

MIL-R-8791D

1 FEBRUARY 1982
 SUPERSEDING
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MILITARY SPECIFICATION

RETAINER, PACKING, HYDRAULIC, AND PNEUMATIC,
 TETRAFLUOROETHYLENE RESIN

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1 SCOPE

1.1 Scope. This specification covers tetrafluoroethylene resin (hereinafter referred to as "TFE") retainers intended for use in hydraulic and pneumatic system components as antiextrusion devices in conjunction with packings and gaskets (see 6.1).

2. APPLICABLE DOCUMENTS

- * 2.1 Issue of 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:

SPECIFICATIONS

FEDERAL

PPP-B-566	Box, Folding, Paperboard
PPP-B-636	Box, Shipping, Fiberboard
PPP-B-640	Box, Fiberboard, Corrugated, Triple Wall
PPP-B-676	Boxes, Set-Up

MILITARY

MIL-P-116	Preservation - Packaging, Methods of
MIL-B-117	Bags, Interior Packaging
MIL-P-7936	Parts and Equipment, Aeronautical, Preparation for Delivery

STANDARDS

MILITARY

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage

- * Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: HQ AFLC CASO/LODS, Federal Center, Battle Creek, MI 49016 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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MS27595	Retainer, Packing Backup, Continuous Ring, Tetrafluoroethylene
MS28773	Retainer, Packing Backup, Tetrafluoroethylene, Straight Thread Tube Fitting Boss
MS28774	Retainer, Packing Backup, Single Turn, Tetrafluoroethylene
MS28782	Retainer, Packing Backup, Teflon
MS28783	Ring, Gasket, Backup, Teflon

* (Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

D570	Method of Test for Water Absorption of Plastics (Tentative)
D747	Method of Test for Stiffness in Flexure of Plastics (Tentative)
D792	Method of Test for Specific Gravity of Plastics
* D1708	Plastics, Tensile Properties of, by Use of Microtensile Specimens

(Copies of ASTM publications may be obtained upon application to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

3. REQUIREMENTS

* 3.1 Materials. The material shall be tetrafluoroethylene resin, hereinafter referred to as "TFE". Reprocessed TFE shall not be used. Bar stock and heavy wall tubing from which parts are machined shall be molded, sintered, baked, and annealed as specified below.

3.1.1 Color. Color shall be uniformly white with no noticeable streaky or blotchy appearance. A slight brownish tint or presence of scattered brownish specks will not be considered detrimental. The surface shall have a waxy sheen. A dead chalklike appearance usually indicates porosity or other unsatisfactory properties. There shall be no noticeable grainy appearance.

3.2 Data. Unless otherwise specified in the contract or order, no data are required by this specification or any of the documents referenced in section 2 (see 6.2).

3.3 Design and construction.

* 3.3.1 Shape and dimensions. The shape and dimensions of the TFE retainers shall conform to MS27595, MS28773, MS28774, MS28782, and MS28783 as applicable (see 6.2).

3.4 Physical properties. The physical properties of the finished retainers and test specimens shall be uniform throughout and shall satisfy the following requirements, when tested as specified in 4.5.1.

3.4.1 Tensile strength. The tensile strength shall be not less than 3,000 pounds per square inch (psi), when tested in accordance with 4.5.1.1.

3.4.2 Elongation. The elongation shall be not less than 75 percent before fracture, when tested in accordance with 4.5.1.2.

3.4.3 Stiffness. The stiffness shall be a minimum of 45,000 psi when tested in accordance with 4.5.1.3.

3.4.4 Water absorption. There shall be no water absorption in excess of 0.005 percent or decrease of soluble matter, when tested in accordance with 4.5.1.4.

3.4.5 Dimensional stability. The circumferential length of the finished retainer shall not change more than 0.002 inch per inch and the cross-sectional dimensions of TFE material shall conform to the applicable military standard when tested in accordance with 4.5.1.5.

* 3.4.6 Specific gravity. The specific gravity value shall be 2.150 to 2.220, when tested in accordance with 4.5.1.6.

3.4.7 Porosity. The retainers shall exhibit no noticeable porosity, when tested in accordance with 4.5.1.7.

3.5 Workmanship.

3.5.1 Finish. Workmanship and finish of the end product shall be uniform in quality and condition. It shall be clean, smooth, and free from foreign materials and from imperfections detrimental to fabrication, appearance, or performance.

