

INCH-POUND

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SUPERSEDING
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DETAIL SPECIFICATION

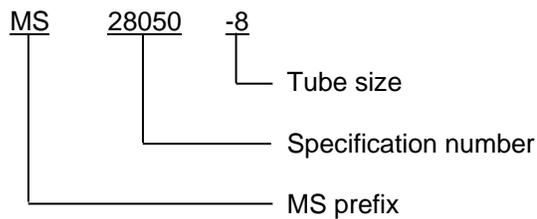
VALVE, CHECK; VACUUM AND PRESSURE SYSTEM

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

1. SCOPE

1.1 Scope. This specification covers one type of valve, check; vacuum and pressure system.

1.2 Part or Identifying Number (PIN). The PIN consists of the prefix MS, specification number and a dash number for tubing size.



PIN example MS28050-8 specifies a check valve .500 (12.10 mm) tube size.

Comments, suggestions, or questions on this document should be addressed to: DLA Land and Maritime, Attn: VAI, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to FluidFlow@dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.

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-S-7742 - Screw - Threads; Standard, Optimum, Selected Series, General Specification For
MS28050 - Valve, Check, Low Pressure, Internal Threads

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-130 - Identification Marking of U.S. Military Property
MIL-STD-889 - Metals, Definition of Dissimilar

(Copies of these documents are available online at <http://quicksearch.dla.mil>.)

2.3 Non-Government publications. The following documents 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.

AEROSPACE INDUSTRIES ASSOCIATION (AIA)

NAS847 - Caps and Plugs, Protective, Dust and Moisture Seal

(Copies of these documents are available online at <http://www.aia-aerospace.org> or from the Aerospace Industries Association, 1000 Wilson Boulevard, Suite 1700, Arlington, VA 22209-3928, Tel: 703-358-1000.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 First article. When specified (see 6.1), samples shall be subjected to first article inspection in accordance with 4.3.

3.1.1 Recycled, recovered, environmentally preferable or biobased materials. Recycled, recovered, environmentally preferable, or biobased 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.

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3.1.2 Hazardous substances. The use of hazardous substances, toxic chemicals, or ozone depleting chemicals shall be avoided, whenever feasible.

3.2 Materials. Materials shall conform to applicable specifications and shall be as specified herein and on applicable drawings. Materials which are not covered by specifications, or which are not specifically described herein, shall be of the best quality, of the lightest practicable weight, and suitable for the purpose intended.

3.2.1 Metal parts. All metal parts shall be of corrosion resistant material or treated in a manner to render them adequately resistant to corrosion. The use of magnesium or its alloys is prohibited.

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

3.2.2 Nonmagnetic materials. Nonmagnetic materials shall be used for all parts of the valve except where magnetic materials are essential.

3.2.3 Protective treatment. When materials are used in the construction of the check valve that are subject to deterioration when exposed to environmental conditions likely to occur during service usage, they shall be protected against such deterioration in a manner that will in no way prevent compliance with the performance requirements of this specification. Protective coating which might crack, chip or scale during normal service life or under extremes of environmental conditions shall not be used.

3.3 Design and construction. The design and construction of the check valve shall be in accordance with MS28050 with the applicable drawings specified in the contract or order (see 6.2).

3.3.1 Flapper hinge. The flapper hinge shall be provided with a spring having sufficient force to return the flapper to its closed position, when the valve is held in any position with no air flow.

3.3.2 Threads. Only Class 3 straight threads conforming to specification MIL-S-7742 shall be used.

3.3.3 Locking. The screws and nuts used in assembling the check valve shall be locked in place; lock washers shall not be used.

3.4 Performance. The check valve shall meet the performance requirements of this specification and shall show no damage after being subjected to the first article inspections in 4.3.

3.4.1 Deterioration. The check valve shall be immersed in tap water (see 4.8.2.1) and kerosene (see 4.8.2.2). After the test, there shall be no evidence of deleterious effects to any part of the check valve.

3.4.2 Durability. The check valve shall be designed so that no parts will work loose in service. It shall be built to withstand the strains, jars, vibrations, and such other conditions as are incidental to shipping, storage, installation, and service.

