

INCH - POUND

MIL-V-16556E(SH)

29 March 1988

SUPERSEDING

MIL-V-16556D(SHIPS)

1 May 1973

(See 6.7)

MILITARY SPECIFICATION

VALVE, SOLENOID, THREE-WAY BYPASS (NAVAL SHIPBOARD USE)

This specification is approved for use within the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers three-way bypass valves, solenoid operated, for use as salinity actuated dump valves.

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.

SPECIFICATIONS

FEDERAL

- QQ-N-281 - Nickel-Copper Alloy Bar, Rod, Plate, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sections.
- MIL-S-901 - Shock Tests, H.I. (High Impact); Shipboard Machinery, Equipment and Systems, Requirements for.
- MIL-E-917 - Electric Power Equipment, Basic Requirements (Naval Shipboard Use).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362-5101 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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- MIL-S-1222 - Studs, Bolts, Hex Cap Screws, Socket Head Cap Screw and Nuts.
- MIL-E-2036 - Enclosures for Electric and Electronic Equipment, Naval Shipboard.
- MIL-S-8805 - Switches and Switch Assemblies, Sensitive and Push (Snap Action), General Specification for
- MIL-S-8805/1 - Switches, Sensitive, SPDT, Unsealed.
- MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Provisioned Items (Repair Parts): Packaging of.
- MIL-F-20042 - Flanges, Pipe and Bulkhead, Bronze (Silver Brazing).
- MIL-G-22050 - Gasket and Packing Material, Rubber, for Use with Polar Fluids, Steam, and Air at Moderately High Temperatures.
- MIL-C-24643 - Cable and Cord, Electrical, Low Smoke, for Shipboard Use, General Specification for.
- MIL-C-24643/15 - Cable, Electrical, 1000 Volts, Type LSDSGU (Including Variation LSDSGA).

STANDARDS

FEDERAL

- FED-STD-H28 - Screw-Thread Standards for Federal Services.

MILITARY

- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).
- MIL-STD-278 - Welding and Casting Standard.
- MIL-STD-798 - Nondestructive Testing, Welding, Quality Control, Material Control and Identification and HI-Shock Test Requirements for Piping System Components for Naval Shipboard Use.

(Copies of specifications and standards 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 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- A 125 - Standard Specification for Steel Springs, Helical, Heat Treated,
- A 313 - Standard Specification for Chromium-Nickel Stainless and Heat-Resisting Steel Spring Wire. (DoD adopted)
- B 21 - Standard Specification for Naval Brass Rod, Bar, and Shapes. (DoD adopted)
- B 61 - Standard Specification for Steam or Valve Bronze Castings. (DoD adopted)
- B 62 - Standard Specification for Composition Bronze or Ounce Metal Castings. (DoD adopted)
- B 127 - Standard Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip. (DoD adopted)
- B 164 - Standard Specification for Nickel-Copper Alloy Rod, Bar, and Wire. (DoD adopted)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Nongovernment 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.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.2 and 6.3).

3.2 Materials. Materials used in the construction of the valve shall be as shown in table I. Where no material is specified for a particular application, the material used shall be of the quality best suited for the purpose intended.

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TABLE I. Materials.

Part	Material	Applicable document
Body	Valve bronze	ASTM B 61
Disc	Nickel-copper-alloy	ASTM B 127; QQ-N-281
Seat rings	Nickel-copper-alloy	ASTM B 127; QQ-N-281
Stem	Nickel-copper-alloy	ASTM B 164; QQ-N-281
Bonnet	Valve bronze	ASTM B 61; ASTM B 62
Yoke	Valve bronze or steel	ASTM B 61; AISI C1018 or C1020
Lever	Valve bronze or steel	ASTM B 61; AISI C1018 or C1020
Bolts and nuts <u>1/</u>	Naval brass	ASTM B 21, copper alloy No. C46400, half-hard
Springs	Spring steel, cadmium or electroplated zinc coated	ASTM A 125; ASTM A 313
Solenoid and switches	See 3.3.2 and 3.3.3	

1/ Manufactured and tested in accordance with MIL-S-1222.

