Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10000

AEROSPACE MATERIAL SPECIFICATION

AMS 7273

Issued 11-1-68
Revised

RINGS, SEALING, SILICONE RUBBER
High Temperature Fuel and Oil Resistant
70 - 80

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. FORM: Molded rings.

3. APPLICATION: Sealing rings for use at temperatures from -55 to +175 C (-67 to +347 F) in fuels and from -55 to +150 C (-67 to +302 F) in lubricating oils. The cross-section of such rings is usually not over 3/16 in. in diameter or thickness.

4. TECHNICAL REQUIREMENTS:

4.1 General:

4.1.1 Condition: Unless otherwise specified, a suitably cured product shall be supplied.

4.1.2 Corrosion: The product shall not have a corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of metal shall not be considered objectionable.

4.2 Properties: The product shall conform to the following requirements; tests shall be performed on the product supplied and, except as otherwise specified, in accordance with the issue of ASTM D1414 specified in the latest issue of AMS 2350, insofar as practicable. Tensile strength testing is not required on rings which are too small to permit assembly on rollers for testing and are, after cutting, too short to permit testing as a single strand. Eliminating tensile testing 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.

4.2.1 As Received:

4.2.1.1	Hardness, Durometer "A" or equiv.	75 ± 5
4.2.1.2	Tensile Strength, psi, min	800
4.2.1.3	Elongation, %, min	100
4.2.1.4	Tensile Stress at 100% Elongation, psi	700 - 1000
4.2.1.5	Specific Gravity, variation from sample submitted for approval, max	±0.03

4.2.2 Aromatic Fuel Resistance: (Immediate Deteriorated Properties)

Medium: ASTM Ref. Fuel B
Temperature: 20 - 30 C (68 - 86 F)
Time: 70 hr

4.2.2.1	Hardness Change, Durometer "A" or equiv.	-10 to 0
4.2.2.2	Tensile Strength Change, %, max (based on area before immersion)	-30

4.2.2.3	Elongation Change, %, max	-15	
4.2.2.4	Volume Change, %	0 to +20	
4.2.3	Lubricating Oil Resistance: (Immediate Deteriorated Properties)		Medium: SAE Ester Test Fluid No. 2 (See Note 2)
4.2.3.1	Hardness Change, Durometer "A" or equiv.	-10 to 0	Temperature: 150 C ± 3 (302 F ± 5.4)
4.2.3.2	Tensile Strength Change, %, max (based on area before immersion)	-25	Time: 70 hr
4.2.3.3	Elongation Change, %, max	-20	
4.2.3.4	Volume Change, %	0 to +12	
4.2.4	Dry Heat Resistance:		Temperature: 200 C ± 3 (392 F ± 5.4)
4.2.4.1	Hardness Change, Durometer "A" or equiv.	-5 to +5	Time: 70 hr
4.2.4.2	Tensile Strength Change, %, max	-10	
4.2.4.3	Elongation Change, %, max	-15	
4.2.4.4	Surface hardening	None	
4.2.4.5	Bend (flat)	No cracking or checking	
4.2.5	Compression Set:		Temperature: 175 C ± 3 (347 F ± 5.4)
	Percent of Original Deflection, max		Time: 22 hr
	Ring Cross-Section Diameter, Inch		
	0.066 to 0.110, incl	50	
	Over 0.110	30	
4.2.6	Low Temperature Resistance:		
4.2.6.1	Temperature Retraction, TR_{10} point, max	-55 C (-67 F)	

4.2.7 Simulated Component Test: Rings shall be capable of meeting the following test; any leakage in excess of "weeping" at any time or pressure on any fixture will be considered failure. Weeping is defined as the formation of small bubbles at a rate not greater than 10 per min. and which do not break the surface of the fluid, when tested under oil, and as slight wetting of the area around the fitting, with no visible flow of fuel, when tested in air.

4.2.7.1 Test Specimens: Shall be "0" rings conforming to dimensions to ARP 568-018, -120, and -214.

4.2.7.2 Apparatus: Shall consist of special blocks and plugs, as shown in Figs. 1 and 2, to be assembled as shown in Fig. 3, plus associated valves, piping, fittings, and means of applying nitrogen at pressures up to 1500 psig as shown in Fig. 4.

