

MIL-C-38373B
 1 July 1975

 SUPERSEDING
 MIL-C-38373A (ASG)
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MILITARY SPECIFICATION

CAP, FLUID TANK FILLER

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

1. SCOPE

1.1 Scope. This specification covers gravity fill, filler caps for fluid tanks.

1.2 Classification. Filler cap units shall be of the types, classes, sizes, and for applications as specified herein (see 3.5.8 and 6.2).

2. APPLICABLE DOCUMENTS

2.1 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

O-E-760	Ethyl Alcohol (Ethanol) Denatured Alcohol, and Proprietary Solvent
P-D-680	Dry Cleaning Solvent
RR-C-271	Chains and Attachments, Welded, Weldless, and Roller Chain
TT-S-735	Standard Test Fluids; Hydrocarbon

Military

MIL-D-1000	Drawings, Engineering and Associated Lists
MIL-G-5572	Gasoline, Aviation; Grades 80/87, 100/130, 115/145
MIL-T-5624	Turbine Fuel, Aviation, Grades JP-4 and JP-5
MIL-L-6081	Lubricating Oil, Jet Engine
MIL-L-6082	Lubricating Oil; Aircraft Reciprocating Engine (Piston)
MIL-L-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
MIL-S-8879	Screw Threads, Controlled Radius Root with Increased Minor Diameter; General Specification for

FSC 1560

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MIL-L-22851	Lubricating Oil, Aircraft Piston Engine, (Ashless Dispersant)
MIL-L-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-N-25027	Nut, Self-Locking, 250°F, 450°F, and 800°F, 125 KSI FTU, 60 KSI FTU, and 30 KSI FTU
MIL-T-25524	Turbine Fuel, Aviation Thermally Stable
MIL-L-27502	Lubricating Oil, Aircraft Turbine Engine, Ester Base

STANDARDSFederal

FED-STD-595 Colors

Military

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-130	Identification Marking of US Military Property
MIL-STD-143	Standards and Specifications, Order of Precedence for the Selection of
MIL-STD-794	Parts and Equipment, Procedures for Packaging and Packing of
MIL-STD-831	Test Reports, Preparation of
MIL-STD-889	Dissimilar Metals
MIL-STD-1523	Age Control of Age-Sensitive Elastomeric Material
MS20995	Wire, Safety or Lock
MS27379	Adapter, Fluid Tank Filler
MS27380	Lanyard, Fluid Tank Cap
MS33588	Nut, Self-Locking, Aircraft Design and Usage
	Limitations of
MS33666	Packing, Preformed - Aeronautical, Elastomeric, Range of Sizes

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

3. REQUIREMENTS

3.1 Qualification. The cap unit furnished under this specification shall be a product which is qualified for listing on the applicable Qualified Products List at the time set for opening of bids (see 4.3 and 6.3).

3.2 Components. The cap unit shall consist of a cap, a gasket or sealing device, and a cap attachment.

3.3 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

3.4 Materials

3.4.1 Metals. Metals shall be of the corrosion-resistant type, unless suitably protected to resist corrosion during normal service life.

3.4.1.1 Dissimilar metals. Unless suitably protected against electrolytic corrosion, dissimilar metals as defined in MIL-STD-889 shall not be used in intimate contact with each other.

3.4.2 Corrosion protection. When materials are used in the construction of cap and adapter units that are subject to corrosion in salt air or other atmospheric conditions likely to occur during service usage, they shall be protected against such corrosion in a manner that will in no way prevent compliance with the performance requirements of this specification. The use of cadmium plating and any protective coating that will crack, chip, or scale with age or extremes of atmospheric conditions shall be prohibited.

3.5 Design. The cap unit shall be designed to close and seal adapters made in accordance with MS27379. It shall be practicable to install and remove the cap without the use of tools, other than a screw driver.

3.5.1 Lightning safety. The cap, mounted in a standard MS27379 adapter, shall withstand a direct lightning strike, without sparking or evidence of scorching of the cap or the adapter on the surfaces exposed to the inside of the fuel tanks, and without losing its sealing function (3-inch size type III only).

3.5.2 Locking and sealing mechanism. The cap locking and sealing mechanism shall be compatible with the applicable MS27379 adapter. Locking of the cap shall be accomplished by rotating the cap tab (see 6.4.3) in a clockwise direction. Unlocking shall be accomplished by rotating the tab in a counterclockwise direction. The rotation required to lock or unlock the cap shall not exceed 50 degrees. Sealing of the cap to the adapter shall be accomplished by depressing the tab to the flush position. When the cap is inserted in the adapter but not sealed, the tab shall be visible from a distance of 10 feet. When the cap is locked and sealed in the adapter, the tab shall be flush with upper surface of the cap and the cap shall conform to the cap envelope as shown on MS27379. The cap shall become unsealed and permit positive tank pressures in excess of 10 inches of water to bleed off any time the tab is raised to the unsealed position with initial tank pressures up to 40 psig.

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3.5.3 Indexing indicator. An indexing indicator and letters, FWD, shall be stamped on the external surface of all 3-inch size caps to properly position the cap, to prevent inadvertent lifting of the cap tab by aerodynamic forces. The cap tab position with respect to the indexing indicator shall be in accordance with figure 1. The arrow and letters shall be painted white.

3.5.4 Torque. The torque required for installation, including locking and removal, shall not exceed 50 pound-inches at any time during the tests specified herein.

3.5.5 Gasket. The gasket and other seals shall be made of material resistant to the action of the specified fluids. The gasket shall be so attached to the cap as not to fall off during normal service usage. O-ring type seals shall conform to MS33666.