3.5.2 Fabrication. Retainers shall be cut from stock having diameters equal to those intended for the end product, if available. If stock material is not available, semifinished machined stock may be employed and processed in accordance with 3.4.5.

4. QUALITY ASSURANCE PROVISIONS

* 4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, the contractor may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to insure supplies and services conform to prescribed requirements.

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4.2 Sampling for lot acceptance. Samples shall be selected at random from each inspection lot in accordance with MIL-STD-105 as follows:

- (a) Examination of product (4.4.1). Use inspection level II, and Acceptable Quality Level (AQL) 1.5 percent defective.
- (b) Physical properties (4.5.1). Use inspection level S-2 and AQL 1.0 percent defective.

4.2.1 Inspection lot. A lot shall consist of all TFE retainers of one type and size made from the same batch of material and submitted for inspection at the same time and place.

4.2.1.1 Batch. A batch shall be defined as the quantity of material received from the resin manufacturer assigned the same batch number.

* 4.2.1.2 Test specimen. Specimens required for use in the elongation and tensile strength tests specified in this specification are obtained by cutting a sample specimen in a longitudinal direction from the TFE tubing. The tubing must be obtained from the same lot of material as the finished items.

* 4.3 Test Conditions.

* 4.3.1 Test specimen. All test specimens, other than finished retainers, shall be prepared and conditioned as specified in the test referenced herein.

4.3.2 Standard temperature. Unless otherwise specified, physical properties tests (4.5.1) shall be performed at room temperature of $75^{\circ} \pm 5^{\circ}$ F (24° C).

4.4 Examinations.

* 4.4.1 Examination of product. Each sample retainer shall be carefully examined to determine conformance to the requirements for workmanship (3.5), color (3.1.1) and dimensions (3.4.5).

4.4.2 Packaging, packing, and marking. Preparation for delivery shall be examined for conformance to section 5.

4.5 Test methods.

4.5.1 Physical properties.

* 4.5.1.1 Tensile strength. Specimens shall be tested in accordance with ASTM D1708 at 1 inch per minute. The mean of (5) values of ultimate tensile strength shall be reported.

* 4.5.1.2 Elongation. Tests shall be conducted in accordance with ASTM D1708 at 1 inch per minute. The mean of (5) five values shall be reported.

* 4.5.1.3 Stiffness. The results of stiffness tests conducted in accordance with ASTM D747 shall be a minimum of 45,000 psi.

4.5.1.4 Water absorption. Sample retainers as required (4.2) shall be subjected to the water absorption tests, 24-hour procedure, as specified in ASTM D570. The percent of increase or decrease of weight shall not exceed 0.005 percent.

4.5.1.5 Dimensional stability. Sample retainers as required (4.2), shall be subjected to air aging for a minimum of 1 hour at $350^{\circ} \pm 10^{\circ}$ F (177° C) and cooled to room temperature, and shall not have exhibited a change in circumferential length of more than 0.002 inch per inch.

* 4.5.1.6 Specific gravity. Specific gravity shall be determined by ASTM D792 on two finished retainers. The specific gravity value shall be 2.150 to 2.220.

4.5.1.7 Porosity. The sample part shall be dip- or brush-coated with suitable red dye penetrant. The coat shall be allowed to stand for 10 minutes and then shall be wiped off with a cloth saturated with solvent. Any retained dye, other than minor indications attributable to surface machining irregularities, is an indication of material porosity and shall be cause for rejection.

5. PACKAGING

5.1 Packaging. Packaging shall be level A or C in accordance with MIL-P-7936, as specified in the contract or order (see 6.2).

5.1.1 Level A packaging shall be Method III of MIL-P-116. Unless otherwise specified, 50 retainers of the same part number shall be arranged snugly side by side on a rigid cylindrical fiberboard, plastic, or metal case and retained at the ends by suitable plastic rings. Each unit shall be packaged within a container conforming to PPP-B-566 or PPP-B-676. Internal supports and centering devices shall be used on the core to prevent the retainers from contacting the inner surfaces of the container.

5.1.2 When two retainers per unit package are specified, packaging shall be Method III of MIL-P-116. Two retainers of the same part number shall be placed on a circular mandril or core fabricated of fiber, plastic, or metal. The outside diameter of the mandril shall effect a snug fit to the inside diameter of the retainers and shall be the approximate height of the two retainers combined. The mandril shall be affixed by the use of a contact cement, to a substantially oversized (no less than 1 1/2-inch clearance from all points of circumference) fiberboard stiffener pad. Caution shall be taken to prevent contamination of retainers by the cement. An additional fiberboard pad shall be placed over the top of the mandril, effecting a sandwich construction of the cushion pads and retainers. The two-cushion pads shall then be secured with pressure-sensitive tape across all four edges. The sandwiched pads containing the two retainers shall be inserted within a bag conforming to class "b" or "c" of MIL-B-117, or equivalent. Closure shall be accomplished by any suitable means.

5.2 Packing. Packing shall be level A, B, or C in accordance with MIL-P-7936, as specified in the contract or order (see 6.2).

5.2.1 Levels A and B. Intermediate packages of retainers shall be snugly packed in shipping containers conforming to PPP-B-636 or PPP-B-640, overseas type for level A, and domestic type for level B.

5.3 Marking of shipment. In addition to any special marking required by the contract or order, unit packages, intermediate packages, and shipping containers shall be marked in accordance with MIL-STD-129.

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6. NOTES

6.1 Intended use. The retainers are intended for use in air, nitrogen, and hydraulic applications that contain fluids conforming to MIL-H-5606, MIL-H-6083, MIL-F-17111, MIL-L-17331, MIL-L-17672, MIL-H-19457 and MIL-H-83282 with no adverse effect on the properties of the fluid, Packings, or metal contained in the system through the temperature range of $-65^{\circ}\text{F}(-55^{\circ}\text{C})$ to $+275^{\circ}\text{F}(135^{\circ}\text{C})$ at operating pressure from 0 to 3,000 psi continuous and 0 to 4,500 psi intermittent.

6.2 Ordering data. Procurement documents should specify:

- (a) Title, number, and date of this specification.
- (b) Data requirements (see 3.2).
- (c) MS part number of the retainer desired (see 3.3.1).
- (d) Levels of preservation, packaging, and packing required (see section 5).

6.3 Dimensional stability. Prior to finish machining, all material should be annealed or dimensionally stabilized by being subjected to air aging for a minimum of 1 hour for each 0.250 inch of thickness, at $500^{\circ} \pm 25^{\circ}\text{F}(260^{\circ}\text{C})$, and then cooled to room temperature at a rate of not less than 1°F and not more than 3°F per minute. The annealed material should be held at a temperature of $75^{\circ}\text{F}(24^{\circ}\text{C})$ or above for at least 16 hours prior to machining. Machining and subsequent inspection should be accomplished at a temperature of $75^{\circ}\text{F}(24^{\circ}\text{C})$ or above. Adequate tool cooling should be provided during machining so that the temperature of the tool does not exceed $350^{\circ}\text{F}(177^{\circ}\text{C})$.

6.4 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Army - MR
Navy - AS
Air Force - 99

Preparing activity:

Air Force - 99

Review activities:

DLA - IS
Army - MI, AV, AR, EA

Project No. 5330-0545

User:

Navy - SH

INCH-POUND
MIL-R-8791D
AMENDMENT 1
21 February 1989

MILITARY SPECIFICATION

RETAINER, PACKING, HYDRAULIC AND PNEUMATIC,
POLYTETRAFLUOROETHYLENE RESIN, (SINGLE TURN)

This amendment forms a part of Military Specification MIL-R-8791D, dated 1 February 1982, and is approved for use by all Departments and Agencies of the Department of Defense.

Page 1

2.1, Delete "Asterisk"

Page 2

3.3.1, Delete "Asterisk"

Custodians:

Army - MR
Navy - AS
Air Force - 99

Review activities:

Army - AR, AV, MI
DLA-IS

User activities:

Army - ME
Navy - SH

Preparing activity:

Air Force - 82

Agent:

DLA - IS

(Project 5330-0731)

AMSC N/A

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FSC 5330

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