AEROSPACE MATERIAL SPECIFICATION

AMS3617	REV. E

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Superseding AMS3617D

Polyamide Type 6-6, Plastic Moldings and Extrusions

RATIONALE

This is a 5 year review of the specification which is a general update, corrects minor errors and has minor changes to format in accordance with SAE requirements

1. SCOPE

1.1 Form

This specification covers one type of Polyamide Type 6-6 (nylon) thermoplastic resin in the form of moldings and extrusions.

1.2 Definition

Nylon 6-6, also referred to as nylon 6,6, is a polyamide from nylon class. The polymer is made of hexamethylenediamine and adipic acid, which give nylon 6,6 a total of 12 carbon atoms in each repeating unit, and its name.

1.3 Application

These products have been used typically for parts requiring high strength and resistance to aircraft fuels and lubricants up to 248 °F (120 °C), but usage is not limited to such applications. Users should test to confirm fluid compatibility at the system's maximum operating temperature before proceeding with part performance testing.

1.4 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 issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

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http://www.sae.org/technical/standards/AMS3617E

2.1 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D 256 Impact Resistance of Plastics and Electrical Insulating Materials

ASTM D 570 Water Absorption of Plastics

ASTM D 638 Tensile Properties of Plastics

ASTM D 638M Tensile Properties of Plastics (Metric)

ASTM D 648 Deflection Temperature of Plastics Under Flexural Load

ASTM D 790 Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

ASTM D 790M Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials (Metric)

ASTM D 792 Specific Gravity (Relative Density) and Density of Plastics by Displacement

ASTM D 3418 Transition Temperatures of Polymers by Thermal Analysis

2.2 U.S. Government Publications

Available from DLA Document Services, Building 4/D, 700 Robbins Avenue, Philadelphia, PA 19111-5094, Tel: 215-697-6396, http://quicksearch.dla.mil/.

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

3. TECHNICAL REQUIREMENTS

3.1 Material

Shall be a polyamide resin with any necessary fillers, modifiers, and plasticizers necessary to meet the requirements of 3.1.1 and 3.2.

3.1.1 Color

Shall be light cream, opaque.

3.2 Properties

The product shall conform to requirements shown in Table 1, Table 2, Table 3, tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable:

3.2.1 Tensile Strength

Shall be as shown in Table 1.

TABLE 1 - MINIMUM TENSILE STRENGTH

Nominal Thickness Inches	Nominal Thickness Millimeters	Value	Test Method
Up to 0.375, excl	Up to 9.52, excl	9.0 ksi (62 MPa)	ASTM D 638 or
0.375 and over	9.52 and over	11.0 ksi (76 MPa)	ASTM D 638M

3.2.2 Elongation

Shall be as shown in Table 2.

TABLE 2 - MINIMUM ELONGATION

Nominal Thickness Inches	Nominal Thickness Millimeters	Value	Test Method
Up to 0.187, excl	Up to 4.75, excl	50%	ASTM D 638 or
0.187 and over	4.75 and over	25%	ASTM D 638M

TABLE 3 - PROPERTIES

Paragraph	Property	Value	Test Method
3.2.3	Flexural Modulus of Elasticity (Tangent), min	310 ksi (2137 MPa)	ASTM D 790 or ASTM D 790M
3.2.4	Impact Resistance per unit of notch, min	0.6 foot pounds/inch (32.0 J/m)	ASTM D 256, Method A
3.2.5	Deflection Temperature at 264 psi (1.82) MPa) fiber stress, min	151 °F (66 °C)	ASTM D 648
3.2.6	Water Absorption (24 hour immersion), weight gain, max	1.5%	ASTM D 570
	Specific Gravity at 73 °F ± 4 (23 °C ± 2)	1.13 to 1.15	ASTM D 792, Method A
3.2.7			
3.2.8	Melting point	482 to 509 °F (250 to 265 °C)	ASTM D 3418 DTA or DSC (See 8.2)

3.2.3 Weather Resistance

When specified, the product shall have weather resistance acceptable to purchaser, determined by a procedure acceptable to purchaser.

3.2.4 Corrosion

When specified, the product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service, determined by a procedure acceptable to purchaser.

3.3 Quality

The product, 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 product.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The manufacturer of the product 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 product conforms to the requirements of this specification.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Tests for tensile strength (3.2.1), elongation (3.2.2), specific gravity (3.2.7), and melting point (3.2.8) 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 the product by a manufacturer, 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 product 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 When the product is of such size or shape that suitable specimens cannot be obtained, separate specimens, injection molded from the same batch of molding powder and under conditions representative of those used in making the product, shall be supplied upon request.

4.3.1.2 A lot shall be all product from the same batch of molding powder processed in one continuous run and presented for manufacturer's inspection at one time.

4.3.1.3 A batch of molding powder shall be all powder produced in one continuous set of operations.

4.3.1.4 When a statistical sampling plan has been agreed upon by purchaser and manufacturer, sampling shall be in accordance with such plan in lieu of sampling as in 4.3.1 and the report of 4.5 shall state that such plan was used.

4.3.2 For Preproduction Tests

As agreed upon by purchaser and manufacturer.

4.4 Approval

4.4.1 Sample product shall be approved by purchaser before product for production use is supplied, unless such approval be waived by purchaser. Results of tests on production product shall be essentially equivalent to those on the approved sample.