3.5.5.1 Age controls. Age controls shall conform to MIL-STD-1523.

3.5.6 Cap attachment. The cap attachment (see 6.4.2) shall withstand a 40-pound pull.

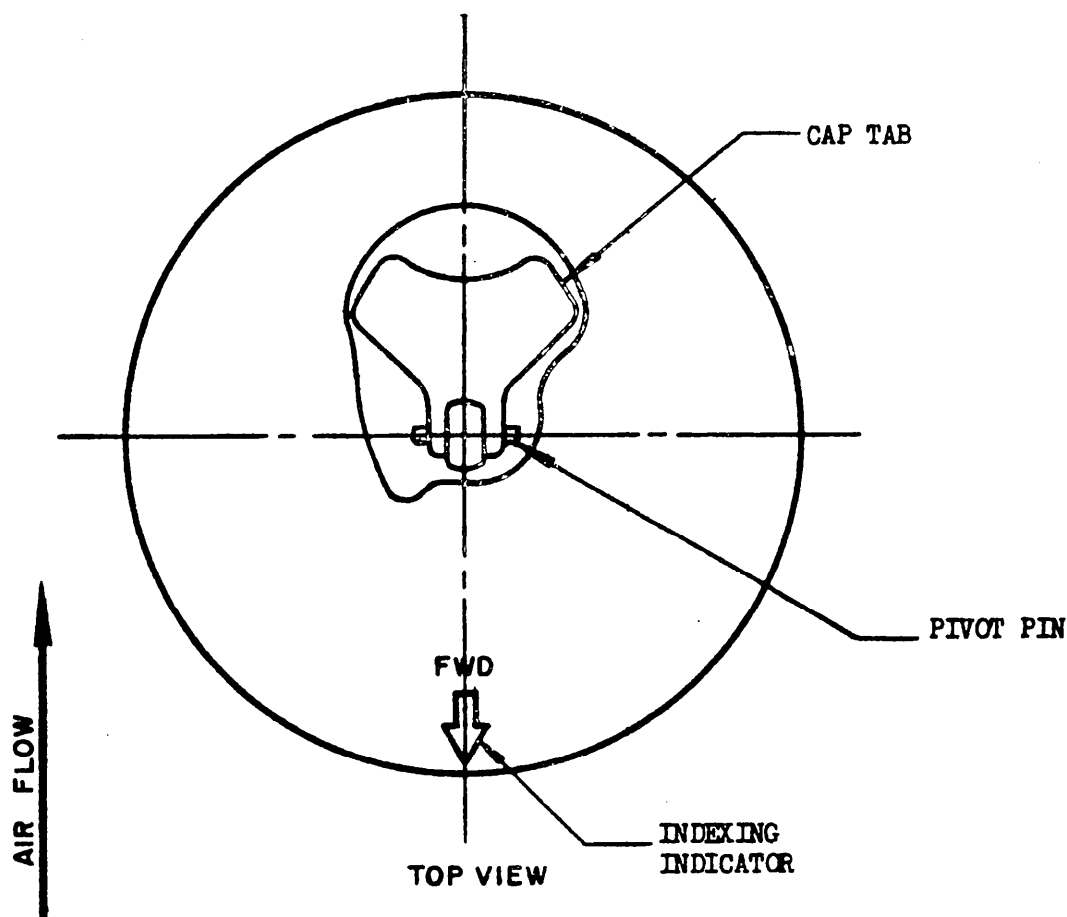
3.5.6.1 Polyurethane lanyard. The cap attachment shall consist of a polyurethane lanyard in accordance with MS27380 and a lanyard-to-cap fastener for 3-inch size caps, type III, class A.

3.5.6.2 Beaded chain. The cap attachment shall consist of a weldless beaded chain in accordance with RR-C-271, type II, class 5, and a chain-to-cap fastener for all 1-1/2-inch caps, 2-inch caps, and for 3-inch type I and type II caps.

3.5.6.3 High temperature lanyard. The cap attachment selected for qualification of either class B or class C fuel caps shall be capable of meeting the cap attachment test (4.6.13) upon completion of the applicable fluid aging and extreme temperature test (4.6.9, 4.6.10, and 4.6.11). The lanyard shall be easily installed on the fastener provided on the adapter.

3.5.7 Pressure. The cap units shall be designed to operate at the following pressures:

- a. Rated - 50 psig
- b. Proof - 75 psig
- c. Burst - 100 psig.



1. THE INDEXING INDICATOR ESTABLISHES THE POSITION OF THE CAP WITH RESPECT TO THE ADAPTER. MS27379 ESTABLISHES THE POSITION OF ADAPTERS WITH RESPECT TO AIR FLOW.
2. CAP TAB IS SHOWN IN CLOSED (FLUSH) POSITION.
3. THE CAP TAB SHALL BE PIVOTED ABOUT THE HORIZONTAL CENTERLINE AS SHOWN, SO THAT AIR FLOW WILL TEND TO KEEP THE CAP CLOSED.
4. THE INDEXING INDICATOR SHALL CONSIST OF AN ARROW AND THE LETTERS "FWD" STAMPED ON THE CAP AND PAINTED WHITE.

FIGURE 1. Indexing indicator and cap tab position

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3.5.8 Sizes and applications. The cap units shall be of the following sizes for applications as listed:

a. 1-1/2-inch adapter opening: For use with synthetic oils conforming to MIL-L-7808, MIL-L-27502 and MIL-L-23699.

b. 2-inch adapter opening:

(1) Type I - for use with hydrocarbon oils conforming to MIL-L-6081, MIL-L-6082, and MIL-L-22851.

(2) Type II - for use with alcohol, water-alcohol mixtures, with alcohol conforming to O-E-760, water, and deicing fluids.

c. 3-inch adapter opening:

(1) Type I - for use with synthetic oils conforming to MIL-L-27502, MIL-L-23699, and hydrocarbon oils conforming to MIL-L-6081, MIL-L-6082, MIL-L-22851 and MIL-L-7808.

(2) Type II - for use with alcohol, water-alcohol mixtures, with alcohol conforming to O-E-760 and water.

(3) Type III - for use with fuels conforming to MIL-G-5572, MIL-T-5624, and MIL-T-25524.

Class A - Temperature range -67°F to 135°F fuel and 160°F ambient

Class B - Temperature range -67°F to 200°F fuel and 350°F ambient

Class C - Temperature range -67°F to 300°F fuel and 600°F ambient.

3.6 Construction. The cap unit shall be so constructed that no parts will work loose in service. The unit shall be able to withstand the strains, jars, vibrations, and other conditions incident to shipping, storage, installation, and service use.

3.7 Part numbering and interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable. The item identification and part number requirements of MIL-D-1000 shall govern the manufacturer's part numbers and changes thereto.

3.8 Threaded parts

3.8.1 Screw threads. Screw threads shall be in accordance with MIL-S-8879.

3.8.2 Pipe threads. Pipe threads shall not be used.

3.8.3 Locking of threaded parts. All internal and external threaded parts shall be positively locked by safety wiring, self-locking nuts, cotter pins, or other approved methods. Safety wire shall have a minimum diameter of 0.032 inch and shall be used in accordance with MS20995. Self-locking nuts shall be of the all-metal type, conforming to MIL-N-25027, and shall be used in accordance with MS33588. Staking and the use of lockwashers shall not be permitted.

