ADOPTION NOTICE

SAE-AMS7276, "RINGS, SEALING, FLUOROCARBON (FKM) RUBBER HIGH-TEMPERATURE-FLUID RESISTANT LOW COMPRESSION SET 70 - 80", was adopted on 20-DEC-91 for use by the Department of Defense (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Commander, Defense Supply Center Philadelphia, ATTN: DSCP-ITAA, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Copies of this document may be purchased from the Society of Automotive Engineers 400 Commonwealth Drive Warrendale, Pennsylvania, United States, 15096-0001. http://www.sae.org/

Custodians:
Army - MR
Navy - AS
Air Force - 11

Adopting Activity:
DLA - IS

FSC 5330

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 7276F

Issued JUN 1974
Revised OCT 1998

Superseding AMS 7276E

Submitted for recognition as an American National Standard

Rings, Sealing, Fluorocarbon (FKM) Rubber High-Temperature-Fluid Resistant Low Compression Set 70 to 80

1. SCOPE:

1.1 Form:

This specification covers a fluorocarbon (FKM) rubber in the form of O-rings, compression seals, O-ring cord and molded in place gaskets.

1.2 Application:

These products have been used typically as sealing rings, compression seals, O-ring cord and molded-in-place gaskets in contact with air or a variety of fuels, lubricants and specific hydraulic fluids from -29 to +260 °C (-20 to +500 °F), but usage is not limited to such applications. Each application however 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 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.

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-7154 FAX: (412) 776-0243
TO PLACE A DOCUMENT ORDER: (412) 776-4970 FAX: (412) 776-0790

2.1 SAE Publications:

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

AMS 2817 Packaging and Identification, Preformed Packings
AMS 3023 Fluid Reference for Testing Polyol Ester (and Diester) Resistant Material

AS568 Aerospace Size Standard for O-Rings
AS871 Manufacturing and Inspection Standards for Preformed Packings (O-Rings)
AS3208 Packing, Preformed - AMS 7276 - Seal
AS3209 Packing, Preformed - AMS 7276 - Seal
AIR851 O-Ring Tension Testing Calculations

2.2 ASTM Publications:

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

ASTM D 297 Rubber Products - Chemical Analysis
ASTM D 395 Rubber Property - Compression Set
ASTM D 412 Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D 471 Rubber Property - Effect of Liquids
ASTM D 573 Rubber Property - Deterioration in an Air Oven
ASTM D 792 Rubber Property - Specific Gravity
ASTM D 1329 Rubber Property - Retraction at Low Temperature (TR Test)
ASTM D 1414 Rubber - Testing O-Rings
ASTM D 2240 Rubber Property - Durometer Hardness

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-P-4681 Packing, Preformed, Rubber, Packaging of

3. TECHNICAL REQUIREMENTS:

3.1 Material:

Shall be a compound, based on a fluorocarbon (FKM) elastomer, suitably cured to sealing rings, compression seals and moded-in-place gaskets a product meeting the requirements of 3.2 and 3.3. A dihydroxy/bisphenol cure system shall be used. Material shall be based on 100% virgin fluorocarbon (FKM) elastomer. No reprocessed or non-fluorocarbon polymer is acceptable.

3.1.1 Color: Shall be black or brown. No other color shall be acceptable.

3.2 Properties:

Rings shall conform to the requirements shown in Table 1 and Table 2; tests shall be performed on the rings supplied and in accordance with ASTM D 1414, insofar as practicable. O-ring sizes, that are suitable for test are shown in Table 3. For all other sizes tests shall be conducted on a size -214 O-ring of identical batch and state of cure as the end item. If at all possible compression set and specific gravity tests shall be conducted on the end item. Calculations of tensile strength and elongation may be made in accordance with AIR851.