3.3 Construction. The valve shall be a three-way valve, arranged to allow flow from the outlet when the solenoid is energized via a relay from the salinity indicating system, and to be shifted by spring action into the dump position when the solenoid is de-energized. The valve shall be provided with a switch mechanically operated by the linkage connected to the valve stem which will open the solenoid circuit upon solenoid de-energization, and which can only be closed when the valve is manually shifted to the outlet position. The valve shall be so constructed that it must be repositioned manually to allow flow to the outlet and that it may be tripped manually to the dump position. An additional switch shall be connected to the linkage in such a way that it will close a circuit to a signal light to indicate when the valve is in the dump position. The signal light shall not be a part of the valve. The complete valve shall be of the lightest and most compact construction consistent with reliability. The valve shall be constructed for 50 pounds per square inch (lb/in²) working pressure (see 4.2).

3.3.1 Valve.

3.3.1.1 Ports. The inlet, outlet, and the dump port shall be flanged in accordance with MIL-F-20042, 150-pound class.

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3.3.1.2 Bonnet. The valve bonnet shall be bolted to the body.

3.3.1.3 Disc. The valve disc shall be guided and positively secured to the valve stem, but in such a manner as to permit replacement.

3.3.1.4 Seats. The valve seats shall be renewable. The valve disc or seat shall be provided with a resilient insert for seating (see 4.2.2 and 4.2.3). The resilient material shall be in accordance with MIL-G-22050.

3.3.1.5 Stuffing box. A stuffing box shall be provided, packed with acceptable packing. Stuffing box shall be provided with glands, and shall be so constructed as to prevent excessive bending on stem. Glands of valves 2 inches and below may have gland nuts; those 2-1/2 inches and above shall be of the bolted type.

3.3.2 Solenoid. The electric equipment shall conform to MIL-E-917 and shall be suitable for an ambient temperature of 40 degrees Celsius (°C). The noise level (hum) shall be kept to a minimum by using shading coils and accurate and small clearances between moving parts. The solenoid shall be provided with dripproof covers in accordance with MIL-E-2036, and shall be arranged for entrance of cable conforming to type LSDSGU of MIL-C-24643 and MIL-C-24643/15.

3.3.3 Switches. The switches shall be in accordance with MIL-S-8805 and MIL-S-8805/1, and shall be mounted in a watertight enclosure in accordance with MIL-E-2036, arranged for entry of cable conforming to type LSDSGU of MIL-C-24643 and MIL-C-24643/15.

3.3.4 Power. Electric equipment shall operate from a normal 115-volt, 60 hertz (Hz), single-phase power source.

3.3.5 Threaded parts. Threaded parts shall conform to FED-STD-H28. The construction shall be such that standard wrenches can be used throughout.

3.3.6 Welding and allied processes. Welding and allied processes shall be in accordance with MIL-STD-278.

3.3.7 Shock. Valves shall pass the requirements of high-impact shock tests in accordance with MIL-S-901 and MIL-STD-798. Equipment and test classification shall be grade A, hull mounted, principal unit, complete assembly, class 1, type A.

3.3.8 Vibration. Valves shall pass the vibration requirements in accordance with MIL-STD-167-1.

3.3.9 Interchangeability. In no case shall parts be physically interchangeable or reversible unless such parts are also interchangeable or reversible with regard to function, performance, and strength.

3.4 Drawings. When specified in the contract or order, drawings shall be prepared (see 6.2.2 and the appendix).

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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 any 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.

4.1.2 Inspection system. When specified in the contract or order, an inspection system program plan shall be prepared (see 6.2.2).

4.2 First article inspection. First article inspection shall be conducted at a laboratory satisfactory to the Naval Sea Systems Command (NAVSEA). First article tests shall consist of the examination of 4.2.1 and the tests specified in 4.2.2 through 4.2.5.