3.9 Performance. The cap units shall satisfy the performance requirements specified in section 4 when subjected to the applicable tests.

3.10 Identification of product. The cap units shall be marked for identification in accordance with MIL-STD-130. The identification data shall be applied to the inside of the cap and shall be as follows:

Rated pressure 50 psi Size _____
 Type _____ (for 2- and 3-inch caps only)
 Class _____ (for 3-inch type III caps only)
 Specification MIL-C-38373
 Manufacturer's Part No.
 Manufacturer's Name
 US

3.10.1 Color identification. The external surface of caps visible when installed in adapters shall be color coded, as follows, in accordance with FED-STD-595:

- a. Caps intended for oils shall be gloss yellow, color No. 13655.
- b. Caps intended for fuels shall be gloss red, color No. 11136.
- c. Caps intended for water, alcohol, and water-alcohol shall be gloss blue, color No. 15102.
- d. Caps intended for deicing fluids shall be gloss gray, color No. 16473.

3.11 Workmanship. The cap units shall be constructed and finished in a workmanlike manner.

3.11.1 Dimensions. Where dimensions and tolerances may affect the interchangeability, operation, or performance of the cap units, they shall be held or limited accordingly.

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3.11.2 Cleaning. The cap units shall be thoroughly cleaned of grease, oil, dirt, metal chips, or other foreign material, before and after final assembly. All burrs and sharp edges shall be removed.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier 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.

4.2 Classification of inspection. The examination and testing of the cap units shall be classified as follows:

- a. Qualification inspection (4.3)
- b. Quality conformance inspection (4.4).

4.3 Qualification inspection. Qualification inspection shall consist of the examination and tests in the order indicated in table I.

4.3.1 Qualification samples. The qualification samples shall consist of two or three cap units of the size and type desired for qualification (see table I), complete with the additional gaskets required. Samples shall be identified with the manufacturer's own part number and any additional information required by the activity responsible for qualification (see 6.3).

4.3.1.1 Manufacturer's drawings. Manufacturer's drawings submitted with the qualification samples shall include a sectional view showing all parts in their normal assembled position and shall specify part numbers of all parts and subassemblies. The following data shall be furnished on or together with the drawings:

- a. Detailed internal construction
- b. Internal, external, and overall dimensions
- c. Materials of construction, treatment, and finish
- d. Weight
- e. O-ring groove and seal details.

TABLE I. Qualification Inspection

Paragraph No.	Size and type	Size and type			
		1-1/2-inch	2-inch type I	2-inch type II	3-inch type I
Sample No. 1					
(a) Examination of product					
(b) Functional		X	X	X	X
(c) Leakage		X	X	X	X
(d) Fuel resistance and low temperature		X	X	X	X
(e) Hydrocarbon oil aging and extreme temperature			X		
(f) Alcohol aging and extreme temperature			X		
(g) Synthetic oil aging and extreme temperature		X		X	
(h) Cap attachment		X	X	X	X
(i) Icing		X	X	X	X
(j) Disassembly and inspection		X	X	X	X
Sample No. 2					
(a) Examination of product					
(b) Functional		X	X	X	X
(c) Leakage		X	X	X	X
(d) Vibration		X	X	X	X
(e) Endurance		X	X	X	X
(f) Accelerated corrosion		X	X	X	X
(g) Burst pressure		X	X	X	X
(h) Disassembly and inspection		X	X	X	X
Sample No. 3					
(a) Examination of product					
(b) Leakage					X
(c) Lightning safety (caps intended)					X

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4.3.1.2 Manufacturer's test report. Three copies of a test report, in accordance with MIL-STD-831, shall accompany the qualification samples and should include the manufacturer's name, basic rubber polymer, compound number, shore hardness, specific gravity, applicable gasket or other seal specification approval, and photographs showing the cap as mounted in each test setup.

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the following:

a. Individual tests (4.4.1)

b. Sampling tests (4.4.2).

4.4.1 Individual tests. Each cap unit shall be subjected to the following:

a. Examination of product (4.6.1)

b. Functional (individual test only) (4.6.2.1)

In addition, each unit shall be subjected to any other test specified herein which may be considered necessary to determine conformance with this specification.

4.4.2 Sampling tests

4.4.2.1 Lot. A lot shall consist of units manufactured under essentially the same conditions and submitted for acceptance at the same time.

4.4.2.2 Sampling. One cap unit, of the same rated pressure and size, which has passed the individual tests shall be selected from each lot of 100 units or fraction thereof for the first 1000 units; then, if no failures occur, one unit from each lot of 1000 units, or fraction thereof, on the order shall be selected and subjected to the following tests in the order indicated:

a. Endurance (4.6.5)

b. Cap attachment (4.6.13)

c. Synthetic oil aging and extreme temperature (for the 1-1/2-inch and 3-inch type I sizes only) (4.6.11)

d. Hydrocarbon oil aging and extreme temperature (for 2-inch, type I, and 3-inch, type I sizes only) (4.6.9)

e. Alcohol aging and extreme temperature (for 2-inch, type II, and 3-inch, type II sizes only) (4.6.10)

- f. Fuel resistance and low temperature (for 3-inch, type III size only)
(4.6.6)

In addition, each unit shall be subjected to any other test specified herein which may be considered necessary to determine conformance with this specification.

4.5 Test conditions

4.5.1 Cleaning. Prior to testing the cap unit, all parts normally in contact with the fluid used in service shall be cleaned thoroughly to remove all foreign matter.

4.5.2 Test fluid. Unless otherwise specified, the following test fluids shall be used for the specified sizes:

- a. Size 1-1/2-inch, synthetic oil conforming to MIL-L-27502
- b. Size 2-inch (type I), hydrocarbon oil, grade 1100, conforming to MIL-L-6082
- c. Size 2-inch (type II), test fluid made up of 25 percent methyl alcohol, 25 percent ethyl alcohol and 50 percent water, by volume
- d. Size 3-inch (type I), synthetic oil conforming to MIL-L-27502
- e. Size 3-inch (type II), test fluid made up of 25 percent methyl alcohol, 25 percent ethyl alcohol, and 50 percent water, by volume
- f. Size 3-inch (type III), fluid conforming to P-D-680, type II.

