SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

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Superseding AMS3628D

Plastic Extrusions and Moldings, Polycarbonate General Purpose

RATIONALE

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

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1. SCOPE:

1.1 Form:

This specification covers a polycarbonate resin in the form of extrusions and moldings.

1.2 Application:

These products have been used typically for mechanical parts requiring high impact strength from -55 to +135 °C (-67 to +275 °F), clarity, high strength, and dimensional stability, but usage is not limited to such applications. These products are sensitive to some solvents; each application must be evaluated on its own merits.

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, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 256	Impact Resistance of Plastics and Electrical Insulating Materials
ASTM D 570	Water Absorption of Plastics
ASTM D 621	Deformation of Plastics Under Load
ASTM D 635	Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position
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

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 Material:

Shall be a polycarbonate resin with fillers, plasticizers, and modifiers necessary to meet the requirements of 3.2 and 3.3.

3.2 Color:

Shall be transparent with a water-white or light straw color, unless otherwise ordered.

3.3 Properties:

The product shall conform to requirements shown in Table 1 and 3.3.10; tests shall be performed on the product supplied and in accordance with specified ASTM methods, insofar as practicable.

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TABLE 1 - Properties

Paragraph	Property	Requirement	Test Method
3.3.1	Tensile Properties:		ASTM D 638 or
	Tensile Strength, minimum	8000 psi (55.2 MPa)	ASTM D 638 M
	Yield Strength, minimum	7000 psi (48.3 MPa)	Speed C
	Elongation at Rupture, minimum	60%	
3.3.2	Flexural Modulus of Elasticity (tangent), minimum	300 ksi (2068 MPa)	ASTM D 790 or ASTM D 790M
3.3.3	Flexural Strength, minimum	11.0 ksi (75.8 MPa)	ASTM D 790 or ASTM D 790M
3.3.4	Impact Strength		ASTM D 256, Method A
3.3.4.1	Notched, minimum	12 foot-pounds/inch (640 J/m)	
3.3.4.2	Unnotched, minimum	60 foot-pounds/inch (3203 J/m)	
3.3.5	Deflection Temperature at 264 psi (1.82 MPa) fiber stress, minimum	128 °C (262 °F)	ASTM D 648
3.3.6	Time of Burning, maximum	5 seconds	ASTM D 635
3.3.7	Water Absorption, 24 hours immersion at 23 °C ± 1 (73 °F ± 2), maximum	0.35%	ASTM D 570
3.3.8	Specific Gravity at 23/23 °C (73/73 °F)	1.19 to 1.21	ASTM D 792
3.3.9	Deformation Under Load, maximum		ASTM D 621
3.3.9.1	4000 psi (27.6 MPa) at 25 °C ± 1 (77 °F ± 2)	0.3%	
3.3.9.2	4000 psi (27.6 MPa) at 70 °C ± 1 (158 °F ± 2)	1.1%	

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3.3.10 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of metals shall not be considered objectionable. Method of test and standards for acceptance shall be as agreed upon by purchaser and vendor.

3.4 Quality:

The product, as received by purchaser, shall be uniform in quality and condition, smooth, and free from imperfections detrimental to usage of the product.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for tensile properties (3.3.1), impact strength (3.3.4), and specific gravity (3.3.8) 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 a product 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 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 shall be supplied upon request. Such specimens shall be injection molded from the same batch of molding powder and under conditions representative of those used in making the product.

4.3.1.2 Specimens for impact strength (3.3.4) shall be nominally 1/2 x 1/8 inch (12.7 x 3.2 mm).

4.3.1.3 A lot shall be all product of the same size and configuration or the same part number from the same batch of molding powder produced in one continuous run and presented for vendor's inspection at one time.

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

4.3.1.5 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 4.5 shall state that such plan was used.

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4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor.

4.3.2.1 Specimens for time-of-burning test (3.3.6) shall be nominally 1/8 inch (3.2 mm) thick.

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.

4.4.2 Vendor shall use ingredients, manufacturing procedures, processes, and methods of inspection on production product which are essentially the same as those used on the approved sample. 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 product. Production product made by the revised procedure shall not be shipped prior to receipt of reapproval.

4.5 Reports:

The vendor of the product shall furnish with each shipment a report showing the results of tests to determine conformance to the acceptance test requirements and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 3628E, vendor's compound number, form, size or part number, and quantity.

4.6 Resampling and Retesting:

If any specimen used in the above tests fails to meet the specified requirements, disposition of the product 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 product represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Product Identification:

5.1.1 Moldings: Each molding of suitable size shall have the part number molded or permanently impressed therein. If size or configuration precludes integral marking, moldings of each different part number shall be packaged in separate containers marked with the part number.

5.1.2 Extrusions: Each extrusion shall be marked near one end or, if coiled, near the outside end with the manufacturer's designation and AMS 3628E.

5.2 Packaging and Package Identification:

5.2.1 A lot of product may be packaged in small quantities and delivered under the basic lot approval provided lot identification is maintained.

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