3.4.3 Pressure drop. When tested in accordance with 4.8.4 the pressure drop of the check valve shall not exceed the applicable maximum permissible pressure drop specified in table I.

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TABLE I. Performance tolerances.

Size of valve		Rating ^{1/} maximum air flow	Maximum permissible pressure drop	Maximum permissible leakage rate
Dash no.	Tube OD	cfm of free air under standard sea level conditions	Inches water	cfm of free air under standard sea level conditions
-4	1/4	0.50	3.75	0.10
-6	3/8	2.00	3.75	0.10
-8	1/2	5.00	3.75	0.10
-10	5/8	10.00	4.25	0.10
-16	1	20.00	4.25	0.10

^{1/} Rating is based on air-flow which produces a pressure drop of 0.10 inch of mercury in 1 foot of length of tubing size OD (see MS28050) by 0.035 inch wall thickness.

3.4.4 Leakage. The inlet port and outlet port when tested in accordance with 4.8.5 shall meet the requirements of 3.4.4.1 and 3.4.4.2 respectively.

3.4.4.1 Inlet port. The leakage rate shall not exceed the applicable specified maximum permissible leakage rate in Table I. The flapper shall close under a differential pressure of 24 inches of water.

3.4.4.2 Outlet port. The change in manometer level shall not exceed 0.20 inches of mercury in 10 seconds.

3.4.5 Magnetic effect. When tested in accordance with 4.8.6 the deflection shall not exceed 5 degrees.

3.5 Interchangeability. All parts having the same manufacturers PIN shall be functionally and dimensionally interchangeable.

3.6 Weight. The weight of the check valve shall not exceed the values specified on MS28050.

3.7 Markings. Markings shall be durable to withstand usage encountered in service.

3.7.1 Identification of product. The check valve shall be marked for identification in accordance with MIL-STD-130.

3.7.2 Check valve flow indicator. Direction of flow shall be indicated by arrows in two places approximately 180 degrees apart as shown in the drawings.

3.8 Pre-packaging. Immediately after cleaning the check valve, end fittings on both ends of the valve, shall be plugged with plugs in accordance with NAS847.

3.9 Workmanship. The check valve shall be uniform in quality and shall be free from irregularities, defects or foreign matter which could adversely affect safety, performance, reliability, or durability.

4. VERIFICATION

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

- a. First article inspection (see 4.3).
- b. Conformance inspection (see 4.5).

4.2 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in accordance with the applicable test method referenced in the test procedures.

4.2.1 Responsibility for compliance. All items shall meet all requirements of sections 3, 4, 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 ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2.2 Lot records. Manufacturers shall keep lot records for 3 years minimum. Manufacturers shall monitor for compliance to the prescribed procedures, and observe that satisfactory manufacturing conditions and records on lots are maintained for these check valves. The records, including as a minimum, an attributes summary of all quality conformance inspections conducted on each lot, shall be available to review by government at all times.

4.3 First article. First article inspection shall be performed at a laboratory acceptable to the Government on sample units produced with equipment and procedures used in production.

4.3.1 Samples for first article. Samples for first article shall be representative of the products proposed to be furnished to this specification. Sampling for check valves shall be in accordance with 4.4.1

4.3.2 First article inspection routine. The samples shall be subjected to the first article inspections specified in table II sequence is manufacturer's discretion.

TABLE II. First article inspection.

Inspection	Requirement	Test paragraph
Visual	3.3, 3.7, 3.8, and 3.9	4.8.1
Weight	3.6	
Deterioration	3.4.1	4.8.2
Water	3.4.1	4.8.2.1
Kerosene	3.4.1	4.8.2.2
Durability	3.4.2	4.8.3
Pressure Drop	3.4.3	4.8.4
Leakage	3.4.4	4.8.2
Magnetic Effect	3.4.5	4.8.6

4.3.3 Acceptance of first article inspection. A first article test cannot be waived by DLA unless the contractor has delivered the same item within the last three years, has no unfavorable quality history, and has not proposed changes to the processes or changed any subcontractors. DLA will not accept first article test results outside the stated requirements. All waivers or deviations shall be approved by the preparing activity; DLA Land and Maritime, Columbus, Attn: VAI, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to FluidFlow@dla.mil.