4.5.3 Test adapter. The test adapter required in the applicable tests shall be in accordance with MS27379.

4.5.4 Room temperature. Unless otherwise specified, all tests shall be performed with the cap, test adapter, and test fluid at a temperature between 60° and 90°F.

4.5.5 Mounting. All tests, except lightning safety test, shall be performed with the test adapter mounted to the test tank in accordance with figure 2.

4.6 Inspection methods

4.6.1 Examination of product. The cap unit shall be examined to determine conformance to the applicable drawings and all requirements of this specification for which there are no specific tests. The approved manufacturer's drawings shall be used to determine that the units submitted for qualification are identical to the design approved by the procuring activity.

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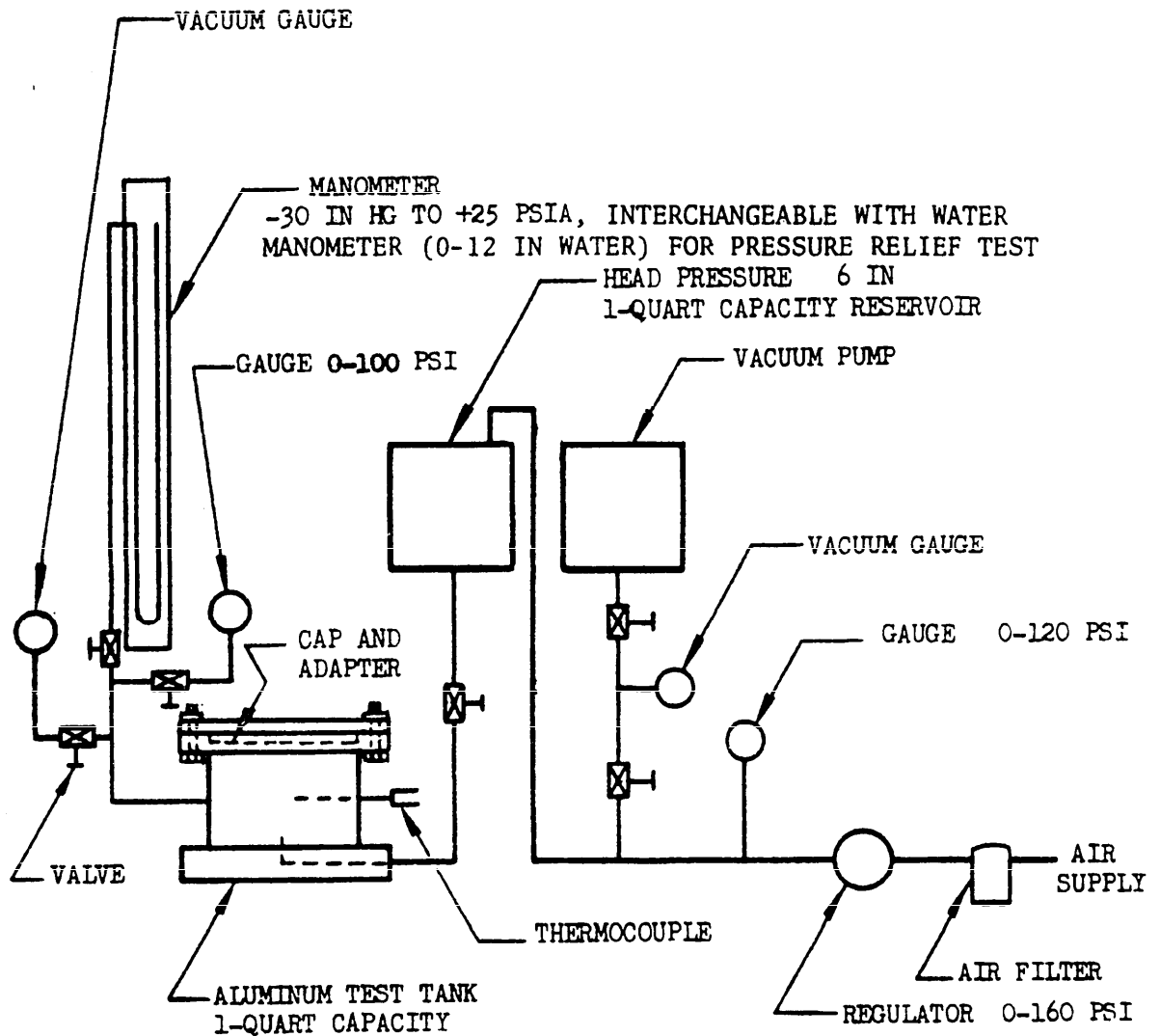


FIGURE 2. Test tank setup

4.6.2 Functional. The cap shall be installed in the test adapter (inserted, locked, and sealed). Rated pressure (see 4.6.3.1) shall be applied with the test fluid in contact with the cap for a period of 1 minute, then released. Leakage, as visually indicated by fluid seepage, shall not occur. A negative pressure of 3 psi shall be applied for 1 minute and then released with the test fluid remaining in contact with the cap. There shall be no leakage as indicated by a drop in a mercury manometer. The test tank shall then be drained of test fluid and air pressures of 5, 25, and 40 psi shall be applied. At each increment the air source shall be turned off so that the specified pressure is trapped in the test tank. The pressure shall then be released by lifting the cap tab. At the end of 10 seconds after lifting the tab, the pressure in the test tank shall not exceed 10 inches of water as indicated by a water manometer.

4.6.2.1 Functional (individual tests only) (See Note 1). The cap shall be installed in the test adapter (inserted, locked and sealed). Proof pressure, air or fluid, of 75 psi shall be applied to the test adapter for a period of at least 15 seconds. There shall be no evidence of leakage by fluid seepage or if air is used, by the indication of bubbles through a head of water not greater than 1 inch or less than 1/4 of an inch. A pressure relief test shall then be conducted by lifting the tab with air pressure at 40 psi. (A separate test tank and adapter may be used at the option of the manufacturer.) During all functional tests there shall be no evidence of binding or loosening of the cap, failure to lock or unlock, or failure to unseal when the tab is lifted.

4.6.3 Leakage. With the cap installed in the test adapter, pressure shall be applied inside of the unit as specified in 4.6.3.1 through 4.6.3.3.

4.6.3.1 Rated pressure (See Note 1). Test fluid pressures shall be 6-inch head; 5 psig, 10 psig, and from 10 psig to the rated pressure of 50 psig (see 3.5.7) in increments of 10 psig. There shall be no evidence of leakage as visually indicated by fluid seepage.