TABLE 1 - Properties

Property	Requirement	Test Method
3.2.1 Hardness, Durometer "A" or equivalent	75 ± 5	ASTM D 2240
3.2.2 Tensile Strength, min	1400 psi (9.65 MPa)	ASTM D 412
3.2.3 Elongation, min	125%	ASTM D 412
3.2.4 Specific Gravity	Preproduction Value ±0.02	ASTM D 792 (Hydrostatic Method)
3.2.5 Aromatic Fuel Resistance		ASTM D 471 ASTM Ref. Fuel B 23 °C ± 2 (73 °F ± 5) 70 hours ± 0.5
3.2.5.1 Hardness Change, Durometer "A" or equivalent	–5 to +5	
3.2.5.2 Tensile Strength Change, max	–20%	
3.2.5.3 Elongation Change, max	–20%	
3.2.5.4 Volume Change	0 to +5%	

TABLE 1 - Properties (Continued)

Property	Requirement	Test Method
3.2.6 Synthetic Lubricant Resistance		ASTM D 471 (Note A) AMS 3023 200 °C ± 3 (392 °F ± 5) 70 hours ± 0.5
3.2.6.1 Hardness Change, Durometer "A" or equivalent	–15 to 0	
3.2.6.2 Tensile Strength Change, max (based on area before immersion)	–35%	
3.2.6.3 Elongation Change, max	–20%	
3.2.6.4 Volume Change	+1 to +25%	
3.2.6.5 Compression Set, Percent of Original Deflection, max		ASTM D 395 Method B
Ring Cross Section Diameter		
0.066 to 0.110, inch (1.68 to 2.79 mm), incl.	30	
Over 0.110 inch (2.79 mm)	10	
3.2.7 Dry Heat Resistance		ASTM D 573 270 °C ± 3 (518 °F ± 5) 70 hours ± 0.5
3.2.7.1 Hardness Change, Durometer "A" or equivalent	–5 to +10	
3.2.7.2 Tensile Strength Change, max	–35%	

TABLE 1 - Properties (Continued)

Property	Requirement	Test Method
3.2.7.3 Elongation Change, max	–15%	
3.2.7.4 Weight Loss, max	10%	4.5.1
3.2.8 Compression Set:		ASTM D 395
Percent of Original		Method B
Deflection, max		200 °C ± 3
Ring Cross Section		(392 °F ± 5)
Diameter,		22 hours ± 0.5
0.066 to 0.110, inch (1.68 to 2.79 mm), incl.	20	
Over 0.110 inch (2.79 mm)	15	
3.2.9 Long-Term Compression Set:		ASTM D 395
Percent of Original		Method B
Deflection, max		200 °C ± 3
Ring Cross Section		(392 °F ± 5)
Diameter,		336 hours ± 0.5
0.066 to 0.110, inch (1.68 to 2.79 mm), incl.	45	
Over 0.110 inch (2.79 mm)	40	
3.2.10 Low-Temperature Resistance		ASTM D 1329
Temperature Retraction, TR, Point, max	-15 °C (+5 °F)	

(Note A) Do not dip specimen in acetone; blot dry residual oil from specimen.

3.3 Physical Properties After Humidity Aging of Brown Product:

The following properties shown in Table 2 shall be determined on brown O-rings, product that have been aged for 28 days ± 2 hours at 25 °C ± 1 (77 °F ± 2) and 95% ± 3 relative humidity.

TABLE 2 - Humidity Aged Properties

Property	Requirement	Test Method
3.3.1 Tensile Strength, min	1400 psi (9.65 MPa)	ASTM D 412
3.3.2 Elongation, min	125%	ASTM D 412
3.3.3 Tensile Strength Change, max, (1)	–15%	
3.3.4 Elongation Change, max, (1)	–15%	
3.4 Synthetic Lubricant Resistance		ASTM D 471 (Note A) AMS 3023 200 °C ± 3 (392 °F ± 5) 70 hours ± 0.5
3.4.1 Tensile Strength Change, max, (2)	–35%	
3.4.2 Elongation Change, max, (2)	–-20%	
3.4.3 Compression Set Percent of Original Deflection, max	10%	ASTM D 395 Method B
3.5 Dry Heat Resistance		ASTM D 573 270 °C ± 3 (518 °F ± 5) 70 hours ± 0.5

