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400 Commonwealth Dr., Warrendale, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 3649B

Issued 7-1-57
Revised 10-1-86

Superseding AMS 3649A

POLYCHLOROTRIFLUOROETHYLENE FILM
Unplasticized

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of April 14, 1986. By this action subject specification number and title will be deleted from the active specification index of Aerospace Material Specifications.

This specification is under the jurisdiction of AMS Committee "C P".

Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

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AMS 3649B
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POLYCHLOROTRIFLUOROETHYLENE FILM
Unplasticized

1. SCOPE:

1.1 Form: This specification covers polychlorotrifluoroethylene in the form of film and film tape 0.010 in. (0.25 mm) and under in nominal thickness.

1.2 Application: Primarily for parts requiring chemical inertness up to 200°C (390°F) and electrical insulating properties up to 165°C (330°F).

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

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 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 D149 - Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies
ASTM D257 - D-C Resistance or Conductance of Insulating Materials
ASTM D618 - Conditioning Plastics and Electrical Insulating Materials for Testing
ASTM D792 - Specific Gravity and Density of Plastics by Displacement
ASTM D882 - Tensile Properties of Thin Plastic Sheeting
ASTM D1430 - Polychlorotrifluoroethylene (PCTFE) Plastics

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

2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall be manufactured from virgin, unplasticized, polymer of polychlorotrifluoroethylene.

Ø 3.2 Color: Shall be natural (unpigmented) and may vary from clear to white or gray translucent.

3.3 Properties: Film shall conform to the following requirements; tests shall be performed on the film supplied and in accordance with specified test methods, insofar as practicable:

3.3.1 Ø	Tensile Strength at 23°C ± 1 (73°F ± 2), min	4500 psi (31.0 MPa)	4.5.1
3.3.2 Ø	Elongation at 23°C ± 1 (73°F ± 2), min	100%	4.5.1
3.3.3 Ø	Volume Resistivity at 50% ± 5 Relative Humidity and 23°C ± 1 (73°F ± 2), min	1.0×10^{14} ohm - cm	ASTM D257
3.3.4 Ø	Dielectric Strength at 23°C ± 1 (73°F ± 2), min	As calculated from equation in 4.5.2	4.5.2
3.3.5	Specific Gravity, min	2.05	ASTM D792, Method A
3.3.6 Ø	Zero Strength Time at 250° C ± 2 (482°F ± 4), min	100 sec	ASTM D1430

3.4 Quality: Film shall be uniform in quality and condition, clean, smooth, and free from foreign materials and from imperfections detrimental to fabrication, appearance, or performance of parts.

3.5 Tolerances: Unless otherwise specified, the following tolerances shall apply; measurements shall be made at 20° - 30°C (68° - 86°F).

TABLE I

Nominal Thickness Inch	Thickness Tolerance, Inch plus and minus
0.002 to 0.005, incl	0.0005
Over 0.005 to 0.010, incl	0.001

TABLE I (SI)

Nominal Thickness Millimetre	Thickness Tolerance, Millimetre plus and minus
0.05 to 0.13, incl	0.013
Over 0.13 to 0.25, incl	0.03

4. QUALITY ASSURANCE PROVISIONS:

4.1 Ø Responsibility for Inspection: The vendor of film shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the film conforms to the requirements of this specification.

Ø 4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to tensile strength (3.3.1), elongation (3.3.2), Ø dielectric strength (3.3.4), specific gravity (3.3.5), zero strength time (3.3.6), and tolerance (3.5) requirements are classified as acceptance tests.

4.2.2 Qualification Tests: Tests to determine conformance to all technical requirements of this specification Ø are classified as qualification tests.

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

4.3 Sampling:

4.3.1 Acceptance Tests: Sufficient film shall be taken from each lot to perform all required tests in Ø triplicate; a lot shall be all film produced in a single production run from the same batch of raw material and presented for vendor's inspection at one time.

Ø 4.3.2 Qualification Tests: As agreed upon by purchaser and vendor.

4.4 Approval:

4.4.1 Sample film shall be approved by purchaser before film for production use is supplied, unless such approval be waived. Results of tests on production film 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 Ø production film which are essentially the same as those used on the approved sample film. If any change is necessary 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 and processing, and when requested, sample film. Production film made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Test Methods:

4.5.1 Tensile Strength and Elongation: Shall be determined in accordance with ASTM D882, Method A, except using a jaw separation rate of 1.0 in. (25 mm) per minute.

4.5.2 Dielectric Strength: Shall be determined in accordance with ASTM D149, short time test, on speci- Ø mens conditioned in accordance with ASTM D618, Procedure A, and using a voltage rise of 500 - 600 V per sec to breakdown. The required value shall be calculated from the equation:

$$E = \frac{4500}{\sqrt{t}} \text{ in U.S. Conventional units;}$$

$$E = \frac{717.3}{\sqrt{t}} \text{ in SI units}$$

where "t" = nominal wall thickness