4.6.3.2 Proof pressure. The cap unit shall be subjected to a proof pressure of 75 psig minimum for at least 1 minute. There shall be no evidence of leakage as visually indicated by fluid seepage.

4.6.3.3 Air pressures. Air pressures shall be -3 psig, 1 psig, 5 psig, 10 psig, and from 10 psig to the rated pressure of 50 psig in increments of 10 psig. There shall be no evidence of leakage.

4.6.4 Burst pressure. The cap unit shall be subjected to a burst pressure of 100 psig minimum for at least 1 minute. There shall be no evidence of distortion or other injury to any part of the cap unit. Upon completion of the burst pressure test the cap unit shall be subjected to the tests specified in 4.6.2 and 4.6.3.1.

Note 1. At -65°F leakage shall not exceed 10 ML/min. No leakage is permitted during tests at other temperatures.

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4.6.5 Endurance. The cap unit shall be installed in the test adapter and subjected to rated pressure of 50 psig with test fluid for 1 minute. The pressure shall then be released and the cap removed from the adapter. This procedure shall be repeated 1,250 times. The cap unit shall function satisfactorily during and after this test. Following this test, the tests specified in 4.6.2 and 4.6.3.1 shall be repeated.

4.6.6 Fuel resistance and low temperature. The fuel resistance and low temperature tests shall be performed in accordance with table II.

4.6.7 Icing. The cap unit shall be installed in the test adapter and the exterior of the cap unit and test adapter shall be flooded with water, and maintained at a temperature of approximately 20°F, until they are completely covered with a layer of ice. It shall be possible to readily remove the cap with the use of a screwdriver.

4.6.8 Vibration. The cap unit and test adapter shall be installed on a test tank with the test tank filled with test fluid. The test tank shall be pressurized to the rated pressure of the cap. The cap and test adapter shall be vibrated in such a manner that the cap will vibrate at a double amplitude of 1/32 inch at a frequency of 2,000 cpm for a period of 24 hours. The 24 hours shall be divided into three equal periods; the first period at -65°F; the second period at room temperature; and the third period at the high fluid temperature listed on the applicable table for fluid aging and extreme temperature for the cap tested. A mark shall be put on the cap opposite to a corresponding mark on the adapter. During the test, evidence of leakage shall constitute failure. Upon completion of the vibration test, the marks put on the cap and adapters shall be in the same position that they were in at the start of the test. The cap unit shall then be subjected to the functional test (4.6.2) and rated pressure test (4.6.3.1).

4.6.8.1 Scanning. The cap unit and test adapter, adequately mounted on the vibration device, shall be subjected to the four vibration-scanning cycle tests specified in table III. There shall be no evidence of leakage, damage or loosening of parts during the test. Upon completion of the scanning test, the cap unit shall be subjected to the tests specified in 4.6.2 and 4.6.3.1.

4.6.9 Hydrocarbon oil aging and extreme temperature. These tests shall be performed in accordance with table IV.

4.6.10 Alcohol aging and extreme temperature. These tests shall be performed in accordance with table V.

4.6.11 Synthetic oil aging and extreme temperature. These tests shall be performed in accordance with table VI.

TABLE II. Fuel resistance and low temperature tests

Test period 1/	Fuel resistance			Low temperature
	Phase I soak 2/	Phase I dry	Phase II soak 2/	Phase II dry
Component configuration	Cap unit installed in adapter, tank filled	Tank drained and vented, cap unit installed in adapter	Cap unit installed in adapter, tank filled	Tank drained and vented, cap unit installed in adapter
Test fluid	TT-S-735 type III	None	TT-S-735 type III	TT-S-735 type I
Period duration	96 hours (4 days)	24 hours	18 hours	30 hours
Ambient and test fluid temp.	Class A 158° ±2° F Class B 236° ±5° F Class C 354° ±10° F	Class A 13° ±2° F Class B 350° ±5° F Class C 600° ±10° F	Same as for phase I soak	Same as for phase I dry
Operation or tests during period	Remove cap and reinstall in adapter twice daily	None	Same as for phase I soak	None
Operation or tests immediately after period	Perform the following tests with ambient and test fluid still at 158° ±2° F: (a) Functional (4.6.2) (b) Rated pressure (4.6.3.1)	(a) Install and remove cap from adapter 5 times; (b) Perform leakage test (4.6.3.1), using TT-S-735 type I fluid	Same as for phase I soak	Perform the following tests with ambient and test fluid still at -67° ±2° F: (a) Functional (4.6.2) (b) Rated Pressure (4.6.3.1)

1/ Each period shall follow the preceding period.

2/ During the period of soaking, the cap and adapter shall be maintained in an inverted position to insure contact of all synthetic parts with the fluid during the soak cycle.

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TABLE III. Vibration tests

Scanning cycle test No.	1	2	3	4
Axis of vibration	Along axis of symmetry	Along axis of symmetry	Normal to axis of symmetry	Normal to axis of symmetry
Fluid pressure	Rated	1/2 psi	Rated	1/2 psi
Scanning cycle time	30 min.	30 min.	30 min.	30 min.
No. of scanning cycles per test	1	1	1	1
Procedure	<p>The frequency shall be uniformly increased with respect to time through a frequency range from 5 to 500 cps, with an applied double amplitude of 0.080 inch up to 10 cps, an applied double amplitude of 0.036 inch from 10 to 75 cps, and from there an applied vibration acceleration not less than $\pm 10g$. The frequency shall be similarly decreased so that the complete cycle is accomplished in the specified cycle time. When one or more resonant frequencies is encountered, the cap unit shall be vibrated at each resonant frequency for an additional 30 minutes.</p>			

