

POLYTETRAFLUOROETHYLENE MOLDINGS, GLASS FIBER FILLED
75 PTFE Resin, 25 Glass, As Sintered

1. SCOPE:

- 1.1 Form: This specification covers one grade of glass-fiber-filled polytetrafluoroethylene in the form of molded billets.
- 1.2 Application: Primarily for parts, such as seals and back-up rings, requiring chemical inertness and superior mechanical properties up to 260°C (500°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 SAE, 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 D621 - Deformation of Plastics Under Load

ASTM D638 - Tensile Properties of Plastics

ASTM D792 - Specific Gravity and Density of Plastics by Displacement

ASTM D1708 - Tensile Properties of Plastics by Use of Microtensile Specimens

- 2.3 U.S. 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

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3. TECHNICAL REQUIREMENTS:

3.1 Material: The product shall be molded from a mixture of 75% $\pm$ 2 by weight of an approved virgin polytetrafluoroethylene powder and 25% $\pm$ 2 by weight glass fiber without admixture of other fillers, pigments, or adulterants and shall be sintered. Glass content shall be determined in accordance with 4.5.1.

3.1.1 Parts etched to remove the glass near the surface are acceptable with glass fiber content as low as 21%.

3.2 Color: Shall be opaque white. Minor discolorations shall not in themselves be cause for rejection.

3.3 Properties: The product shall conform to the following requirements; tests shall be performed on the product supplied and in accordance with specified test methods:

3.3.1 Tensile Strength, min, at 24°C $\pm$ 3 (75°F $\pm$ 5): 4.5.2

3.3.1.1 Parallel to Direction of Molding 2100 psi (14.5 MPa)

3.3.1.2 Perpendicular to Direction of Molding 2700 psi (18.5 MPa)

3.3.2 Elongation, min, at 24°C $\pm$ 3 (75°F $\pm$ 5): 4.5.2

3.3.2.1 Parallel to Direction of Molding 270%

3.3.2.2 Perpendicular to Direction of Molding 240%

3.3.3 Specific Gravity at 23°C/23°C - (73°F/73°F) - 2.22 $\pm$ 0.02 4.5.3

3.3.4 Compressive Creep under 2000 psi (14 MPa) at 24°C $\pm$ 3 (75°F $\pm$ 5): 4.5.4

3.3.4.1 After 24 hr at load 7.1%

3.3.4.2 After 24 hr recovery 3.9%

3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, clean, smooth, and free from foreign materials and from internal and external imperfections detrimental to usage of the product.

3.5 Tolerances: Unless otherwise specified, the following tolerances apply at 23° - 30°C (73° - 86°F):

3.5.1 Rods and Shapes:

TABLE I

Nominal Diameter or Distance Between Parallel Sides Inches	Tolerance, Inch plus only
Up to 0.250, incl	0.008
Over 0.250 to 0.500, incl	0.016
Over 0.500 to 0.750, incl	0.020
Over 0.750 to 1.000, incl	0.025
Over 1.000 to 1.250, incl	0.030
Over 1.250 to 1.500, incl	0.038
Over 1.500 to 1.750, incl	0.046
Over 1.750 to 2.000, incl	0.052
Over 2.000 to 2.250, incl	0.068
Over 2.250 to 2.500, incl	0.076

TABLE I (SI)

Nominal Diameter or Distance Between Parallel Sides Millimetres	Tolerance, Millimetres plus only
Up to 6.25, incl	0.20
Over 6.25 to 12.50, incl	0.40
Over 12.50 to 18.75, incl	0.50
Over 18.75 to 25.00, incl	0.62
Over 25.00 to 31.25, incl	0.75
Over 31.25 to 37.50, incl	0.95
Over 37.50 to 43.75, incl	1.15
Over 43.75 to 50.00, incl	1.30
Over 50.00 to 56.25, incl	1.75
Over 56.25 to 62.50, incl	1.95

