SAE Aerospace
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# AEROSPACE MATERIAL SPECIFICATION

SAE AMS3756 REV. C

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Superseding AMS3756B

## Moldings, Glass Fiber Filled Polytetrafluoroethylene (PTFE) 75% PTFE Resin, 25% Glass Fibers, As Sintered

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 one grade of glass-fiber-filled polytetrafluoroethylene (PTFE) 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 500 °F (260 °C).

### 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 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.

### 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 621 | Standard Test Methods for Deformation of Plastics Under Load |
| ASTM D 792 | Specific Gravity and Density of Plastics by Displacement |
| ASTM D 4894 | Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials |

## 3. TECHNICAL REQUIREMENTS

### 3.1 Material

The product shall be molded from a mixture of 75% ± 2 by weight of virgin polytetrafluoroethylene (PTFE) powder conforming to ASTM D 4894, Type II or Type IV and 25% ± 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 be cause for rejection.

### 3.3 Properties

The product shall conform to the requirements of Table 1; tests shall be performed on production product supplied and in accordance with specified test methods:

TABLE 1 - PROPERTIES

| Paragraph | Property | Requirement | Test Method |
|---|---|---|---|
| 4.4.2 | Tensile Strength at 75 °F ± 3 (24 °C ± 2), minimum: | | 4.4.2 |
| 4.4.2 | Parallel to Direction of Molding | 2100 psi (14.5 MPa) | |
| 4.4.2 | Perpendicular to Direction of Molding | 2700 psi (18.6 MPa) | |
| 4.4.2 | Elongation at 75 °F ± 3 (24 °C ± 2), minimum: | | 4.4.2 |
| 4.4.2 | Parallel to Direction of Molding | 270% | |
| 4.4.2 | Perpendicular to Direction of Molding | 240% | |
| 4.4.3 | Specific Gravity at 73 °F ± 3 (23 °C ± 2) | 2.22 ± 0.02 | 4.4.3 |
| 4.4.4 | Compressive Creep under 2000 psi (13.8 MPa) at 75 °F ± 5 (24 °C ± 3), maximum: | | 4.4.4 |
| 4.4.4 | After 24 hours at load | 7.1% | |
| 4.4.4 | After 24 hours recovery | 3.9% | |

3.4 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.

3.5 Tolerances

Unless otherwise agreed between vendor and purchaser, dimensional tolerances of moldings shall be in accordance with Table 2, determined at 73 °F ± 5 (23 °C ± 3):

TABLE 2 - TOLERANCES ON DIMENSIONS OF MOLDED RODS AND SHAPES

| Nominal Diameter or Distance Between Parallel Sides Inches (Millimeters) | | | | | Tolerance, Inches (Millimeters) plus only |
|---|---|---|---|---|---|
| | Up | to | 0.250 ( 6.35) | incl | 0.008 (0.20) |
| Over | 0.250 ( 6.35) | to | 0.500 (12.70) | incl | 0.016 (0.41) |
| Over | 0.500 (12.70) | to | 0.750 (19.05) | incl | 0.020 (0.51) |
| Over | 0.750 (19.05) | to | 1.000 (25.40) | incl | 0.025 (0.64) |
| Over | 1.000 (25.40) | to | 1.250 (31.75) | incl | 0.030 (0.76) |
| Over | 1.250 (31.75) | to | 1.500 (38.10) | incl | 0.038 (0.97) |
| Over | 1.500 (38.10) | to | 1.750 (44.45) | incl | 0.046 (1.17) |
| Over | 1.750 (44.45) | to | 2.000 (50.80) | incl | 0.052 (1.32) |
| Over | 2.000 (50.80) | to | 2.250 (57.15) | incl | 0.068 (1.73) |
| Over | 2.250 (57.15) | to | 2.500 (63.50) | incl | 0.076 (1.93) |

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The manufacturer of the product shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to AMS requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Each lot shall conform to all technical requirements of this specification and all tests shall be performed prior to shipment of moldings to a purchaser.

4.2.1.1 Sampling

A lot shall be all billets molded from one batch of blended PTFE resin and sintered in an oven 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.

4.2.1.2 Sufficient moldings shall be taken from each lot to perform all required tests. The manufacturer shall supply sufficient skived sheet or tube machined from billet(s) from each lot of sintered material for five microtensile specimens for each direction of molding plus a section of the billet for specific gravity test and glass content.

4.3 Approval

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

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

4.4 Test Methods

4.4.1 Glass Fiber Content (by resin lot)

4.4.1.1 Equipment

Platinum Crucible
Desiccator
Analytical Balance (Capable of weighing to 0.001 gram)
Muffle Furnace (Capable of being heated to 1202 °F (650 °C), with heating elements embedded in ceramic

4.4.1.2 Procedure

Heat a platinum crucible at 1202 °F ± 36 (650 °C ± 20) for 10 minutes. Place crucible in desiccator for at least 30 minutes and obtain tare weight of crucible to the nearest 0.001 gram. Place a 1.0 to 1.5 gram sample of the product, cut into small pieces, into the crucible. Place crucible and sample into muffle furnace (See 4.4.1.2.1) for 10 to 12 minutes at 1202 °F ± 36 (650 °C ± 20). Cool the crucible for 30 minutes in desiccator and weigh to the nearest 0.001 gram. Calculate the glass fiber content of the sample as follows:

$$\text{Glass fiber, \% by weight} \quad \frac{\text{Weight of ash (glass fiber)}}{\text{Sample weight, grams}} \text{ X } 100 \qquad \text{(Eq. 1)}$$

4.4.1.2.1 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.

4.4.2 Tensile Properties

Tensile strength and elongation shall be determined in accordance with ASTM D 4894. Rods 0.250 inch (6.35 mm) and under in diameter may be tested in full cross-section. Specimens shall be prepared from a production billet(s) of sufficient size or if production billet(s) will not yield suitable test samples, from a test billet from the same lot of resin. All results shall be reported.

4.4.3 Specific Gravity

Shall be determined in accordance with ASTM D 792, Method A with 2 drops of wetting agent added to the water, on a specimen or a part machined from one of the billets in the subject lot.