

MIL-V-20064E
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SUPERSEDING
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(See 6.4)

MILITARY SPECIFICATION

VALVE, NONFERROUS, FOR USE WITH HALOGENATED REFRIGERANTS

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

1. SCOPE

1.1 Scope. This specification covers manually operated valves for use with halogenated refrigerants.

1.2 Classification. Valves shall be of the following types and classes, as specified (see 6.1):

Type I - Diaphragm, nonback seating, packless.

Class 1 - Shut-off service, angle, brazed.

Class 2 - Shut-off service, straight, brazed.

Class 3 - Shut-off service, angle, brazed to flare.

Class 4 - Shut-off service, straight, flare.

Class 5 - Shut-off service, straight, three-way flare.

Class 6 - Throttling service, angle, brazed.

Class 7 - Throttling service, straight, brazed.

Class 8 - Charging, drain or purge, service, angle, brazed to flare.

Class 9 - Charging, drain or purge, service, straight, brazed to flare.

Type II - Packed, back seating.

Class 1 - Shut-off service, angle, brazed.

Class 2 - Shut-off service, straight, brazed.

Type III - Diaphragm, back seating, packless.

Class 1 - Shut-off service, angle, brazed.

Class 2 - Shut-off service, straight, brazed.

Class 3 - Shut-off service, angle, brazed to flare.

Class 4 - Shut-off service, straight, flare.

Class 5 - Shut-off service, straight, three-way flare.

Class 6 - Throttling service, angle, brazed.

Class 7 - Throttling service, straight, brazed.

Class 8 - Charging, drain or purge, service, angle, brazed to flare.

Class 9 - Charging, drain or purge, service, straight, brazed to flare.

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 the specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

QQ-B-613 - Brass, Leaded and Non-Leaded; Flat Products
(Plate, Bar, Sheet, and Strip).

QQ-B-626 - Brass, Leaded and Non-Leaded; Rod, Shapes,

Forgings, and Flat Products with Finished Edges
(Bar and Strip).

QQ-B-750 - Bronze, Phosphor; Bar, Plate, Rod, Sheet, Strip,
Flat Wire, and Structural and Special Shaped
Sections.

QQ-C-502 - Copper Rods and Shapes; and Flat Products with
Finished Edges (Flat Wire, Strips, and Bars).

QQ-N-281 - Nickel-Copper-Alloy Bar, Plate, Rod, Sheet, Strip,
Wire, Forgings, and Structural and Special Shaped
Sections.

QQ-S-763 - Steel Bars, Wire, Shapes, and Forgings,
Corrosion-Resisting.

MILITARY

MIL-V-3 - Valves, Fittings, and Flanges (Except for Systems
Indicated Herein); Packaging of.

MIL-S-901 - Shock Tests, H.I. (High-Impact); Shipboard
Machinery, Equipment and Systems, Requirements
for.

MIL-C-15726 - Copper-Nickel Alloy, Rod, Flat Products (Flat
Wire, Strip, Sheet, Bar, and Plate) and
Forgings.

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MIL-I-45208 - Inspection System Requirements.

(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.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

B62-63 - Composition Bronze or Ounce Metal Castings.

B98-66 - Copper-Silicon Alloy Rod, Bar and Shapes.

B124-66 - Copper and Copper-Alloy Forging Rod, Bar, and Shapes.

B145-63 - Leaded Red Brass and Leaded Semi-Red Brass Sand Castings.

D1170-62 - Nonmetallic Gasket Materials for General Automotive and Aeronautical Purposes.

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B16.22-63 - Wrought Copper and Bronze Solder-Joint Pressure Fittings.

B70.1-69 - Refrigeration Flare-Type Fittings.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.)

UNIFORM CLASSIFICATION COMMITTEE

Uniform Freight Classification Rules.