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. Results of such tests shall be reported to the purchaser as required by 4.6. 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 Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and as preproduction tests and shall be performed prior to or on the initial shipment of moldings to a purchaser, on each lot, when a change in material or processing, or both, requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.
- 4.2.1 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, the contracting officer, or the request for procurement.
- 4.3 Sampling: Sufficient moldings shall be taken from each lot to perform all required tests and as follows:
- 4.3.1 The vendor shall supply sufficient sheet skived from billet from each lot of sintered material for 5 microtensile specimens for each direction of molding plus a section of the billet for specific gravity test and glass content.
- 4.3.2 A lot shall be all billets molded by one operator during one shift, made from one batch of mixed polytetrafluoroethylene and glass fiber, and sintered in a furnace at one time. Each lot shall be assigned a traceable serial number. All parts machined from a lot of billets shall be identified as to lot number. Parts machined from a lot of billets may be shipped as ordered but identity of lot number shall be maintained for all parts made from one lot.
- 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 by purchaser. Results of tests on production material 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 material which are essentially the same as those used on the approved sample material. 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 materials or processing, or both, 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 Glass Fiber Content:

4.5.1.1 Equipment: Platinum Crucible

Desiccator

Analytical Balance (Capable of weighing to 0.001 g)

Muffle Furnace (Capable of being heated to 650°C (1200°F), with heating elements embedded in ceramic.

4.5.1.2 Procedure: Heat a platinum crucible at 650°C $\pm$ 20 (1200°F $\pm$ 40) for 10 minutes. Place crucible in desiccator for at least 30 min. and obtain tare weight of crucible to the nearest 0.001 gram. Place a 1.0 to 1.5 g sample, cut up into small pieces, into the crucible. Place crucible and sample into muffle furnace (see 4.5.1.2.1) for 10 - 12 min. at 650°C $\pm$ 20 (1200°F $\pm$ 40). Cool the crucible for 30 min. in desiccator and weigh to the nearest 0.001 gram. Calculate the glass fiber content of the sample as follows:

$$\text{Glass fiber, \% by wt} = \frac{\text{Weight of ash (glass fiber)}}{\text{Sample weight, g}} \times 100$$

4.5.1.2.1 The furnace should have ventilation to sweep the volatiles from the furnace and a hood outside of the furnace to remove toxic vapors from the laboratory.

4.5.2 Tensile Properties: Tensile strength and elongation shall be determined in accordance with ASTM D638, using microtensile specimens conforming to ASTM D1708. The initial jaw separation shall be 0.875 in. $\pm$ 0.005 (22 mm $\pm$ 0.12) and the speed of testing shall be 2 in. (50 mm) per minute. Specimens shall be prepared from slices 0.031 in. $\pm$ 0.002 (0.80 mm $\pm$ 0.05) thick cut from a billet of sufficient diameter which is processed with and representative of one lot of billets molded and sintered to make the product. Three microtensile specimens parallel to direction of molding and three specimens perpendicular to the direction of molding shall be tested and the median used as the characteristic of the product, except that if one or more specimens do not meet the minimum requirements, two additional specimens shall be tested for each specimen not meeting the minimum requirements and the median result of all specimens used as the characteristic of the product. All results shall be reported.

4.5.3 Specific Gravity: Shall be determined in accordance with ASTM D792, Method A-1, on specimen or a part machined from 10% of the billets in one lot.

4.5.4 Compressive Creep: Shall be determined in accordance with ASTM D621, Method A, using a load of 2000 psi (14 MPa) for 24 hr at 24°C $\pm$ 3 (75°F $\pm$ 5). In addition, the specimen shall be allowed to recover in the free state for 24 hr at 24°C $\pm$ 3 (75°F $\pm$ 5) and the permanent set determined. The compressive creep shall be determined on one part machined from 5% of the billets in each lot, but no less than one per lot.

4.6 Reports: