INCH-POUND

MIL-C-5501G
30 June 1989
SUPERSEDING
MIL-C-5501F
20 March 1973

MILITARY SPECIFICATION

CAPS AND PLUGS, PROTECTIVE, DUST AND MOISTURE SEAL,

GENERAL SPECIFICATION FOR

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

1. SCOPE

1.1 Scope. This specification covers caps and plugs (hereinafter referred to as closures) for the protection of thread and sealing surfaces, for prevention of intrusion of dust and moisture and for pressure sealing accessories and parts during storage and shipment.

1.2 Classification. Types and sizes of closures shall be as specified on the applicable specification sheets and MS90376.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Armament Research, Development and Engineering Center, ATTN: SMCAR-BAC-S, Picatinny Arsenal, NJ 07806-5000 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5340

SPECIFICATIONS

FEDERAL

L-P-390 - Plastic, Molding and Extrusion Material, Polyethylene and Copolymers (Low, Medium and High Density)
QQ-A-250/2 - Aluminum Alloy 3003, Plate and Sheet
PPP-B-585 - Boxes, Wood, Wirebound
PPP-B-601 - Boxes, Wood, Cleated-Plywood
PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner
PPP-B-636 - Boxes, Fiberboard
PPP-T-76 - Tape, Pressure-Sensitive Adhesive Paper, Water Resistant (For Carton Sealing)

MILITARY

MIL-P-116 - Preservation, Methods of
MIL-C-5541 - Chemical Conversion Coatings on Aluminum and Aluminum Alloys
MIL-H-5606 - Hydraulic Fluid, Petroleum Base; Aircraft, Missile and Ordnance
MIL-H-6083 - Hydraulic Fluid, Petroleum Base; For Preservation and Testing
MIL-A-8625 - Anodic Coatings, For Aluminum and Aluminum Alloys
MIL-H-83282 - Hydraulic Fluid, Fire Resistant Synthetic Hydrocarbon Base, Aircraft

(SEE SUPPLEMENT 1 FOR LIST OF ASSOCIATED SPECIFICATIONS)

STANDARDS

MILITARY

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

(Copies of specifications, standards and other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issue of documents not listed in the DODISS are the issue of the documents in the solicitation (see 6.2).

ASTM

ASTM D638 - Tensile Properties of Plastics

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

(Non-government standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained, in which case the exception will be identified in the text and cited in the solicitation.

3. REQUIREMENTS

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheet and MS90376. In the event of any conflict between requirements of this specification and the specification sheet, the latter shall govern (see 6.3).

3.2 Material. Closures shall be made from the following materials, as specified in the applicable specification sheet and MS90376.

3.2.1 Aluminum Alloy. Aluminum alloy 3003 (UNS A93003), Temper 0, shall be in accordance with QQ-A-250/2. When specified in the applicable specification sheet, aluminum alloy closures shall be furnished with a neoprene gasket or seal. The gasket or seal shall be resistant to MIL-H-5606, MIL-H-6083 and MIL-H-83282 fluids.

3.2.2 Rigid plastic. Rigid plastics and elastomers shall have a tensile strength of 60,000 psi (414 MPa) min. Materials shall be of high quality and shall be resistant to MIL-H-5606, MIL-H-6083 and MIL-H-83282 fluids. Closures made from these materials shall not soften when exposed to temperatures of 160°F (71°C) or chip at temperatures of -65°F (-53°C).

3.2.3 Flexible plastic. Flexible plastic shall be polyethylene in accordance with L-P-390, Type I, Class L, Grade optional.

3.3 Proctective coating. Aluminum alloy closures shall have a chemical treatment in accordance with MIL-C-5541, Class 1A or shall be anodized in accordance with MIL-A-8625, as specified on the applicable specification sheet.

3.4 Design and construction. Design and construction of closures shall be as specified in the applicable specification sheet and MS90376. The number of ribs on plastic closures shall be at the supplier's option.

3.4.1 Threads. Closure threads shall be suitable for use with mating parts having Class 1, 2 or 3 fits. Aluminum alloy closures shall have a minimum of one full thread. Plastic closures shall have a minimum of three full threads.

3.4.2 Closures. Closures shall be constructed to withstand the normal strains, jars, vibrations and other conditions incident to shipping, storage and handling. Aluminum alloy closures shall not seize or produce shavings when applied to the units without the aid of thread lubricants. Rigid plastic closures shall not chip or shred when installed and removed.

3.5 Installation. Threaded closures shall be designed to permit their being installed and removed by hand with not more than 1 inch-pound (.113 N•m) thread friction until the sealing surface has come into contact with its mating part. When installed, all closures shall be capable of protecting and, when applicable, sealing the threaded, beaded and tapered surfaces. Climatic conditions shall not affect the performance of the closures.

3.6 Durability. Closures shall be capable of assembly and disassembly a minimum of 5 times. They shall be constructed to sustain normal mechanical handling without appreciably diminishing their effective life span. Flexible plastic closures shall not fail when installed hand tight in the parts to be protected and aluminum alloy and rigid plastic closures shall not fail when installed in the parts to be protected with the torques listed in Table I. Closures shall be tested as specified in 4.5.2 and 4.5.2.1.

. 3.6.1 Drop. Aluminum alloy and rigid plastic closures, when assembled to mating parts shall be capable of being dropped from a minimum height of 3 feet (914mm) on a hardwood block 2 inches (51mm) minimum thickness without becoming unserviceable. No failure or deformation shall result to destroy the seal (when applicable) or prevent reuse of the closure. Closures shall be tested as specified in 4.5.3.

3.7 Sealing pressure. Unless otherwise specified in the applicable specification sheet, aluminum alloy and rigid plastic closures shall be capable of holding pneumatic pressure of 2.0 to 5.0 psi (14 KPa to 34 KPa) without leakage. A gasket or seal may be used if necessary to seal the port. These closures shall be pressure tested in accordance with 4.5.1.

3.8 Workmanship. Closures shall be free from warpage, cracks, blisters, chipped edges, burrs, burns and other defects which would affect proper functioning. All sealing surfaces shall be smooth except that annular tool marks up to 100 microinches (2.54 micrometers) will be acceptable.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by 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 assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

a. Quality conformance inspection (see 4.4).

4.3 Sampling for lot inspection.

4.3.1 Sampling for examination. A random sample of closures shall be taken from each lot in accordance with MIL-STD-105, Inspection Level S-4. The Acceptable Quality Level (AQL) shall be 4.0 percent defective.

4.3.2 Sampling for tests. A random sample of closures shall be taken from each lot in accordance with MIL-STD-105, Inspection Level S-1. The AQL shall be 2.5 percent defective.

4.4 Quality conformance inspection.

4.4.1 Inspection of packaging. Except when commercial packaging is specified, the sampling and inspection of the preservation and interior package marking shall be in accordance with groups A and B quality conformance inspection requirements of MIL-P-116. The sampling and inspection of the packing for shipment and storage shall be in accordance with the quality assurance provisions of the applicable container specification shown in section 5. The inspection of marking for shipment and storage shall be in accordance with MIL-STD-129. The inspection of commercial packaging shall be as specified in the contract (see 6.3).

4.4.2 Inspection lot. A lot shall consist of completed closures which are of the same part number, produced by the same manufacturer under essentially the same conditions, and submitted for acceptance at one time.

4.4.3 Examination. Samples taken as specified in 4.3.1 shall be examined to determine conformance with this specification with respect to material, dimensions and workmanship.

4.5 Tests.

4.5.1 Sealing tests for aluminum alloy and threaded rigid plastic closures only. Samples taken as specified in 4.3.2 shall have the sealing surface wetted with MIL-H-5606, MIL-H-6083 or MIL-H-83282 fluids, assembled to a fitting connected to an air supply of 2.0 to 5.0 psi (14 KPa to 34 KPa) air pressure, and immersed in water or other suitable fluid for a period of at least 30 seconds and not more than 1 minute. No leakage shall occur. The applied torque shall be as specified in Table I. The test shall be conducted at room temperature. Samples assembled and tested as previously described shall be immersed in water or other suitable fluid at a temperature of 160°F ± 2°F (71°C ± 1°C) and held for a minimum of 5 minutes. No leakage shall result. The same sample shall then be immersed in MIL-H-5606, MIL-H-6083 or MIL-H-83282 fluids, and brought to a temperature of -65°F ± 2°F (-53°C ± 1°C), held for a minimum of 5 minutes, and subjected to 2.0 to 5.0 psi (14 KPa to 34KPa) air pressure. No leakage shall result.

TABLE I. MINIMUM TORQUE

Dash Number			Inch-Pound	Newton Meter
2	R2	102	5	(0.56)
3	R3	103	5	(0.56)
4	R4	104	5	(0.56)
5	R5	105	10	(1.13)
6	R6	106	10	(1.13)
8	R8	108	15	(1.69)
10	R10	110	15	(1.69)
12	R12	112	15	(1.69)
16	R16	116	20	(2.26)
20	R20	120	20	(2.26)
24	R24	124	25	(2.82)
28	R28	128	25	(2.82)
32	R32	132	25	(2.82)

4.5.2 Repeated assembly tests for aluminum alloy and threaded rigid plastic closures only. Samples taken as specified in 4.3.2 shall be assembled to the proper fittings with torques specified in Table I. Each selected closure shall then be disassembled and reassembled for a minimum of 15 times. No failure such as thread chipping, shredding, jumping or stripping shall result. No leakage shall occur when subjected to the test described in 4.5.1.

4.5.2.1 Repeated assembly tests for threaded flexible plastic closures only. Samples taken as specified in 4.3.2 shall be assembled to mating parts hand tight. Each selected closure shall then be disassembled and reassembled for a minimum of 5 times without failure. No evidence of thread damage shall result.

4.5.3 Drop. Samples taken as specified in 4.3.2 shall be assembled to mating parts and dropped from a height of 3 feet (914mm) on a hardwood block 2 inches (51mm) thick, to verify conformance with 3.6.1. Items shall be dropped first on one end of the closure and then on a side.

4.5.4 Tensile strength. The supplier shall furnish the Government certification that the rigid plastic or elastomer used in the manufacture of closures has a tensile strength of 60,000 psi (414 MPa) min. Samples taken as specified in 4.3.2 shall be tested for tensile strength in accordance with ASTM D638.

5. PACKAGING

5.1 Preservation. Preservation shall be level A or C, as specified (see 6.3).

5.1.1 Level A.

5.1.1.1 Unit packaging. Closures shall be packaged in accordance with MIL-P-116, Method III, in quantities as specified by the procuring activity (see 6.3), in containers conforming to PPP-B-636, Class weather resistant. The containers shall be sealed at all joints and seams, including the manufacturer's joint, with tape conforming to PPP-T-76.

5.1.1.2 Intermediate packaging. When specified (see 6.3), unit packages shall be intermediate packaged in containers conforming to PPP-B-636, Class weather resistant. The gross weight of the containers shall not exceed the weight limitations of the container specification. The containers shall be closed in accordance with the appendix to the container specification.

5.1.2 Level C. Closures shall be packaged to provide adequate protection against corrosion, deterioration and physical damage during shipment from the supply source to the first receiving activity.

5.2 Packing. Packing shall be level A, B or C, as specified (see 6.3).

5.2.1 Level A. Closures shall be packed in overseas-type shipping containers conforming to PPP-B-585, PPP-B-601 or PPP-B-621, as specified (see 6.3). When specified (see 6.3), plywood for PPP-B-601 containers shall be surface treated in accordance with PPP-B-601 (see 3.6). Containers shall be closed and strapped in accordance with the applicable container specification and the appendix thereto.

5.2.2 Level B. Closures shall be packed in containers conforming to PPP-B-636, Class weather resistant. Containers shall be closed and strapped in accordance with the container specification and the appendix thereto.

5.2.3 Level C. Closures shall be packed in shipping containers to insure carrier acceptance and delivery without damage from the supply source to the first receiving activity.

5.3 Marking. Interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

"(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)"

6.1 Intended use. These closures are intended to protect the threads, flares, tapered and straight surfaces of units from the intrusion of dirt, moisture and foreign matter during storage and shipment, and to "seal-in" the anti-corrosion fluid in hydraulic units in storage and shipment.

6.2 Issue of DODISS. When this specification is used in acquisition, the applicable issue of the DODISS must be cited in the solicitaton (see 2.1.1 and 2.2).

6.3 Ordering data.

6.3.1 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number and date of this specification.
b. Title, number and date of the applicable specification sheet.
c. Applicable part number.
d. Selection of applicable level of packaging and packing (see 5.1 and 5.2).
e. Quantity of closures per unit package (see 5.1.1.1).
f. Selection of applicable level A shipping containers (see 5.2.1).
g. When plywood in PPP-B-601 boxes is to be surface treated (see 5.2.1).

6.4 Subject term (key word) listing.

Caps
Plugs
Moisture seal
Dust seal
Tubing

6.5 Changes from previous issue. Asterisks (or vertical lines) are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - AR
Navy - AS
Air Force - 82

Review activities:
Army - AV, ER, GL
DLA - IS

User activities:
Army - AT, ME, MI
Navy - MC, OS, SH, YD

Preparing Activity:
Army - AR

Agent:
DLA - IS

(Project 5340-1755)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-C-5501G	

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)* _____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation.

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)* – Optional
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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NOTE. This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document*(s)* or to amend contractual requirements.

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