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

AEROSPACE MATERIAL SPECIFICATION

AMS3644

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Revised

PLASTIC ROD AND BAR, POLYIMIDE
Molded

1. SCOPE:

1.1 Form: This specification and its supplementary detail specifications cover a polyimide plastic in the form of molded rod and bar.

1.2 Application: Primarily for parts requiring low coefficients of friction, thermal resistance, and toughness up to 260°C (500°F).

1.3 Classification: The requirements specified herein and in the applicable detail specification define each product on the basis of the filler used with the same base polyimide polymer. The presence of filler and the material used as filler are specified in the title of each detail specification.

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 D695 - Compressive Properties of Rigid Plastics
ASTM D790 - Flexural Properties of Plastics and Electrical Insulating Materials
ASTM D792 - Specific Gravity and Density of Plastics by Displacement
ASTM D1708 - Tensile Properties of Plastics by Use of Microtensile Specimens
ASTM D2714 - Calibration and Operation of the Alpha Model LFW-1 Friction and Wear Testing Machine

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 Detail Specifications: The requirements for a specific material shall consist of all the requirements specified herein in addition to the requirements specified in the applicable detail specification. In the case of any conflict between the requirements of this basic specification and an applicable detail specification, the requirements of the detail specification shall govern.

3.2 Material: Moldings shall be manufactured from virgin, unplasticized polyimide polymer, unfilled or filled as specified in the applicable detail specification, ready for machining and use.

3.3 Color: Shall be natural and may vary as specified in the applicable detail specification, depending on the filler material used.

3.4 Properties: Shall conform to the requirements of this specification and the applicable detail specification. Tests shall be performed on the product supplied and in accordance with the specified test methods:

Tensile Strength	ASTM D1708
Elongation	ASTM D1708
Compressive Strength	ASTM D695
Flexural Strength	ASTM D790
Coefficient of Friction	4.5.1
Specific Gravity	ASTM D792, Method A

3.4.1 Dimensional Stability: No dimensions of raw stock or fabricated parts shall change more than 0.001 in. per in. (0.001 mm/mm), measured at 20° - 30°C (68° - 86°F) before and after being held for 24 hr ± 0.5 at 260°C ± 5 (500°F ± 9) in air. Before initial measurement, specimens shall be conditioned at 150°C ± 5 (302°F ± 9) for 24 hr ± 0.5.

3.5 Quality: The product shall be uniform in quality and condition, clean, smooth, and free from foreign materials and from internal and external imperfections detrimental to fabrication, appearance, or performance of parts.

3.6 Tolerances: Unless otherwise specified, the following tolerances shall apply; measurements shall be made at 20° - 30°C (68° - 86°F) except that closer temperature control may be required for large dimensions.

TABLE I

Nominal Diameter Inches	Diameter Tolerances, Inch plus only
0.250 to 1.000, incl	0.025
Over 1.000 to 2.000, incl	0.050
Over 2.000 to 3.500, incl	0.070
Over 3.500	As specified by purchaser

TABLE I (SI)

Nominal Diameter Millimetres	Diameter Tolerance, Millimetres plus only
6.35 to 25.40, incl	0.64
Over 25.40 to 50.80, incl	1.27
Over 50.80 to 88.90, incl	1.78
Over 88.90	As specified by purchaser

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product 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 product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for tensile strength at 23°C (73°F), elongation at 23°C (73°F), and specific gravity at 23°C (73°F) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Qualification Tests: Tests to determine conformance to all technical requirements of this specification and the applicable detail specification are classified as qualification tests and shall be performed on the initial shipment of the product to a purchaser, when a change in material 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, qualification 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: Shall be as follows:

4.3.1 For Acceptance Tests: Each lot of product shall be sampled at random to provide sufficient material to perform all required tests. The number of specimens for each test 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 molded product produced in a single production run from the same batch of polymer and presented for vendor's inspection at one time. A lot may be packaged or delivered in small quantities under a basic lot approval as long as the lot identification is maintained. An inspection lot may contain product of varying sizes but shall not exceed 200 lb (90 kg) of product.

4.3.1.2 When a statistical sampling plan and acceptance quality level (AQL) 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 and the report of 4.6.1 shall state that such plan was used.

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

4.4 Approval:

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

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

4.5 Test Methods:

4.5.1 Coefficient of Friction: Shall be determined in accordance with ASTM D2714, using conforming polymeric block against a rotating steel ring without lubricant.

4.6 Reports:

4.6.1 The vendor of the product shall furnish with each shipment three copies of 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 of this specification and the applicable detail specification. This report shall include the purchase order number, material specification number and its applicable detail specification number, vendor's product identification, lot number, size or part number, and quantity.

4.6.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its applicable detail specification number, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification and the applicable detail specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.7 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 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 Packaging shall be accomplished in such a manner as to ensure that the product, during shipment and storage, will not be permanently distorted and will be protected against damage from exposure to weather or any normal hazard.

5.1.2 Each package shall be permanently and legibly marked to show not less than the following information:

PLASTIC __*__, POLYIMIDE, MOLDED
AMS 36EW/__**__
MANUFACTURER'S PRODUCT IDENTIFICATION_____
LOT NUMBER_____
SIZE OR PART NUMBER_____
QUANTITY_____
PURCHASE ORDER NUMBER_____

* Add "ROD" or "Bar" as applicable.
** Add detail specification number and definition from applicable detail specification.

5.1.3 Packages shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.1.4 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-794, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.1.1 and 5.1.3 will be acceptable if it meets the requirements of Level C.