TABLE IV. Hydrocarbon oil aging and extreme temperature tests

Cycle	Test fluid	Temperature	Time (hours)	Component configuration	Remarks
1/1	MIL-L-22851 grade 1100	215° ±2° F	72	Cap unit removed from adapter	O-ring shall not come loose from cap.
2	Air	160° ±2° F	24	Cap unit removed from adapter	(a) Install and remove from adapter five times. (b) Perform the leakage test (4.6.3.1) after end of cycle.
1/3	MIL-L-22851 grade 1100	215° ±2° F	120	Cap unit removed from adapter	(a) Tank shall be at operating pressure. (b) Remove and immediately reinstall cap two times daily. After releasing pressure from tank, O-ring shall not come loose from cap, nor shall O-ring swell prevent installation or removal. (c) Perform the functional (4.6.2) and leakage tests (4.6.3.1) at 215° ±2° F at end of cycle.
4	Air	160° ±2° F	24	Cap unit installed in adapter	Perform the leakage test (4.6.3.1) after completion of cycle.
5	MIL-L-22851 grade 1100 oil mixed with 30% by volume of TT-S-735 type I fluid	+30° F	24	Cap unit installed in adapter	Perform the functional (4.6.2) and leakage tests (4.6.3.1) at +30° F after completion of cycle.
6	MIL-L-22851 grade 1100 oil mixed with 30% by volume of TT-S-735 type I fluid	0° F	24	Cap unit installed in adapter	Perform the functional (4.6.2) and leakage tests (4.6.3.1) at 0° F after completion of cycle.
7	MIL-L-22851 grade 1100 oil mixed with 30% by volume of TT-S-735 type I fluid	-30° F	24	Cap unit installed in adapter	Perform the functional (4.6.2) and leakage tests (4.6.3.1) at -30° F after completion of cycle.
2/8	MIL-L-22851 grade 1100 oil mixed with 30% by volume of TT-S-735 type I fluid	-65° F	24	Cap unit installed in adapter	(a) Perform the functional (4.6.2) and leakage tests (4.6.3.1) at -65° F after completion of cycle. (b) Perform the functional (4.6.2) and leakage tests (4.6.3.1) at ambient temperature after completion of cycle.

1/ During the period of soaking, the cap and adapter shall be maintained in an inverted position to insure contact of all synthetic parts with the fluid during the soak cycle.

2/ At -65°F leakage shall not exceed 10 ML/min. No leakage is permitted during tests at other temperatures.

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TABLE V. Alcohol aging and extreme temperature tests

Cycle	Test fluid	Temperature	Time (hours)	Component configuration	Remarks
1	25% methyl alcohol 25% ethyl alcohol 1/ 50% water	+110° ±2° F	72	Cap unit removed from adapter	O-ring shall not come loose from cap.
2	Air	+160° ±2° F	24	Cap unit removed from adapter	(a) Install and remove from adapter 5 times. (b) Perform the leakage test (4.6.3.1) after end of cycle.
2/3	Same as 1	+110° ±2° F	120	Cap unit installed in adapter	(a) Tank shall be at operating pressure (b) Remove and immediately reinstall cap two times daily. O-ring shall not come loose from cap nor shall O-ring swell prevent installation or removal. (c) Perform the functional (4.6.2) and leakage tests (4.6.3.1) at +110° ±2° F at end of cycle.
4	Air	+160° ±2° F	24	Cap unit installed in adapter	Perform the leakage test (4.6.3.1) after completion of cycle.
5	Same as 1	-65° ±2° F	72	Cap unit installed in adapter	Perform the functional (4.6.2) and leakage tests (4.6.3.1) at -65° ±2° F after completion of cycle.

1/ Percentages by volume.

2/ During the period of soaking, the cap and adapter shall be maintained in an inverted position to insure contact of all synthetic parts with the fluid during the soak cycle.

TABLE VI. Synthetic oil aging and extreme temperature tests

Cycle	Test fluid	Temperature	Time (hours)	Component configuration	Remarks
1	MIL-L-7808	350° ±2° F	72	Cap unit removed from adapter	O-ring shall not come loose from cap.
2	Air	160° ±2° F	24	Cap unit removed from adapter	(a) Install and remove from adapter 5 times. (b) Perform the leakage test (4.6.3.1) after end of cycle.
1/3	MIL-L-7808	350° ±2° F	120	Cap unit installed in adapter	(a) Tank shall be at operating pressure. (b) Remove and immediately reinstall cap two times daily. O-ring shall not come loose from cap, nor shall O-ring swell prevent installation or removal. (c) Perform the functional (4.6.2) and leakage tests (4.6.3.1) at 325° ±2° F at end of cycle.
4	Air	160° ±2° F	24	Cap unit installed in adapter	Perform the leakage test (4.6.3.1) after completion of cycle.
5	MIL-L-7808	+30° ±2° F	24	Cap unit installed in adapter	Perform the functional (4.6.2) and leakage tests (4.6.3.1) at +30° F after completion of cycle.
6	MIL-L-7808	0° ±2° F	24	Cap unit installed in adapter	Perform the functional (4.6.2) and leakage tests (4.6.3.1) at 0° F after completion of cycle.
7	MIL-L-7808	-30° ±2° F	24	Cap unit installed in adapter	Perform the functional (4.6.2) and leakage tests (4.6.3.1) at -30° F after completion of cycle.
8	MIL-L-7808	-65° ±2° F	24	Cap unit installed in adapter	(a) Perform the functional (4.6.2) and leakage tests (4.6.3.1) at -65° F at completion of cycle. (b) Perform the functional (4.6.2) and leakage tests (4.6.3.1) at ambient temperature after completion of cycle.

1/ During the period of soaking, the cap and adapter shall be maintained in an inverted position to insure contact of all synthetic parts with the fluid during the soak cycle.

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4.6.12 Accelerated corrosion. The cap unit shall be immersed in a solution consisting of 2-1/2 percent by weight of sodium chloride in distilled water. After immersion, the solution shall be drained, and the unit shall be heated in an oven to a temperature of 125° to 130°F for a period of not less than 1 hour. The immersion and heating cycle shall be repeated 50 times. Immediately after completing the immersion cycles, the cap unit shall be disassembled and washed out with warm water to remove all salt accumulations, after which the unit shall be dried and subjected to the tests specified in 4.6.2, 4.6.3, and 4.6.15.

4.6.13 Cap attachment. Upon completion of the applicable fluid aging and extreme temperature test the cap attachment shall be subjected to the 40-pound pull test. A test adapter shall be securely mounted in a horizontal position. With the cap not installed on the adapter and the cap and the adapter connected only by the lanyard, a 40-pound static pull shall be applied to the cap in the four directions as shown on figure 3. Separation of the cap from the adapter or distortion of the lanyard-to-cap fastener shall constitute failure.

