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AEROSPACE MATERIAL SPECIFICATION

SAE

AMS 3678

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Polytetrafluoroethylene (PTFE) Moldings and Extrusions Unfilled, Pigmented, and Filled Components

1. SCOPE:

1.1 Form:

This specification covers several grades of virgin polytetrafluoroethylene (PTFE) resin which may be compounded with pigment and fillers in the form of extruded or molded rods or tubes which are sintered after molding or, in the case of extrusions, sintered during the extrusion process.

1.2 Application:

These products have been used typically for mechanical parts such as back-up rings, seals, and bearings requiring dimensional stability up to 450 °F (232 °C) with good mechanical properties, but usage is not limited to such applications. Each application should be considered individually.

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 other publications shall be the issue in effect on the date of the purchase order.

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AMS 3678**SAE****AMS 3678****2.1 ASTM Publications:**

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

ASTM D 792 Density and Specific Gravity (Relative Density) of Plastics by Displacement
 ASTM D 4745 Filled Compounds of Polytetrafluoroethylene (PTFE) Molding and Extrusion
 Materials
 ASTM D 4894 Polytetrafluoroethylene (PTFE) Granular Molding and Ram Extrusion Materials

3. TECHNICAL REQUIREMENTS:**3.1 Detail Specifications:**

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

3.2 Material:

All products shall be molded or extruded from fresh virgin or filled polytetrafluoroethylene (PTFE) powder. The virgin PTFE powder used in both unfilled and filled compounds to this specification shall conform to ASTM D 4894, Type II or Type IV. The blending of fillers with the virgin PTFE for each type shall be as shown in Table 1.

TABLE 1 - Material Types

Type	Description	Detail Specification
1	Virgin PTFE	AMS 3678/1
2	PTFE filled with 15% graphite	AMS 3678/2
3	PTFE filled with 15% glass fiber and 5% molybdenum disulfide	AMS 3678/3
4	PTFE filled with 25% glass fiber	AMS 3678/4
5	PTFE filled with inorganic pigment	AMS 3678/5
6	PTFE filled with 60% bronze powder	AMS 3678/6

3.2.1 Virgin polytetrafluoroethylene shall mean resin that has no pigment or filler added and the resin has not experienced any previous pressure or heat history.

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- 3.2.2 Filled material shall mean that at least one pigment or filler has been uniformly blended with the virgin PTFE polymer prior to any pressure or heat process. The percentage(s) of pigment(s) or filler(s) added shall be measured by weight.
- 3.2.3 Pigmented material shall mean that a small percentage of inorganic pigment which may also include a color enhancing agent, total additive(s) usually less than 2% by weight, has been added to color the material and uniformly blended.
- 3.2.4 Type 1 material is used typically for backup rings and seal components for static and light duty dynamic applications. Type 1 materials can be used to seal against steel, stainless steel, chromium plating, bronze, bare or anodized aluminum and aluminum alloys, and ceramic coatings. Type 1 materials have the highest wear rate and lowest coefficients of friction.
- 3.2.5 Type 2 material is used typically in seal components for dynamic reciprocating and rotary applications. Type 2 materials have better extrusion resistance than Type 1 materials. Type 2 materials can be used to seal against the same materials as Type 1 materials. Type 2 materials have much better wear resistance than Type 1 materials with slightly higher coefficients of friction.
- 3.2.6 Type 3 material is used typically in seal components where resistance to high temperature and pressure is required along with very good wear resistance. Type 3 materials are used to seal against steel, stainless steel, and chromium plate in a lubricated environment.
- 3.2.7 Type 4 material is used typically for dynamic seals. Type 4 materials have better extrusion resistance but slightly higher coefficients of friction than Type 3 materials. Type 4 materials are used to seal against the same materials as Type 3 materials in a lubricated environment.
- 3.2.8 Type 5 material is used typically for backup rings and seal elements in both static and dynamic applications. Type 5 materials have essentially the same physical properties as Type 1 materials with better wear resistance as a result of the presence of the inorganic pigment. Type 5 material is used to seal against steel (with the exception of nitrated steel), stainless steel, chromium plate, and anodized aluminum and aluminum alloys in both dry and lubricated environments. As opposed to Type 1 and Type 2 materials, Type 5 materials should not be used against bare aluminum or aluminum alloy.
- 3.2.9 Type 6 material is used typically for bearing and wear ring applications in a lubricated environment against steel, stainless steel, and chromium plate. Type 6 material has very good compressive strength and abrasion resistance.
- 3.2.10 Unless a specific type is ordered, Type 1 shall be supplied.

3.3 Properties:

The product shall conform to the requirements of this specification and those shown for each type in the applicable detail specification; tests shall be performed on production product in accordance with specified test methods, insofar as practicable.