SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS3649 REV. D

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Superseding AMS3649C

Film, Polychlorotrifluoroethylene (PCTFE) Unplasticized

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

STABILIZED NOTICE

This document has been declared "Stabilized" by SAE AMS P, Polymeric Materials Committee, and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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1. SCOPE:

1.1 Form:

This specification covers a 100% homopolymer of polychlorotrifluoroethylene (PCTFE) in the form of film and film tape 0.010 inch (0.25 mm) and under in nominal thickness.

1.2 Application:

Primarily for parts requiring chemical inertness up to 200 °C (392 °F) and electrical insulating properties up to 165 °C (329 °F).

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.

2.1 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM D 149	Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies
ASTM D 257	D-C Resistance or Conductance of Insulating Materials
ASTM D 618	Conditioning Plastics and Electrical Insulating Materials for Testing
ASTM D 792	Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D 882	Tensile Properties of Thin Plastics Sheeting
ASTM D 1430	Polychlorotrifluoroethylene (PCTFE) Plastics

2.2 U.S. Government Publications:

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

2.2.1 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, 100% homopolymer of polychlorotrifluoroethylene (PCTFE).

3.2 Color:

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

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	Tensile Strength at 23 °C ± 1 (73 °F ± 2), minimum	4500 psi (31.0 MPa)	4.5.1
3.3.2	Elongation at 23 °C ± 1 (73 °F ± 2), minimum	100%	4.5.1
3.3.3	Volume Resistivity at 50% ± 5 Relative Humidity and 23 °C ± 1 (73 °F ± 2), minimum	1.0×10^{14} ohm - cm	ASTM D 257

3.3.4	Dielectric Strength at 23 °C ± 1 (73 °F ± 2), minimum	450 volts per mil (17,717 r/mn)	4.5.2
3.3.5	Specific Gravity at 23/23 °C (73°/73 °F), minimum	2.08 - 2.18	ASTM D 792, Method A
3.3.6	Zero Strength Time at 250 °C ± 2 (482 °F ± 4), minimum	100 seconds	ASTM D 1430

3.4 Quality:

Film, 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 film.

3.5 Tolerances:

Shall be as follows; measurements shall be made at 20 to 30 °C (68 to 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 Millimeter	Thickness Tolerance, Millimeter 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 Responsibility for Inspection:

The vendor of film 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 film conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for tensile strength (3.3.1), elongation (3.3.2), dielectric strength (3.3.4), specific gravity (3.3.5), zero strength time (3.3.6), and tolerances (3.5) are acceptance tests and shall be performed on each lot.

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 film 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 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:

Shall be as follows:

4.3.1 For Acceptance Tests: Sufficient film shall be taken at random from each lot to perform all required tests. 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.

4.3.1.1 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. An inspection lot shall not exceed 500 pounds (227 kg). A lot may be packaged in smaller quantities and delivered under the basic lot approval provided lot identification is maintained.

4.3.1.2 When a statistical sampling plan has been agreed upon by purchaser and vendor, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.6 shall state that such plan was used.

4.3.2 For Preproduction Tests: As agreed 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 by purchaser. 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 production film which are essentially the same as those used on the approved sample film. 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 ingredients and/or 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 D 882, Method A, except using a jaw separation rate of 1.0 inch (25 mm) per minute.