conforms to the other technical requirements of this specification. This report shall include the purchase order number, AMS 3823C, lot number, vendor's material and finish designation, date of finishing, and quantity.
- 4.5.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 3823C, contractor or other direct supplier of cloth, supplier's material and finish designation, and quantity. When cloth for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of cloth to determine conformance to the requirements of this specification and shall include in the report either a statement that the cloth conforms or copies of laboratory reports showing the results of tests to determine conformance.
- 4.6 Resampling and Retesting: 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 and no additional testing shall be permitted. Results of all tests shall be reported.

**5. PREPARATION FOR DELIVERY:****5.1 Packaging and Identification:**

- 5.1.1 Each roll of cloth shall have attached a tag showing the manufacturer's name or trademark and the phrase "CLOTH, GLASS, Style 7781, Chrome-Silane Finish".