4.2.7.3 Procedure: The following tests shall be run in sequence, holding for 10 min., unless otherwise specified, at each pressure. In raising pressure, any momentary leaking while "0" rings are seating themselves shall be disregarded. If unacceptable leakage occurs, the test shall be discontinued at that step; if no unacceptable leakage occurs, the test shall be carried to the next step.

4.2.7.3.1 Fill recesses in block with ASTM Reference Fuel B (ASTM D471). Wipe specimens with ASTM No. 1 Oil (ASTM D471) to provide a lubricating oil film. Assemble specimens in their respective grooves in the plugs and assemble plugs to blocks. Tighten bolts to 90 - 110 lb-in. torque. Fill test fixture to top of fitting, using a hypodermic syringe, with ASTM Reference Fuel B. Test for leakage at room temperature using 100 psi nitrogen pressure. If unacceptable leakage occurs, disassemble and reassemble test fixture, refill as necessary with ASTM Reference Fuel B, and again pressure test.

4.2.7.3.2 Place fixture in a suitable oil bath in an oven at 175 C ± 3 (347 F ± 5.4), attach pressure lines (See Fig. 4), and close all valves. (A suitable oil is one which is clear, light in color, and stable at the test temperature.) Heat fixture at 175 C ± 3 (347 F ± 5.4) for 6 hours. Pressure test, using nitrogen as the pressurizing medium, at 250, 500, 1000, and 1500 psig, noting any leakage by bubble formation in the oil. (Note. Use valve system to isolate leakage of any particular ring.)

4.2.7.3.3 Shut off heat input to oven, allow apparatus to cool to room temperature, and release pressure. Remove fixture from the oil bath and pressure test at room temperature in air at pressure of 250, 500, 1000, and 1500 psig, using nitrogen as the pressurizing medium.

4.2.7.3.4 Place the fixture, still filled with ASTM Ref. Fuel B at atmospheric pressure, in refrigerator at -55 C ± 1 (-67 F ± 1.8) for 5 hours. While still in the refrigerator, pressure test at 250, 500, 1000, and 1500 psig for 5 min. at each pressure, using nitrogen as the pressurizing medium.

4.2.7.3.5 Remove the fixture from the refrigerator, warm to room temperature, and pressure test as in 4.2.7.3.3.

4.2.7.3.6 Repeat the tests of 4.2.7.3.2 through 4.2.7.3.5 twice, making a total of 3 complete cycles. At the conclusion of the final cycle, disassemble the fixture and examine the rings. There shall be no evidence of extrusion, cracking, splitting, and other defects.

Note 1. Each time the fixture is removed from the pressurizing manifold, the level of the fuel in the fixture should be checked and the fixture refilled if necessary.

Note 2. SAE Ester Test Fluid No. 2 may be ordered as Stauffer Blend No. 7700 from:

Stauffer Chemical Company
Special Chemical Division
380 Madison Avenue
New York, New York 10017

5. QUALITY: The product shall be uniform in quality and condition, clean, smooth, as free from foreign material as commercially practicable, and free from internal imperfections detrimental to performance of parts. Surface imperfections shall, unless otherwise specified, be no greater than permitted for Grade A rings in the "O-Ring Inspection Guide, Surface Defects Control", First Edition, published by the Rubber Manufacturer's Association, Inc. Unless otherwise specified on the drawing, parting line projection shall be not greater than 0.005 in. in width and 0.003 in. in height.

6. REPORTS: Unless otherwise specified, the vendor shall furnish with each shipment three copies of a report showing the results of tests made on the product to determine conformance to the requirements of this specification. This report shall include the purchase order number, material specification number, vendor's compound number, batch number, part number, and quantity.

7. PACKAGING AND MARKING: Unless otherwise ordered, rings shall be packaged and identified as follows:

7.1 Individual rings shall be packaged and identified in accordance with the latest issue of AMS 2817 except cure date is not required.