(Application for copies should be addressed to the Uniform Classification Committee, 202 Union Station, 516 West Jackson Boulevard, Chicago, Illinois 60606.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 First article sample. Unless otherwise specified (see 6.1) and within the time limit specified in the contract or order and prior to submission of any complete units for final acceptance the supplier shall furnish a first article sample for inspection (see 4.2) to determine conformance with this specification (see 6.3). Approval of the first article sample by the command or agency concerned shall not relieve the supplier of his obligation to supply equipment conforming to this specification. No changes or deviations from the first article sample will be acceptable without prior written approval from the contracting officer.

3.2 Material. All material used in the construction of the valves shall be as specified herein. Alternate materials will be considered in lieu of those specified, but their use will only be permitted after the command or agency concerned has been satisfied by test or other means that

the proposed substitutes fully meet the service requirements of this specification.

3.2.1 Bodies, bonnets or caps.

3.2.1.1 For types I and III valves, bodies, bonnets or caps up to and including 5/8 inch shall be constructed of forged brass in accordance with QQ-B-626, composition 21. Valves above 5/8 inch may be forged or cast brass. Cast valves shall be of brass in accordance with ASTM B-145, alloy 4A.

3.2.1.2 For type II valves, bodies, bonnets or caps shall be constructed of forged brass or cast bronze in accordance with QQ-B-626, QQ-B-750, ASTM B-124, alloy 2 or ASTM B-62, as applicable. Bonnets shall be of the flange type or such other types as may be determined suitable for Military use.

3.2.2 Handwheels. Types I and III valves shall be provided with either a fixed or removable handwheel, as specified (see 6.1), constructed of corrosion-resistant metal, a die cast alloy with a suitable protective finish or malleable iron with a suitable protective coating.

3.2.3 Protection against corrosion. In order to prevent deterioration due to corrosion, bolts, nuts, studs, pins, screws, and such other fastenings or fittings as may be required, shall be of corrosion-resisting steel, copper, brass, bronze, copper-nickel, copper-silicon or nickel-copper alloy in accordance with QQ-S-763, QQ-C-502, QQ-B-613, QQ-B-750, MIL-C-15726, ASTM B-98, alloy B and QQ-N-281, respectively.

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3.2.3.1 All internal parts of valves such as seats, disks, stems and springs that come in contact with the refrigerant shall be of a corrosion-resistant material. The treatment of ferrous material by plating is not considered satisfactory as a corrosion-resistant material for internal parts. Valve stems shall be of a material and hardness to prevent galling.

3.3 Sizes. Valves shall be of the sizes shown in table I and IV as specified (see 6.1).

Table III - Valve types I and III.

Valve size	End to end dimension								End to end dimension (run)		Center line of run to face of branch connection	
	Class 2		Class 4		Class 7		Class 9		Class 5		Class 5	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	2-5/8	2-25/32	2-5/8	2-25/32	2-5/8	2-25/32	2-5/8	2-25/32	2-3/4	3-3/8	1-3/8	1-9/16
3/8	2-5/8	2-25/32	2-5/8	2-25/32	2-5/8	2-25/32	2-5/8	2-25/32	2-3/4	3-7/16	1-3/8	1-11/16
1/2	3-1/8	3-11/16	3-1/8	3-1/2	2-5/8	3-11/16	3-1/4	3-1/2	3	3-23/32	1-3/4	1-7/8
5/8	3-1/2	4	3-5/8	4	3-3/8	4	3-5/8	3-7/8	3-3/8	3-7/8	1-5/16	2-3/16
7/8	4-3/8	4-13/16	-----	-----	4-7/16	4-1/2	-----	-----	-----	-----	-----	-----
1-1/8	5-3/16	5-15/16	-----	-----	4-3/8	4-15/16	-----	-----	-----	-----	-----	-----

NOTES:

1. All dimensions are in inches.
2. Tolerances are $\pm 1/32$.

Table II - Valve type II.

