

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard



AMS-P-83461

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Packing, Preformed, Petroleum Hydraulic Fluid Resistant, Improved Performance at 275°F (135°C)

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1. SCOPE:

1.1 Scope:

This specification covers O-ring packings for use with petroleum based hydraulic fluids conforming to MIL-H-5606 and MIL-H-83282 over the temperature range of -65° to 275°F (-54° to 135°C). This material gives improved high temperature performance over materials conforming to MIL-P-25732.

1.2 Sizes:

The O-rings conform to sizes shown in MIL-P-83461/1.

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Documents

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2. APPLICABLE DOCUMENTS:

The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

2.1 U.S. Government Publications:

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

MIL-P-4861	Packing, Preformed, Rubber, Packaging of
MIL-H-5440	Hydraulic Systems, Aircraft, Types I and II, Design, Installation, and Data Requirements For
MIL-G-5514	Gland Design, Packings, Hydraulic, General Requirements for
MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-H-6083	Hydraulic Fluid, Petroleum Base for Preservation and Operation
MIL-S-18729	Steel Plate, Sheet, and Strip, Alloy 4130, Aircraft Quality
MIL-P-25732	Packing, Preformed, Petroleum Hydraulic Fluid Resistant, Limited Service at 275°F (135°C)
MIL-H-83282	Hydraulic FLuid, Fire Resistant, Synthetic Hydrocarbon Base, Aircraft
MIL-P-83461/1	Packings, Preformed, Petroleum Hydraulic Fluid Resistant, Improved Performance at 275°F (135°C), Sizes and Tolerances
MIL-P-83461/2	Packings, Preformed, Petroleum Hydraulic Fluid Resistant, Improved Performance at 275°F (135°C) for Use in Boss Fittings, Sizes and Tolerances
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-413	Visual Inspection Guide for Rubber O-rings
QQ-A-250/4	Aluminum Alloy 2024, Plate and Sheet
QQ-A-250/11	Aluminum Alloy 6061, Plate and Sheet
QQ-A-250/12	Aluminum Alloy 7075, Plate and Sheet

2.2 SAE Publications:

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

AMS 3020	Oil, Reference, for "L" Stock Rubber Testing
AMS 5513	Steel, Corrosion Resistant, Sheet, Strip, and Plate, 19Cr - 9.2Ni (SAE 30304), Solution Heat Treated
AMS 5630	Steel, Corrosion Resistant, Bars, Wire, and Forgings, 17Cr - 0.52Mo (0.95 - 1.20C) (SAE 51440C)

2.3 ASTM Publications:

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

ASTM D 1414 Rubber O-rings

2.4 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI B46.1 Surface Tecture (Surface Roughness, Waviness and Lay)

3. REQUIREMENTS:

3.1 Qualification:

The packings furnished under this specification shall be a product which has been tested and passed the qualification tests specified herein and has been listed on or approved for listing on the applicable qualified products list.

3.2 Materials:

This specification originally required a specific formulation which was developed under an Air Force Materials Laboratory contract. This exact formulation is no longer required but the formulation shown below is recommended since it will meet the requirements of this specification when properly processed.

Ingredients	Parts by Weight
Chemigum N917 ¹	100.0
Magnesium Oxide ²	5.0
Zinc Oxide ²	5.0
N330 RAF ²	40.0
N550 FEF ²	35.0
Aminox ³	1.5
Antioxidant ZMB ⁴	1.5
Dibutyloxyethyl Sebacate ⁵	10.0
Diethylhexyl Azelate ⁶	10.0
Varox ⁷	3.5

1. Source: The Goodyear Tire and Rubber Company
2. Source: Several
3. Source: Uniroyal Chemical
4. Source: Bayer
5. Source: C. P. Hall
6. Source: C. P. Hall
7. Source: R. T. Vanderbilt Co., Inc.

3.2 (Continued):

The cure shall be 4 minutes at 370°F. This cure has been used successfully in molds which are attached to the plates of curing presses. If the molds are not attached to the platens other curing conditions will have to be used. The alternate cure must be equivalent to the 4 minutes at 370°F cure and the material must meet the physical property requirements of this specification.

A very significant difference in the ability to withstand dynamic cycling has been noted between batches of this material. Physical property tests do not show significant differences. It appears that the age of the Varox may be a factor although this has not been proven. Work is continuing to attempt to find the exact causes of the differences in cycling. In the interim, fresh Varox should be used to make this compound. This is particularly important during production because cycling tests are not conducted as a part of quality conformance inspection. Dynamic cycling tests shall be run on samples of production batches of this material at various intervals at the discretion of the qualifying agency.

3.3 Dimensions and tolerances:

The dimensions and tolerances of O-rings procured to this specification shall conform to MIL-P-83461/1 or MIL-P-83461/2.

3.4 Physical properties:

The physical properties of the rubber shall conform to the values given in Table I.

Table I. Physical Properties

Original Properties	Requirements
Specific gravity	As determined
Hardness, Type A, points	75 ± 5
Tensile strength, psi	1350, minimum
Elongation,%	125, minimum
Tensile stress (modulus psi at 100% elongation)	650, minimum
Temperature Retraction, TR-10 50% elongation and 10% return, °F	-49, maximum
Corrosion and adhesion	Slight corrosion allowed on 4130 steel, none on other metals
After aging 70 hours at 275° ± 5°F in ARM 201 (AMS-3020)	
Hardness change, Type A, points	+5,-10
Tensile strength decrease,%	50, maximum
Elongation decrease,%	35, maximum
Volume change,%	10 to 20
Compression set, 25% deflection % of original deflection	35, maximum
Temperature Retraction, TR-10 50% elongation and 10% return, °F	-49, maximum
After aging 70 hours at 275° ± 5°F in MIL-H-83282	
Hardness change, Type A, points	+5, 10
Tensile strength decrease,%	40 maximum
Elongation decrease,%	35 maximum
Volume change,%	0 to 15
Compression set, 25% deflection, % of original deflection	45 maximum
Temperature Retraction, TR-10 50% elongation and 10% Return, °F	-49 maximum
After aging 70 hours at 275°F ± 5°F in air	
Compression set, 25% deflection, % of original deflection	67, maximum
After aging 60 days at 75° ± 5°F in air	
Compression set, 25% deflection, % of original deflection	25, maximum
After aging 60 days at 75° ± 5°F in ARM 201, (AMS-3020)	
Compression set, 25% deflection, % of original deflection	20, maximum