

INCH-POUND

MIL-DTL-5500E

5 November 2007

SUPERSEDING

MIL-C-5500D

05 August 1992

## DETAIL SPECIFICATION

## CAP, HIGH PRESSURE AIR VALVE

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

1.1 Scope. This specification covers one type and grade of high-pressure air valve cap suitable for use in aircraft hydraulic systems.

## 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

## DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-5606	Hydraulic Fluid, Petroleum Base; Aircraft, Missile, and Ordnance
MIL-R-6855	Rubber, Synthetic, Sheets, Strips, Molded or Extruded Shapes, General Specification For

## DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-130	Identification Marking Of U.S. Military property
MS20813	Cap, Pneumatic Valve, High-Pressure
MS28889	Valve, Air, High Pressure Charging, 5000 psi

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil> or from the Standardization Documents Order Desk, 700 Robbins Ave, Building 4D, Philadelphia, PA 19111-5094)

Comments, suggestions, or questions on this document should be addressed to: Oklahoma city Air Logistics Center/ENEP, 3001 Staff Drive, Suite 2AG-68A, Tinker AFB, OK 73145-3036 or emailed to [ocalc.enrs.sma@tinker.af.mil](mailto:ocalc.enrs.sma@tinker.af.mil) Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at <http://assist.daps.dla.mil>

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2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the applicable issues of the documents which have been adopted by the DoD are those listed in the specific issue of the DoDISS cited in the solicitation. Unless otherwise specified, the documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

## AMERICAN NATIONAL STANDARDS INSTITUTE/AMERICAN SOCIETY FOR THE QUALITY CONTROL (ANSI/ASQC)

## ANSI/ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes (DoD-adopted)

(Application for copies should be addressed to American Society for Quality Control, P.O. Box 3066, Milwaukee, WI 53201-3066, or to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

2.4 Order of Precedence. In the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

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

3.1.1 Qualification. The high pressure air valve cap furnished under this specification shall be products which are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.4 and 6.4).

3.2 Materials. Materials shall conform to applicable specifications as specified herein.

3.3 Design and construction. The cap shall be designed and constructed in accordance with MS20813.

3.3.1 Size and dimensions. The cap shall have limiting dimensions in accordance with MS20813. No part of the cap shall project outside the overall dimension indicated.

3.3.1.1 Valve stem. The cap shall fit an MS28889 valve stem.

3.3.2 Shell and swivel seat plate. Metal used in the shell and swivel seat plate shall be as specified in MS20813.

3.3.3 Seat. The valve seat material shall be in accordance with MIL-R-6855, class 2, type A, grade 60 or 80, or approved equivalent, that is resistant to hydraulic oil which conforms to MIL-PRF-5606, and shall be suitably bonded to the swivel seat to withstand service usage without separation of the bond.

3.3.3.1 Resistant. The material shall be resistant to abrasion to prevent disintegration under pull-up tests or during normal service usage.

3.3.3.2 Compression resistant. The material shall have suitable compression set resistance and flexibility at all operating temperatures between -65° to 160°F (-54° to 71°C) to seal all operating pressures up to 5,000 psi with maximum wrench torque of 30 inch-pounds.

3.3.3.3 Homogeneous. The material shall be homogeneous to insure consistent swell, strength, and hardness characteristics throughout the entire batch.

3.3.3.4 Physical properties. When subjected to accelerated aging in either air or hydraulic oil which conforms to MIL-PRF-5606, the tensile strength, elongation, and hardness characteristics of material shall not change more than the values indicated in table I.

TABLE I Seat material physical properties.

PROPERTY	CHANGE INCREASE (MAX)	PERCENT DECREASE (MAX)
Tensile strength	-	20
Elongation	-	30
Hardness shore durometer	10	10

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3.3.4 Finish. Finish shall be as specified in MS20813. The swivel seat need not be finished.

3.3.5 Assembly. The bonded valve seat assembly shall swivel freely in the housing after assembly, but shall not fall out during normal service handling or usage.