Vertical center line of valve to face of side connection		
Valve size	Class 1	
	Minimum	Maximum
7/8	1-13/16	2
1-1/8	2	2-11/32
1-3/8	2-3/8	2-23/32
1-5/8	2-17/32	3
2-1/8	3-3/16	3-5/8
2-5/8	3-19/32	4-5/16
3-1/8	4-1/16	4-5/8

NOTES:

1. All dimensions are in inches.
2. Tolerances are $\pm 1/32$.

Table III - Valve types I and III.

Valve size	End to end dimension								End to end dimension (run)		Center line of run to face of branch connection	
	Class 2		Class 4		Class 7		Class 9		Class 5		Class 5	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/4	2-5/8	2-25/32	2-5/8	2-25/32	2-5/8	2-25/32	2-5/8	2-25/32	2-3/4	3-3/8	1-3/8	1-9/16
3/8	2-5/8	2-25/32	2-5/8	2-25/32	2-5/8	2-25/32	2-5/8	2-25/32	2-3/4	3-7/16	1-3/8	1-11/16
1/2	3-1/8	3-11/16	3-1/8	3-1/2	2-5/8	3-11/16	3-1/4	3-1/2	3	3-23/32	1-3/4	1-7/8
5/8	3-1/2	4	3-5/8	4	3-3/8	4	3-5/8	3-7/8	3-3/8	3-7/8	1-5/16	2-3/16
7/8	4-3/8	4-13/16	-----	-----	4-7/16	4-1/2	-----	-----	-----	-----	-----	-----
1-1/8	5-3/16	5-15/16	-----	-----	4-3/8	4-15/16	-----	-----	-----	-----	-----	-----

NOTES:

1. All dimensions are in inches.
2. Tolerances are $\pm 1/32$.

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Table IV - Valve type II.

	End to end dimension	
Valve size	Class 2	
	Minimum	Maximum
7/8	4-1/4	4-3/4
1-1/8	4-7/8	5-3/16
1-3/8	5-1/4	6-7/16
1-5/8	6-1/2	6-3/4
2-1/8	8	8-1/2
2-5/8	9-5/8	11
3-1/8	11	12
3-5/8	12-3/4	14
4-1/8	14	15

NOTES:

1. All dimensions are in inches.
2. Tolerances are +/- 1/32.

3.4 Design. Valves shall be for use with halogenated refrigerants. The valves shall be designed for a maximum operating pressure of 300 pounds per square inch gage (psig). Types II and III valves shall be designed to withstand high shock and shall have successfully passed the high shock requirements in accordance with MIL-S-901. Valves shall be of such a design that the internal working parts may be removed for inspection, repair or replacement without the necessity of applying heat to the valve or breaking line connections. Where brazed joints are used for valve assembly, the brazing shall be done with silver solder or equally satisfactory material.

3.4.1 Valves shall be provided with rising stem to indicate an open or closed position and shall be arranged to close with a right hand (clockwise) motion of the handwheel or operating wrench when facing the end of the valve stem. Stem disks shall not rotate on the seat during closing or opening. The operating screw (upper stem) shall not rotate on the diaphragm during closing or opening. The operating screw (upper stem) and threaded valve bonnet shall be of materials having a sufficient difference in hardness to minimize thread galling. The operating screw (upper stem) shall back seat on the valve bonnet. The lower stem on type I valves may or may not back seat when the valve is completely open. The lower stem on type II valves shall back seat against the bonnet when the valve is completely open. The lower stem on type III valve shall back seat against the body or body bushing when the valve is completely open. The lower stem assembly shall be screwed into the valve body with a shouldered seal. All valve seat disks shall be securely retained and fastened to the lower stem by crimping or other mechanical means such as locking screws or nuts. Where seat disks are retained by crimping only, a suitable vent shall be provided between the seat disk and lower stem to discharge any entrapped refrigerant to prevent possible dislodgment of the seat disk.

3.4.2 Bodies of valves shall be so fitted that the valve seat may be easily refaced.

3.4.3 Orifice. Valves, except those used for throttling or expansion purposes, shall have an unrestricted flow area at least equivalent to the area of a circle having a diameter equal to the nominal pipe size.

