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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

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RINGS, SEALING, PHOSPHONITRILIC FLUOROELASTOMER (FZ)
Aviation Fuel Resistant

1. SCOPE:

1.1 Form: This specification and its associated detail specifications cover phosphonitrilic fluoroelastomers (FZ) in the form of molded rings.

1.2 Application: Primarily for use in aircraft fuel systems operating from -55° to +150°C (-67° to +302°F). The cross section of such rings is usually not over 0.275 inch (6.98 mm) in diameter or thickness.

1.3 Classification: Rings are classified by hardness as shown in the detail specifications.

1.4 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 latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1 Aerospace Material Specifications:

AMS-2817 - Packaging and Identification, Preformed Packings
AMS-3022 - Reference Fluid for Testing Hydrocarbon Fuel Resistant Materials, 10% Aromatic Content

2.1.2 Aerospace Standards:

AS568 - Aerospace Size Standards for O-Rings
AS871 - Manufacturing and Inspection Standards for Preformed Packings (O-Rings)

2.1.3 Aerospace Information Reports:

AIR851 - O-Ring Tension Testing Calculations

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM D 471 - Rubber Property - Effect of Liquids
ASTM D 1414 - Testing Rubber O-Rings
ASTM D 2240 - Rubber Property - Durometer Hardness
ASTM D 3418 - Transition Temperatures of Polymers by Thermal Analysis

2.3 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.3.1 Military Standards:

MIL-STD-413 - Visual Inspection Guide for Elastomeric O-Rings

3. TECHNICAL REQUIREMENTS:

3.1 Detail Specifications: The requirements for a specific sealing ring 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 basic specification and an applicable detail specification, requirements of the detail specification shall govern.

3.2 Material: Shall be a compound, based on a phosphonitrilic fluoroelastomer (FZ), suitably cured to produce rings meeting the requirements of this specification and the applicable detail specification.

3.3 Properties: Rings shall conform to the following requirements:

3.3.1 Rings shall conform to the requirements of the applicable detail specification; tests shall be performed on the rings supplied and in accordance with ASTM D 1414, insofar as practicable. Testing for tensile strength is not required on rings which are too small to permit assembly on rollers and are, after cutting, too short to permit testing as a single strand. Eliminating testing for tensile strength does not eliminate testing for elongation; elongation test can be made by stretching a ring over a mandrel of a size which will stretch the ring sufficiently to produce the required elongation when figured on the ID of the ring. Calculations of tensile strength and elongation may be made in accordance with AIR851.

3.3.2 Differential Soak Test: Rings shall conform to requirements of the applicable detail specification. Testing shall be performed on AS568-214 O-rings in designated ASTM D 471 reference fuels as follows: AS568-214 O-rings shall be soaked in Ref. Fuel A for 70 hours at room temperature and volume swell AD_1 determined. Specimens shall be immediately inserted in Ref. Fuel B for 70 hours at room temperature and volume swell AD_2, based on original volume, determined. The difference between AD2 and AD1 is differential swell. The order of testing is then reversed with new O-rings in Ref. Fuel B first and then Ref. Fuel A with volume changes AD3 and AD4, respectively, determined from which the differential swell is calculated. After both sequences, volume swell after a 48-hour dry out at room temperature shall be determined (based on original volume).

3.3.3 Glass transition temperature shall conform to requirements of the applicable detail specification, determined in accordance with ASTM D 3418.

3.4 Quality: Rings, as received by purchaser, shall be uniform in quality and condition, smooth, as free from foreign material as commercially practicable, and free from internal imperfections detrimental to their performance. Surface imperfections shall be no greater than permitted by MIL-STD-413.

3.5 Sizes and Tolerances: Shall be as specified on the drawing. Inspection for conformance to dimensional requirements shall be made in accordance with AS871. Standard sizes are as shown in AS568.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibilty for Inspection: The vendor of rings 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 rings conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for quality (3.4) and the following requirements of the applicable detail specification are acceptance tests and shall be performed on each lot.

Requirements	Detail Specification Paragraph Reference
Hardness, as received	3.2.1.1
Tensile Strength, as received	3.2.1.2
Elongation, as received	3.2.1.3
Specific Gravity, as received	3.2.1.4
Compression Set	3.2.2.4
Volume Change in fuel	3.2.4.3

4.2.2 Preproduction Tests: Tests for all technical requirements of this specification and the applicable detail specification are preproduction tests and shall be performed prior to or on the initial shipment of rings to a purchaser, when a change in ingredients and/or processing requires reapproval as in 4.2.2, 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 rings 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 rings shall be selected 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 A lot shall be all rings produced from the same batch of compound processed in one continuous series of operations and presented for vendor's inspection at one time.

4.3.1.2 A batch shall be the quantity of compound run through a mill or mixer at one time.

4.3.1.3 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.

4.3.2 For Preproduction Tests: As agreed upon by purchaser and vendor. Tests, except hardness, shall be made on AS568-214 size rings; hardness tests shall be made on specimens meeting the requirements of ASTM D 2240.