4.2.1 Examination. The various materials and parts of the components of each of the complete bypass valves shall be subjected to an examination to determine conformance with the various material specifications and with the requirements of this specification.

4.2.2 Operation. The valve shall be installed in a line supplied with wet saturated steam at a minimum of approximately 215 degrees Fahrenheit ($^{\circ}\text{F}$) (15.591 lb/in^2 absolute) and the solenoid shall be connected to a source of the specified electrical current and voltage (see 3.3.4). The valve shall be subjected to steam flow for approximately 6000 cycles of operation. During this period of operation the valve shall retain seat tightness in both of its operating positions. A test for seat tightness shall be conducted at intervals of approximately 1000 cycles and at the completion of the cyclic test in accordance with 4.2.5. The tripping mechanism and the electrical apparatus shall function as specified for the duration of the test.

4.2.3 Shock and vibration. Valves shall be shock and vibration tested in accordance with 3.3.7 and 3.3.8. Upon completion of shock and vibration tests, the valves shall be subjected to the tests specified in 4.2.4 and 4.2.5.

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4.2.4 Hydrostatic. The valve shall be subjected to a hydrostatic pressure of 100 lb/in gauge for strength and porosity. There shall be no visible leakage through any part of the valve body, the packing gland, or seats with the valve in either of its operating positions.

4.2.5 Seat tightness. Each valve shall be subjected to the leak tests specified in 4.2.5.1 through 4.2.5.3. Test duration shall be 5 minutes at each test condition. The valve assembly shall be vented prior to each test to ensure that no air is present. No leakage shall be observed with the valve seat visible during the duration of each test.

4.2.5.1 Latched position. The valve shall be tested in the latched position, inlet port pressurized to 5 lb/in² and the dump port at 0 lb/in².

4.2.5.2 Dump position. The valve shall be tested in the dump position, inlet port pressurized to 5 lb/in² and the outlet port at 0 lb/in².

4.2.5.3 Latched position. The valve shall be tested in the latched position, dump port pressurized to 15 lb/in² and the inlet port at 0 lb/in².

4.3 Production inspection. Each valve offered for delivery shall be subjected to the examination and test specified in 4.2.1, 4.2.4, and 4.2.5.

4.4 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the packaging requirements of referenced documents listed in section 2, see 6.5.)

5.1 Presentation, packing and marking. The equipment, accessories, technical manuals and repair parts shall be preserved and packed by level A, B, or C and marked as specified (see 6.2.1) in accordance with MIL-E-17555.

5.2 Use of polystyrene (loose-fill) material.

5.2.1 For domestic shipment and early equipment installation and level C packaging and packing. Unless otherwise specified (see 6.2.1), use of polystyrene (loose-fill) material for domestic shipment and early equipment installation and level C packaging and packing applications such as cushioning, filler and dunnage is prohibited. When approved, unit packages and containers (interior and exterior) shall be marked and labeled as follows:

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"CAUTION

Contents cushioned etc. with polystyrene (loose-fill) material.
 Not to be taken on board ship.
 Remove and discard loose-fill material before shipboard storage.
 If required, recushion with cellulosic material bound fiber,
 fiberboard or transparent flexible cellular material."

5.2.2 For level A packaging and level A and B packing. Use of polystyrene (loose-fill) material is prohibited for level A packaging and level A and B packing applications such as cushioning, filler and dunnage.

6. NOTES

6.1 Intended use. The valves covered by this specification are intended for use as salinity actuated dump valves.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) When first article is required (see 3.1).
- (c) Selection of applicable levels for presentation, packing, and marking (see 5.1).
- (d) When polystyrene "loose-fill" material is approved (see 5.2.1).