4.3.4 Failures. All samples must meet all of the contract requirements. Failure of a sample unit to pass any test shall be cause for rejection of the entire lot and to deny granting first article approval.

4.3.5 First article production samples. Unless otherwise specified, after award of the contract or order, the manufacturer shall forward the required number of check valves, selected randomly from a lot. The samples shall be representative of the construction, workmanship, components, and materials to be used during production. When a manufacturer is in continuous production of check valves from one contract to another, submission of additional first article samples for a new contract may be waived at the discretion of the acquiring activity (see 6.2).

4.3.5.1 Delivery of samples for inspection. First article samples shall be furnished to the Government as directed by the contracting officer (see 6.2).

4.3.6 Waivers or deviations to specification requirements. All waivers or deviations to specification requirements shall be coordinated through the preparing activity; DLA Land and Maritime, Attn: VAI, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to Fluidflow@dla.mil.

4.4 Inspection lot sampling.

4.4.1 Lot and sample. The inspection lot shall be selected at random from the production lot, without regard to quality and shall be the sample size as specified in table III.

4.4.1.1 Inspection lot. All check valves of the same size offered for delivery at one time shall be considered a lot for purposes of inspection.

TABLE III. Lot and sample size.

Production lot size	Sample size
1 to 20	2
21 to 50	5
51 to 100	10
101 to 500	15

4.5 Conformance inspection. For manufacturers that have successfully passed first article inspections and are continuously producing check valves to this specification, on going inspections shall consist of individual inspections (see 4.5.1) and periodic inspections (see 4.5.3). If first article is waived due to prior successful first article inspection, the individual inspections and periodic inspections shall be the manufactures in house inspection procedures.

4.5.1 Individual inspection. Individual inspection shall consist of the inspections specified in table IV. Individual inspections shall be implemented on a continual basis throughout the production of check valves.

TABLE IV. Individual inspections.

Inspection	Requirement	Test paragraph
Examination	3.3 , 3.7 , 3.8 , and 3.9	4.8.1
Leakage	3.4.4	4.8.5

4.5.2 Sampling inspection. A random sample shall be selected from each inspection lot in accordance with [table III](#), and shall be subject to the tests in [table IV](#). If a sample fails to pass any of these tests, the lot represented by that sample shall be rejected. The tests shall be performed in the order listed. The valves should be examined after each test for signs of deterioration or impending failures.

4.5.3 Periodic inspections. Every 3 years periodic inspections shall consist of the inspections specified in [table I](#) and shall be made on test samples which have been subjected to and passed the individual inspections (see [table IV](#)).

4.6 Test condition. Unless otherwise specified, tests shall be conducted at ambient temperature of 77 ± 18°F and at an ambient barometric pressure of 28 to 32 inches of mercury.

4.6.1 Failures. All samples shall meet all of the contract requirements. Failure of a sample unit to pass any test shall be cause for rejection of the entire lot and to grant first article approval see [4.3.4](#).

4.6.2 Disposition of samples. First article samples shall be furnished to the Government as directed by the contracting officer (see [6.2](#)).

4.7 Non conformance. In the event a failure should occur, then the production lot shall be screened for that particular defect and defects to be removed. An inspection lot shall be selected from the production lot and all sampling and tests shall be performed. If one or more defects are found in the second inspection lot, the production lot shall be rejected and shall not be supplied to this specification. Test data of part performance shall be made available to the contracting agency upon request.

4.8 Inspection methods.

4.8.1 Examination. The check valve shall be thoroughly examined to determine conformance with this specification and applicable drawings with respect to all the requirements not covered by tests.

4.8.2 Deterioration (see [3.4.1](#)). The check valve shall be immersed in tap water (see [4.8.2.1](#)) and kerosene (see [4.8.2.2](#)). After the test there the check valve shall meet the requirements of [3.4.1](#).