3.4.4 Connections. All valve connections shall be designed for outside diameter (od) size refrigeration tubing and shall be male flare or female solder joints. The male flare connections shall be in accordance with ANSI B70.1. The female solder joint connections shall be in accordance with ANSI B16.22.

3.4.5 All straight type valves, except type I, class 5 and class 9, shall have in-line connections.

3.4.6 Pressures. Valves shall not show evidence of leakage at 300 psig operating pressure. Valves shall readily open and close and shall not leak across the seat at an operating pressure of 300 psig (see 4.5.2 and 4.5.3). Valves shall withstand 450 psig test pressure applied as indicated (see 4.5.1).

3.5 Marking. Valves shall have distinctly cast or stamped on the side of the body or on a plate secured to the top of the handwheel the following information:

- (a) Trademark or name of manufacturer.
- (b) Catalog number, size of valve, specification and type number.

Type I valves, classes 6 and 7, shall show in addition the letters EXP. Valve handwheels or plates attached thereto shall show a directional arrow with the word "Open." Where a plate under the handwheel is used for the marking it shall not project outside the handwheel nor jut in such a manner as to be dangerous to handle. Valves shall have distinctly cast or stamped on one side of the body an arrow indicating direction of flow which will show that the inlet pressure is under the valve seal except for type III valves that are designed to be nondirectional.

3.6 Types I and III diaphragm, packless.

3.6.1 Size. Valves shall be furnished in the following sizes (outside diameter of tubing) (see tables I and III):

<u>Inches</u>	<u>Classes</u>
1/4	All
3/8	All
1/2	All
5/8	All
7/8	1, 2, 6, 7
1-1/8	1, 2, 6, 7

NOTE: Classes 8 and 9 shall have same size tube for brazed and flare ends.

3.6.2 Stem release. Provision shall be made to permit opening of the valve under pressure without sticking of the stem and seat.

3.6.3 Mounting. Mounting flanges or lugs shall be provided on all straight type valves.

3.6.4 Classes 8 and 9. Classes 8 and 9 shall be provided with a seal cap for the male flare end connection. The seal cap shall be of nonferrous material and shall contain a retained type gasket. The cap shall be fastened to the valve by a brass chain of sufficient length to permit easy removal of the cap.

3.7 Type II, packed, back seating.

3.7.1 Size. Valves shall be globe valves, class 1, angle and class 2, straight, provided with wing caps and furnished in 7/8, 1-1/8, 1-3/8, 1-5/8, 2-1/8, 2-5/8, 3-1/8, 3-5/8 and 4-1/8 inch sizes (see tables II and IV).

3.7.2 Packing. Valves shall be of the back seating type to permit repacking under pressure. The valve stem stuffing box and gland shall be designed so the packing may be replaced while the valve is under pressure. Packing shall be of a plastic type, either moulded rings or continuous strip, containing asbestos fiber and graphite, and shall be suitable for use with halogenated refrigerants. Equally effective material satisfactory to the command or agency concerned will be acceptable.

3.7.3 Gaskets. Retained type gaskets shall be used in all seal caps to prevent loss. Bonnet gaskets shall be made of compressed asbestos fiber material conforming to type P1161A of ASTM D-1170. Equally effective material satisfactory to the command or agency concerned will be acceptable.

3.8 Reliability assurance.

3.8.1 The principle of maximum reliability is paramount and no compromise of this principle shall be made with any other basic requirement of design. Where wear or corrosion is unavoidable, the parts subjected to such wear or corrosion shall be of the best material for the purpose in order to reduce these detrimental effects to a minimum.

3.8.2 The supplier shall establish and maintain an effective reliability assurance program including the items specified in 3.8.2.1

through 3.8.2.3.

3.8.2.1 Design reviews. The reliability assurance program shall include provisions for the reliability review and evaluation of designs as an integral part of the supplier's engineering design procedures. Design or engineering changes occurring during development or production shall be subjected to comparable review procedures.