3.4 Proof and burst pressures. Caps shall withstand a proof pressure of 10,000 psi and a burst pressure of 20,000 psi.

3.5 Pull-up. The caps shall withstand 30 pull-ups at a wrench torque of 50 inch-pounds. Ten of these pull-ups shall be after the caps have been exposed a minimum of 72 hours to a temperature of -65°F (-54°C).

3.6 Impulse. During the impulse test there shall be no leakage in excess of 1 drop per 10,000 cycles at room temperature or 1 drop per 1,000 cycles at -65°F (-54°C).

3.7 Leakage. The cap shall not leak or malfunction in any manner at all operating conditions up to the design operating pressure of 5,000 psi at a wrench tightening torque of 15 to 50 inches-pound when seated on an MS28889 valve stem.

3.8 Identification of product. Each cap shall be permanently marked for identification with the part number and the manufacturer's name, symbol, or trade-mark in accordance with MIL-STD-130. This marking shall be placed in the recessed diameter as shown on MS20813.

3.9 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

#### 4. VERIFICATION

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

- a. Qualification inspection (see 4.3).
- b. Conformance inspection (see 4.5).

4.2 Inspection conditions. Unless otherwise specified, all tests required by this specification shall be made at an atmospheric pressure of approximately 29.92 inches of Hg and a temperature of 77 °F. When tests are made with ambient pressure or temperature substantially different from the above values, proper allowance shall be made for the difference from the specified conditions.

4.2.1 Sampling instructions. Qualification test samples shall consist of 12 caps, 144 square inches of 0.125 inch thick platen press sheets of the seat material compounded as in the production seat and given an equivalent cure, and detail and assembly drawings. Identify samples as required.

4.2.2 Preparation of valve caps for qualification inspection. Three caps to be subjected to qualification tests shall be air-aged in a Geer oven, or equivalent, at 158°+2°F (70°+1°C) for 7 days, and a second group of 3 shall be aged in hydraulic fluid conforming to MIL-PRF-5606, held at a temperature of 158°+2°F (70°+1°C) in a closed container or reflux condenser for 7 days.

4.3 Qualification inspections. The qualification tests of the caps shall consist of all the tests specified under Conformance inspections and, in addition, the following tests:

4.3.1 Seat material. The seat material shall be tested in accordance with MIL-R-6855.

4.3.2 Burst pressure. The caps, when seated on a body conforming to MS28889, shall withstand a burst pressure up to 20,000 psi, without failure, distortion, or evidence of leakage in any manner.

4.3.3 Pull-up. Three new caps and the 3 caps aged in air and hydraulic oil, shall be assembled and disassembled on an MS28889 valve at least 30 times at a wrench torque of 50 inch-pounds minimum. Each assembly and disassembly shall consist of a complete tightening to the specified torque and then loosened until the seat has ceased making contact with the valve body.

4.3.3.1 Cold-soak pull-up. At least 10 of these pull-ups shall be made at a temperature not warmer than -65°F (-54°C) after the caps have been exposed to this temperature for a minimum of 72 hours. During this cold-soaking period, the caps shall not be tightened on the bodies.

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4.3.4 Impulse. The same caps as used in the pull-up test shall be installed on an MS28889 valve and impulse cycled from 0 to 1,500 psi pressure at the pace of 25 +10 cycles per minute for 50,000 impulses minimum. The impulsing medium shall be hydraulic oil conforming to MIL-PRF-5606. At least 5,000 of these impulses shall be made with the impulsing medium and the caps at a temperature not warmer than -65°F (-54° C). The caps shall be held at this temperature for 72 hours prior to the start of the -65°F (-54° C) impulse cycles. Leakage shall not exceed the values specified (see 3.6).

4.3.5 Leakage. The caps used on the impulse test specified (see 4.3.4) shall be loosened and retightened on MS28889 valves with 15 to 20 inch-pound torque. The caps shall be tested for 1 hour at 10 psi and for 1 hour at 5,000 psi. No leakage shall occur during the 1 hour test periods.

4.3.5.1 Caps. The caps, still on the bodies at the same torque, shall be chilled to at least -65°F (-54°C) for 24 hours while maintaining air pressure of not less than 1,000 psi in the inside of the caps. No leakage shall occur.