7.2 Ring packages shall be packed in cartons in such a manner that the rings, during shipment and storage, will not be permanently distorted and will be protected against damage from exposure to weather or any normal hazard. Each carton shall be marked to give the following information:

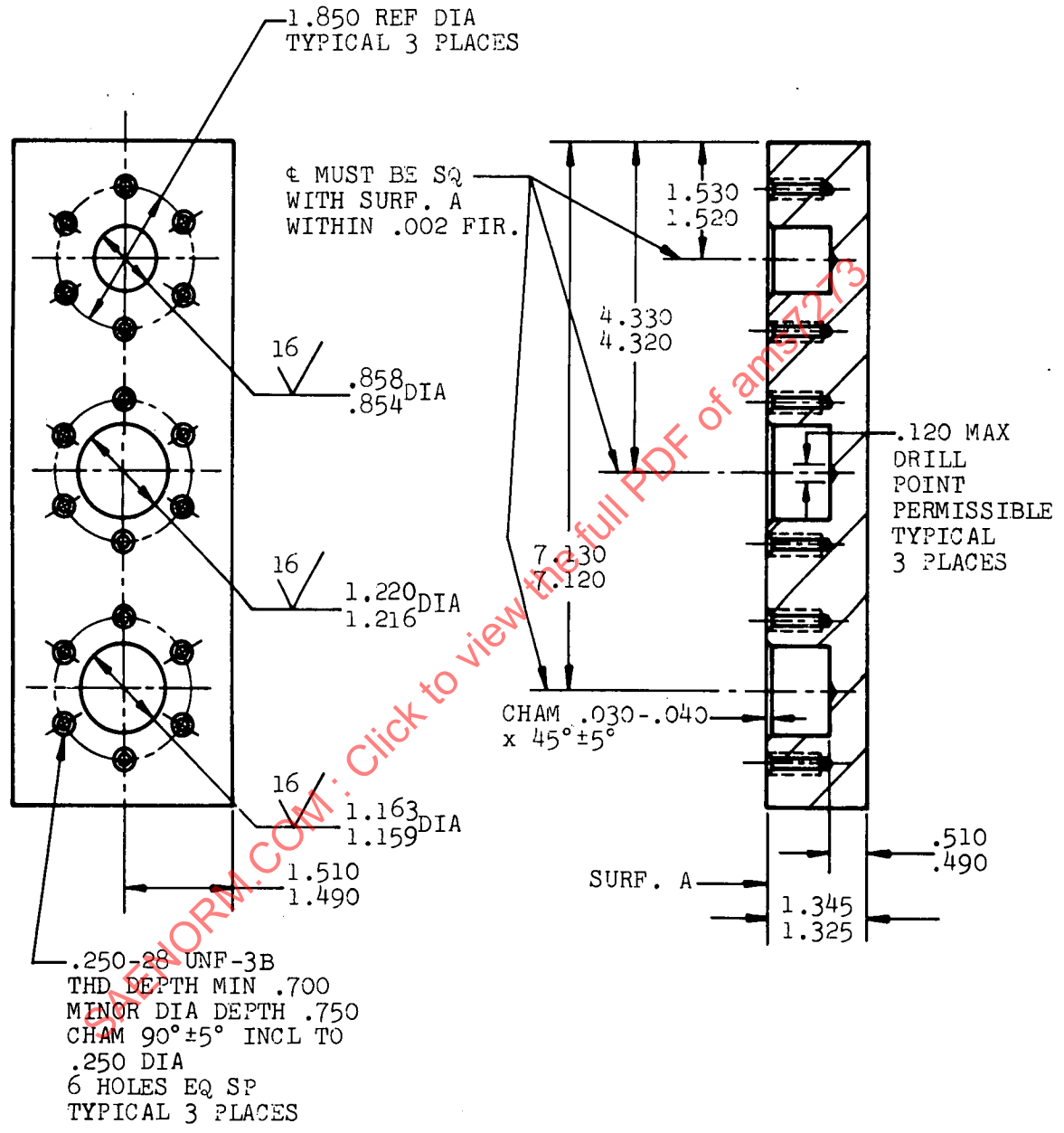
AMS 7273
PART NUMBER_____
PURCHASE ORDER NUMBER_____
QUANTITY_____
COMPOUND NUMBER_____
BATCH NUMBER_____
MANUFACTURER'S IDENTIFICATION_____
DATE OF SHIPMENT_____

8. APPROVAL:

8.1 Sample rings shall be approved by purchaser before material for production use is supplied, unless such approval be waived. Results of tests on production rings shall be essentially equivalent to those on the approved sample.