4.8.2.1 Water deterioration (see [3.4.1](#)). The check valve shall be immersed in tap water for a 12 hour period. All internal parts of the check valve shall be in contact with the fluid during the immersion. After the test there the check valve shall meet the requirements of [3.4.1](#).

4.8.2.2 Kerosene deterioration (see [3.4.1](#)). The check valve shall be immersed in commercial kerosene for a 12 hour period. All internal parts of the check valve shall be in contact with the fluid during the immersion. After the test the check valve shall meet the requirements of [3.4.1](#).

4.8.3 Durability. The valve shall be opened and closed 2000 times. After the test there shall be no evidence of malfunction, mechanical failure or deformation.

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4.8.4 Pressure drop (see 3.4.3). The check valve shall be tested for pressure drop with its axis in a horizontal position and again with its axis in a vertical position, with the inlet port down. The pressure drop through the check valve shall be determined at the applicable maximum air flow specified in table I. The pressure drop shall meet the requirements of 3.4.3.

4.8.5 Leakage.

4.8.5.1 Inlet port (see 3.4.4.1). The check valve shall be tested for leakage with a vacuum applied to the inlet port in such a way as to hold the flapper closed. The pressure required to close the flapper shall be noted. The leakage rate shall be determined with a suitable air-flow meter connected between the outlet port and the atmosphere to measure the air-flow into the valve. The leakage rate and flapper closing shall meet the requirements 3.4.4.1.

4.8.5.2 Outlet port (see 3.4.4.2). The valve shall be tested for leakage with a vacuum applied to the outlet port and with the inlet port plugged. A vacuum of 10 inches of mercury shall be applied to the outlet port and then pinched off. The change in manometer level shall meet the requirements of 3.4.4.2.

4.8.6 Magnetic effect (see 3.4.5). The magnetic property of the valve shall be determined in terms of the deflection of a free magnet, the following details shall apply:

- a. The free magnet approximately 1.5 inches long shall have a magnetic field with a horizontal intensity of 0.18 Gauss.
- b. The valve shall be held magnetically east or west of and 5 inches from the center of the magnet.
- c. The deflection of the compass shall be noted.
- d. The deflection shall meet the requirements of 3.4.5.

NOTE: An aircraft compass with compensating magnets removed therefrom may be used as the free magnet for this test.

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's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. The valves covered by this specification are intended for use in vacuum and pressure systems to limit the air-flow to only one direction. The valves are for use with air, coolants, and non-potable water at pressures not exceeding 50 psi (3.45 bar).

6.1.1 Military unique rational. The valves are required to meet the magnetic requirements of this specification; commercial valves have no magnetic requirements.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. PIN see 1.2.
- c. Quantity required.
- d. Whether first article inspection is waived (see 4.3.3).
- e. Lot records if required (4.2.2).
- f. Name and address of the first article inspection test facility to which first article test samples (if required) are to be forwarded (see 4.3) and the name and address of the Government activity responsible for conducting the first article inspection program (see 4.3. and 6.3).
- g. Name and address of the facility to have first article production sample(s) sent, see 4.3.6. specify quantity and type of samples.
- h. Packaging requirements (see 5.1).

6.3 First article. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first article samples. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 Environmentally preferable material. Environmentally preferable materials should be used to the maximum extent possible to meet the requirements of this specification. As of the dating of this document, the U.S. Environmental Protection Agency (EPA) is focusing efforts on reducing 31 priority chemicals. The list of chemicals and additional information is available on their website <http://www.epa.gov/osw/hazard/wastemin/priority.htm>. Included in the EPA list of 31 priority chemicals are cadmium, lead, and mercury. Use of these materials should be minimized or eliminated unless needed to meet the requirements specified herein (see Section 3).

6.5 Subject term (key word) listing.

Air
Coolants
Directional
Non-magnetic
Non-potable water

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 extent of the changes.

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CONCLUDING MATERIAL

Custodians:

Navy - AS
Air Force - 99
DLA - CC

Preparing Activity:
DLA - CC

(Project 4820-2014-013)

Review activities:

Navy - MC, SA
Air Force - 70, 71

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