TABLE 2 - Humidity Aged Properties (Continued)

Property	Requirement	Test Method
3.5.1 Tensile Strength Change, max	–35%	
3.5.2 Elongation Change, max	–25%	
3.6 Compression Set: Percent of Original Deflection, max	15%	ASTM D 395 Method B 200 °C ± 3 (392 °F ± 5) 22 hours ± 0.5

(1) Shall be based on the original tensile strength and elongation found when tested to the requirements of Table 1.

(2) Shall be based on the tensile strength and elongation found after aging 28 days + 2 hours at 25 °C ± 2 (77 °F ± 5) and 95% ± 3 relative humidity.

3.7 Quality:

Products, as received by purchaser, shall be uniform in quality and condition, smooth as free from foreign materials, and free from internal imperfections detrimental to usage of the rings. Surface imperfections shall be no greater than permitted by AS871 for minor defects.

3.8 Sizes and Tolerances:

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

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Requirements shown in Table 3 are acceptance tests and shall be performed on each lot.

TABLE 3 - Acceptance Requirements

Requirements	Paragraph Reference
Hardness	3.2.1
Tensile Strength	3.2.2
Elongation	3.2.3
Specific Gravity	3.2.4
Compression Set	3.2.8
Quality	3.7
Sizes and Tolerances	3.8

4.2.2 Preproduction Tests: All technical requirements are preproduction tests and shall be performed prior to or on the initial shipment of the product by the manufacturer or when a change in ingredients and/or processing requires reapproval as in 4.4.1.

4.3 Sampling and Testing:

Shall be as follows.

4.3.1 Acceptance Tests: Sufficient product shall be taken at random from each lot to perform all the required tests in Table 3. The number of determinations for each requirement shall be as specified, except as otherwise specified in 4.3.1.4, in the applicable test procedure or, if not specified therein, not less than three.

TABLE 4 - Suitable Size Test Table (See 3.2)

1/8 inch Spool		
CS	0.070	–0.11 to –014
1/4 inch Spool		
CS	0.070	–015 to –021
	0.103	–113 to –119
	0.139	–211 to –213
1/2 inch Spool		
CS	0.070	–022 to –050
	0.103	–120 to –163
	0.139	–214 to –258

4.3.1.1 A lot shall be all rings of the same size, from the same batch of compound processed in one continuous run and presented for manufacturer'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 A statistical sampling plan may be used in lieu of sampling as in 4.3.1.

4.3.1.4 Sampling Plan: The sample unit shall be one molded part. The sample size for both visual and dimensional inspection shall be as indicated below. Acceptance is based on zero defects. Sample size for visual and dimensional requirements shall be as shown in Table 5.

TABLE 5 - Visual and Dimensional Inspection

Lot Size	Sample Size
2 to 8	Entire Lot
9 to 90	8
91 to 150	12
151 to 280	19
281 to 500	21
501 to 1200	27
1201 to 3200	35
3201 to 10,000	38
10,001 to 35,000	46
35,001 to 150,000	56
150,001 and Over	65

4.3.2 Preproduction Tests: Samples shall consist of 50 AS568 - 214 O-rings from one production lot. Eight 1-inch (25 mm) nominal diameter by 1/4 inch (6.4 mm) minimum thickness hardness buttons shall be supplied from the same lot.

4.4 Approval:

4.4.1 Manufacturer shall establish, for each size of ring, parameters for the process control factors which will produce rings meeting the technical requirements of this specification. These shall constitute the approved procedures and shall be used for manufacturing production of product. Production product made by the revised procedure shall not be shipped prior to receipt of reapproval. If necessary to make any change in parameters for the process control factors, manufacturer shall submit for reapproval a statement of the proposed changes in ingredients and/or processing and when requested, sample rings. Production product incorporating the revised procedure shall not be shipped prior to receipt of reapproval.