4.6.14 Lightning safety

4.6.14.1 Test setup. The cap and adapter shall be mounted on a test chamber similar to that shown on figure 4. The lanyard of the cap attachment assembly shall be included in the test. The adapter opening in the test chamber shall be a minimum of 4.25 inches. The adapter shall be centered in the test chamber adapter opening and mounted to the test chamber by dome type press nuts, manufactured by Rosan, Inc., Newport Beach, California, or equivalent. The only type of seal permitted between the adapter and the test chamber is a conventional Buna-N flat gasket. Masking of any portion of the adapter inside the test chamber is not permitted. The adapter and test chamber shall be adequately grounded to transfer the lightning stroke without sparking between the adapter and test chamber or between chamber walls. A camera shall be so positioned that the axis of symmetry of the cap passes through the focal point of the lens and is perpendicular to the focal plane of the camera as shown on figure 4. A camera monitor hole shall be drilled with a No. 70 drill through the test chamber wall at least 1 inch from the adapter. The purpose of the monitoring hole is to indicate by a light spot on the film that the camera shutter was open during the test. The (f) stop setting of the camera shall not be less than f4 nor greater than f5.6. The film speed shall not be less than ASA 3000. The camera shutter shall be held open in the darkened test chamber during the test.

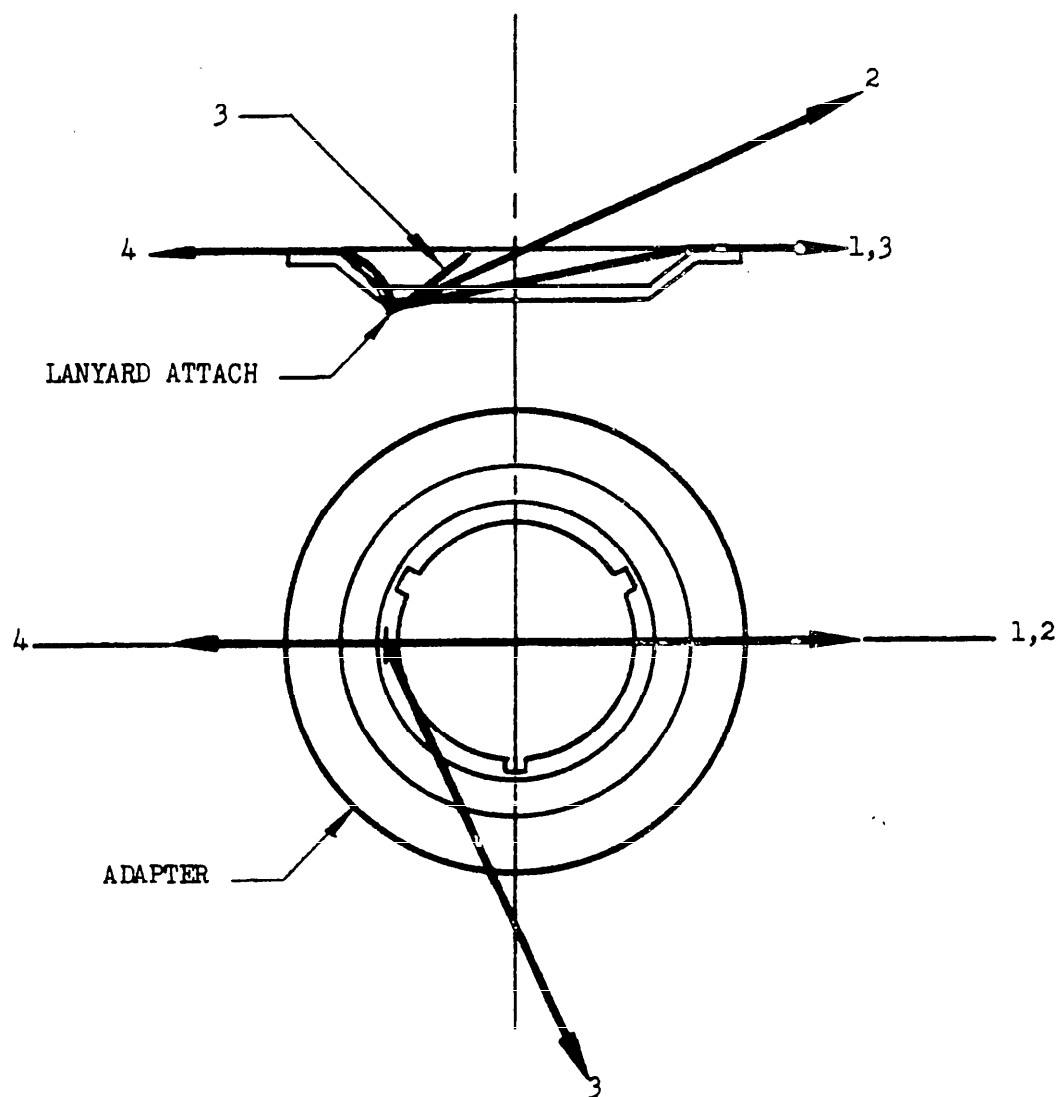


FIGURE 3. Cap attachment pull test

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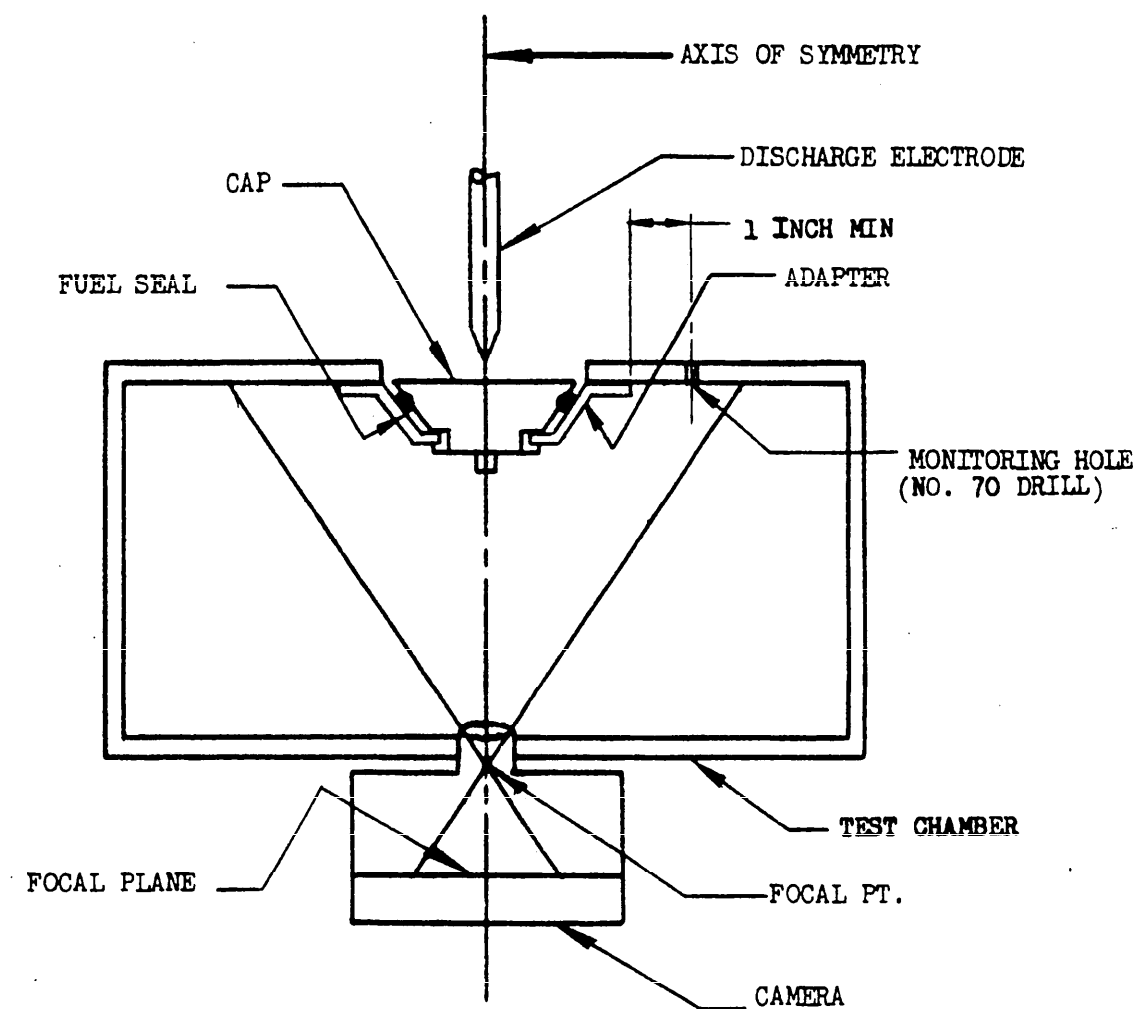


FIGURE 4. Lightning safety test setup

4.6.14.2 High current. The cap shall be subjected to a simulated lightning strike in such a manner that the peak current flow between the cap and the adapter is 200,000 amperes, and the total charge transfer over the duration of the stroke is not less than 12 coulombs. The time required for the current to rise from 0 to 200,000 amps shall not exceed 15 microseconds. The strike shall be directed to the axis of symmetry of the cap, unless this portion of the cap is constructed of a nonmetallic material, in which case the stroke shall be directed to the metallic portion of the cap nearest the axis of symmetry. A plot of current vs. time shall be recorded. The wave shape of this plot may be either oscillatory or unipolarity of either polarity. Any evidence of light on the photograph from any source other than the camera monitoring hole shall constitute a failure. The cap shall be removed and visually examined after the test. Any evidence of blow-by past any seal or scorching (discoloration) of the adapter due to excessive localized heating shall constitute a failure.

4.6.14.3 High coulomb test. The cap shall be subjected to a simulated lightning strike in such a manner that the charge transfer is at least 500 coulombs at a current flow of at least 75 amperes. The strike may be directed to any portion of the top surface of the cap. If the 500 coulomb charge transfer cannot be accomplished with one discharge due to the consumption of material, repeated discharges of at least 75 amperes minimum shall be accomplished until the summation of charge transfers is at least 500 coulombs. Plots of the current vs. time shall be recorded. The cap shall be removed and visually examined after the test. Any evidence of blow-by past any seal or scorching (discoloration) of the adapter due to excessive localized heating shall constitute a failure. Upon completion of the test specified in 4.6.14, the cap shall be subjected to the test specified in 4.6.3.2.