4.3.5.2 Leakage check. Leakage may be checked by immersion under water or other transparent liquid or by securely fastening a deflated rubber bag on the valve body in such a manner that all leakage from the cap would be trapped in the bag.

4.4 Examination after test. After completion of the tests enumerated herein, all the caps shall be examined for deterioration and failure. There shall be no separation of the seat from the swivel seat plate, and the swivel shall not be tightly jammed into the housing. There shall be no evidence of excessive wear or deterioration, such as flaking, cracking, or cutting of the seat material. A compression set of the seat in the form of a circular groove at the contact point of the seat on the MS28889 stem, and a slight roughening of the seat material, shall not be interpreted as excessive wear or deterioration.

4.5 Conformance inspections. The conformance inspections shall consist of individual tests and sampling tests.

4.5.1 Individual tests. Each cap shall be subjected to the following test:

4.5.1.1 Examination of product. Each cap shall be carefully examined to determine conformance with this specification with respect to dimensions, finish, material, and workmanship.

4.5.2 Sampling tests. The caps shall be sampled in accordance with ANSI/ASQ Z1.4 at the normal inspection level, unless other wise specified in the acquisition document (see 6.2), and subjected to the proof pressure test as specified (see 4.5.2.1). In addition, these caps shall be subjected to any of the tests described under qualification tests which the inspector considers necessary to determine conformance with the requirements of this specification.

4.5.2.1 Proof pressure. The caps seated on a body conforming to MS28889 shall be subjected to a proof pressure of up to 10,000 psi without failure, distortion, or evidence of leakage in any manner.

4.5.3 Rejection and retest. When an item selected from a production run fails to meet the specification, no items still on hand or later produced shall be accepted until the extent and cause of failure have been determined and appropriately corrected. The contractor shall explain to the Government representative the cause of failure and the action taken to preclude recurrence. After correction, all of the tests shall be repeated.

4.5.3.1 Individual tests may continue. For production reasons, individual tests or other sampling plans may be continued pending the investigation of a sampling test failure. But final acceptance of the items on hand or items produced later shall not be made until it is determined that all items meet all the requirements of the specification.

4.6 Retention of qualification. Each vendor listed on the Qualified Products List (QPL) shall be required to certify their product on DD form 1718 every 2 years. Contractor shall repeat the qualification requirements specified (see 4.3) under the following circumstances:

- a. Contractor has not manufactured the item for a period in excess of ten years,
- b. Contractor has relocated the facility in which the items were manufactured.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military service's system commands. Packaging data retrieval is available from the managing Military Department' or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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## 6. NOTES

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

6.1 Intended use. The caps covered by this specification are for use in connection with high-pressure air valves as used in hydraulic accumulators, shock struts, etc.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification.
- b. Issue of the DoDISS to be cited in the solicitation, and if required, the specific issue of the individual documents referenced (see 2.2).
- c. If the inspection level for sampling is different than normal (i.e., tightened or reduced) (see 4.5.2).
- d. Packaging requirements (see 5.1).

6.3 Subject term (key word) listing.

Accumulator  
Burst pressure  
Filler stem  
Hydraulic accumulator  
Proof pressure  
Shock struts

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Products List QPL 5500 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, 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 purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from OC-ALC/ENEP, 3001 Staff Drive, Suite 2AG-68A, Tinker AFB, OK 73145-3036 or emailed to [ocalc.enrs.sma@tinker.af.mil](mailto:ocalc.enrs.sma@tinker.af.mil).

6.5 International standardization agreement implementation. This specification implements international standardization agreement ABC 17/6C and STANAG 3209. When amendment, revision, or cancellation of this specification is proposed, the preparing activity must coordinate the action with the U.S. National Point of Contact for the international standardization agreement, as identified in the ASSIST database at <http://assist.daps.dla.mil>

6.6 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:  
Air Force - 71  
Army - AV  
Navy - AS  
DLA - GS

Preparing activity:  
Air Force - 71  
  
(Project 1650-2007-007)

Review Activities:  
Air Force - 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organization and responsibilities can change, you should verify the currency of the information above using the ASSIST database at <http://assist.daps.dla.mil>