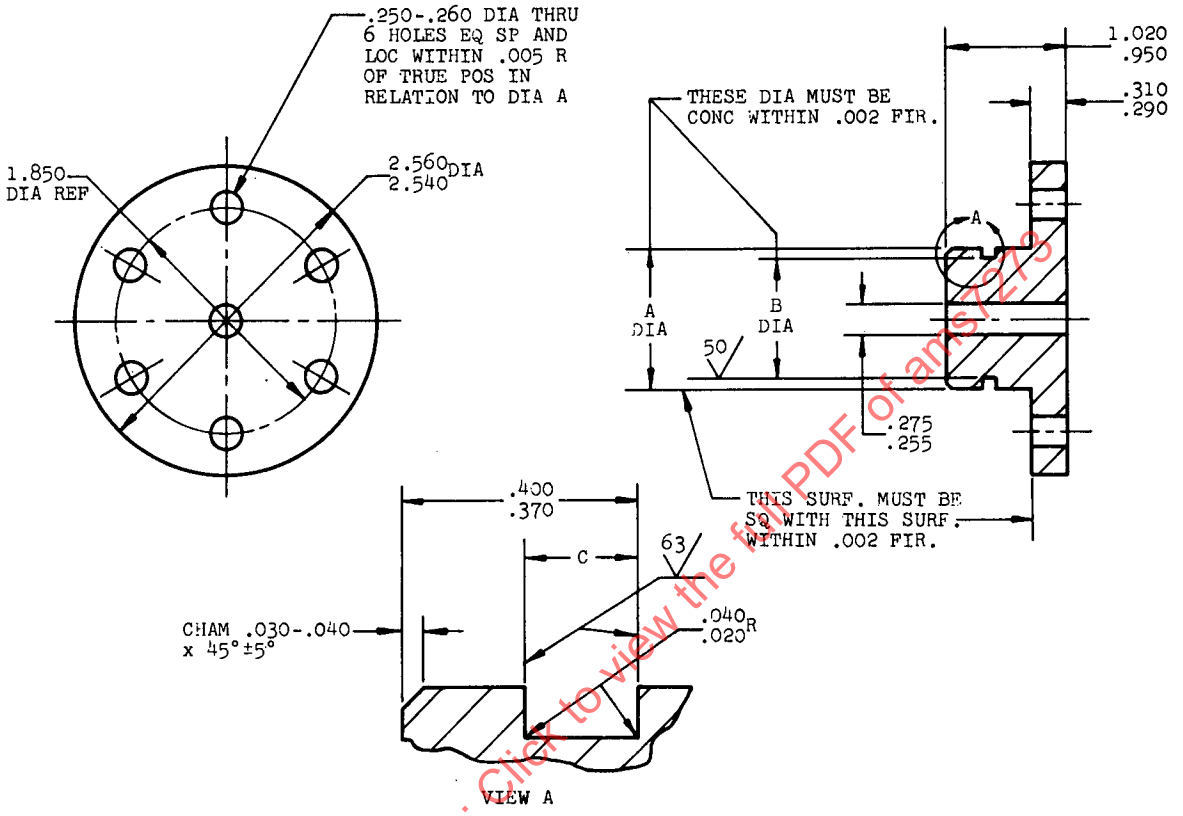
8.2 Vendor shall use manufacturing procedures, processes, and methods of routine inspection on production rings to determine conformance to this specification which are essentially the same as those used on the approved sample rings. If any change in compound ingredients or in proportions thereof outside established composition limits or in order of mixing, in type of equipment used for mixing the compound, in method of preparing preforms, in molding procedures, or in curing times, temperatures, and atmospheres is necessary, vendor shall submit for reapproval a detailed statement of the revised compounding and/or manufacturing procedures and, when requested, sample changed rings. No production rings made by the revised procedure shall be shipped prior to receipt of reapproval.

9. REJECTIONS: Parts not conforming to this specification or to authorized modifications will be subject to rejection.



DIMENSIONS IN INCHES
BREAK EDGES .003-.015
CORNER FILLETS .005-.020 R
MATERIAL: AMS 5645 OR AMS 5645

FIGURE 1 - SEALING RING TEST FIXTURE BLOCK



O-RING SIZE	A ±.001	B	C ±.005
-018	.851	.744-.748	.105
-120	1.156	.993-.997	.145
-214	1.213	.990-.994	.185

DIMENSIONS IN INCHES
BREAK EDGES .003-.015
CORNER FILLETS .005-.020 R
DIAMETERS MUST BE CONC WITHIN .010 FIR. UNLESS OTHERWISE SPECIFIED
MATERIAL: AMS 5645 OR AMS 5646

FIGURE 2 - SEALING RING TEST FIXTURE PLUGS