4.6.14.4 Special instructions. A specific cap design may require modification to the test procedures and tests stated herein in order for the tests to be meaningful demonstrations of lightning safety. For example, a cap that transmits light (due to the use of translucent materials) would invalidate the photographic method of recording test results. If masking certain areas of the cap surface to prevent light transmission is not practical, a trained observer is required to observe the test results, in which case any visual detection of arcing on the fuel side of the cap installation constitutes a failure. Any variations in the test procedures required by cap designs not anticipated in the preparation of this specification will be submitted to and approved by the activity responsible for qualification (see 6.3).

4.6.15 Disassembly and inspection. The cap unit shall be disassembled and inspected. There shall be no evidence of corrosion. There shall be no evidence of deterioration or undue wear which might affect the performance of the cap unit.

4.7 Preservation, packaging, packing, and marking. Preparation for delivery shall be inspected for conformance to section 5.

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5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing. The cap unit shall be preserved, packaged, and packed in accordance with MIL-STD-794.

5.2 Marking for shipment. Interior and exterior containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The cap units covered by this specification are intended for use as tank filler closures for hydrocarbon fuel, hydrocarbon oil, synthetic oil, water, water-alcohol, and deicing tanks.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Size, type, class, and quantity cap unit to be furnished (see 1.2 and 3.5.8 and 3.10).
- c. Color identification required (see 3.10.1).
- d. Levels of packaging and packing desired (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List, whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is ASD/ENJPF, Wright-Patterson Air Force Base, Ohio 45433, and information pertaining to qualification of products may be obtained from that activity.

6.4 Definitions

6.4.1 Gasket or sealing device. The gasket or sealing device is a part of the cap and is the pressure sealing bond between the cap and adapter.

6.4.2 Cap attachment assembly. The cap attachment assembly secures the cap to the adapter, to prevent loss or damage to the cap, when the cap is disengaged from the adapter during aircraft servicing.

6.4.3 Cap tab. The cap tab is an integral part of the locking mechanism accessible at the external surface of the cap, which is used to operate the locking mechanism.

6.5 International standardization. Certain provisions (1.2 and 3.5) of this specification are the subject of international standardization agreements ASCC 17/11 and 11/2. When amendment, revision, or cancellation of this specification is proposed, the departmental custodians will inform their respective Departmental Standardization Offices so that appropriate action may be taken respecting the international agreement concerned.

6.6 Marginal indicia. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:

Navy - AS

Air Force - 11

Preparing activity:

Air Force - 11

Project No. 1560-0098

Reviewer activity:

Army - AV, EA

Air Force - 80

International interest (see 6.5)

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