6.2.2 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD FAR Supplement, Part 27, Sub-Part 27.475-1 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification are cited in the following paragraphs.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
3.4 and appendix	Drawings, engineering and associated lists	DI-E-7031	----
4.1.2	Inspection system program plan	DI-R-4803	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5010.12-L. , AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

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6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 First article. When a first article inspection is required, the items should be a first article sample. The first article should be as specified herein. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results and disposition of first articles. 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 Provisioning. Provisioning Technical Documentation (PTD), spare parts, and repair parts should be furnished as specified in the contract.

6.4.1 When ordering spare parts or repair parts for the equipment covered by this specification, the contract should state that such spare parts and repair parts should meet the same requirements and quality assurance provisions as the parts used in the manufacture of the equipment. Packaging for such parts should also be specified.

6.5 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.6 Subject term (key word) listing.

Dump port
Salinity indicating system
Seat tightness
Three-way valve

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

Preparing activity:
Navy - SH
(Project 4810-N077)

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APPENDIX

DRAWING TECHNICAL CONTENT REQUIREMENTS

10. SCOPE

10.1 Scope. This appendix covers the technical requirements that should be included on drawings when required by the contract or order. This appendix is mandatory only when the appropriate data item description is cited on the DD Form 1423.

20. APPLICABLE DOCUMENTS

20.1 Government documents.

20.1.1 Specification and standard. The following specification and standard forms 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.

SPECIFICATION

MILITARY

DOD-D-1000 - Drawings, Engineering and Associated Lists.

STANDARD

MILITARY

DOD-STD-100 - Engineering Drawing Practices.

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

30. DRAWINGS

30.1 Drawings. When required by the contract or order, drawings shall contain the following information.

30.1.1 Drawings shall be furnished in accordance with level A of DOD-D-1000.

30.1.1.1 Types of drawings. In lieu of the drawings listed in DOD-STD-100, the drawings specified in 30.1.1.2 through 30.1.1.4 shall be provided.

30.1.1.2 An external arrangement drawing called "outline drawing" shall be furnished. This drawing shall show necessary external views of the valve, shall include external dimensions required for reproduction on ship's machinery arrangement drawings and for guidance of the shipyard in installation thereof. The drawing shall show the space required for removal and replacement of parts which can be replaced without removal of the valve from the piping.

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30.1.1.3 A drawing showing complete sectional views of the valve which shall be called "assembly drawing". This drawing shall show the relationship of all parts and shall be such that a thorough understanding of the design and construction of the valve may be obtained without reference to related detail drawings.

30.1.1.3.1 The "assembly drawing" shall contain a list of materials showing the names of parts with identifying numbers and materials thereof. The identifying numbers shall also be shown adjacent to the parts depicted in the various views, with arrows pointing to the parts.

30.1.1.4 Detail drawings shall contain drawings of all parts, completely dimensioned, with finishes and welding symbols indicated, as required for manufacture.

30.1.1.5 It is the intent that the drawings provide sufficient information to enable:

- (a) Evaluation of the design to assure conformance with the requirements of this specification and compatibility with the ship and ship's systems.
- (b) Evaluation of the suitability of the design for Naval use.
- (c) Evaluation of performance and maintenance capability.
- (d) Shipboard installation without contractor's assistance.
- (e) Naval ship and shore activities to repair and maintain the valve.

INSTRUCTIONS: In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

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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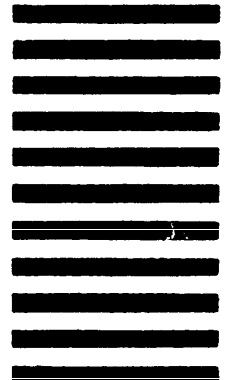
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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions - Reverse Side)

1. DOCUMENT NUMBER MIL-V-16556E(SH)		2. DOCUMENT TITLE VALVE, SOLENOID, THREE-WAY BYPASS (NAVAL SHIPBOARD USE)	
3a. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify) _____	
b. ADDRESS (Street, City, State, ZIP Code)			
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)	