3.8.2.2 Production control and monitoring. The reliability assurance program shall provide an economical and effective system of production control and monitoring to assure that reliability achieved in design is maintained during production (see 4.1.1).

3.8.2.3 Subsupplier and vendor reliability. The reliability assurance program shall include provisions to assure subsupplier and vendor selection and performance consistent with the reliability requirements of the contract and applicable portions of this specification.

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

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Government reserves the right to perform any of the inspections set forth in the specifications where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Inspection system. The supplier shall provide and maintain an inspection system acceptable to the Government for supplies and services cover by this specification. The inspection system shall be in accordance with MIL-I-45208 (see 6.1 and 6.2).

4.2 First article inspection. Prior to furnishing any valves under this specification, the manufacturer shall furnish, examine and test one valve of each type and class to be furnished to demonstrate the suitability of his valves. The examination and tests shall be as specified in 4.4 and 4.5. Types II and III valves shall also be tested as required in 4.2.1.

4.2.1 Shock tests.

4.2.1.1 One complete type II and III valve shall be subjected to the high-impact shock tests specified in MIL-S-901 for grade A, class I equipment. The largest size valve of each type shall be tested.

4.2.1.2 Where a manufacturer is unable to conduct these tests at his own plant, he may arrange to have them conducted at a commercial laboratory or Government laboratory suitably equipped to conduct tests. Where shock tests are conducted at a Government laboratory, copies of the applicable approved drawings shall accompany the valves.

4.2.1.3 Equipment shall be considered to have failed to pass the shock test in the event of any of the following:

- (a) Breakage of any parts, including mounting bolts.
- (b) Appreciable distortion or dislocation of any part or otherwise creating a hazard to personnel or other equipment.
- (c) Significant effect on performance.

4.2.2 Equipment which has been subjected to the high-impact shock test and has failed to conform to the requirements will not be acceptable.

4.2.3 Equipment which has been subjected to the high-impact shock test and has successfully passed this test shall be considered for such service as the command or agency concerned may authorize. Each part shall be carefully examined by the manufacturer and any part which he considers substandard shall be replaced.

4.2.4 Where first article tests, as required by this specification, have previously been conducted and equipment offered is the same as that previously tested, accepted, and proven satisfactory, a test report of prior tests conducted or certification of prior approval will be acceptable in lieu of retesting.

4.3 Sampling for quality conformance inspection.

4.3.1 Lot. All valves of the same type, class and size which are presented at one time shall be considered a lot for purposes of quality conformance inspection.

4.3.2 Sampling for examination and operating test. A random sample of valves shall be selected in accordance with table V from each lot for examination specified in 4.4 and test specified in 4.5.2. Any valve in the sample containing one or more defects shall not be offered for delivery,

and if the number of defective valves in any sample exceeds the acceptance number for that sample, it shall be cause for rejection of the lot represented by the sample.

Table V - Sampling for examination and operating
test AQL (approx.) = 1.5 percent defective.

Number of valves in lot	Number of valves in sample	Acceptance number (defectives)	Rejection number (defectives)
15 and under	10	0	1
16 to 40	15	0	1
41 to 110	25	1	2
111 to 300	35	1	2
301 to 500	50	2	3
501 to 800	75	3	4
801 to 1,300	110	4	5
1,301 and over	150	5	6

4.3.3 Sampling for pressure test. A random sample of valves shall be selected from each lot in accordance with table VI and subjected to the test specified in 4.5.1. If any sample fails to pass the test, it shall not be offered for delivery. If the number of defective valves in any sample exceeds the acceptance number for that sample, it shall be cause for rejection of the lot represented by the sample.

Table VI - Sampling for pressure test.

Number of valves in lot	Number of valves in sample	Acceptance number (defectives)	Rejection number (defectives)
65 and under	15	0	1
66 to 110	25	0	1
111 to 300	35	1	2
301 to 500	50	1	2
501 to 800	75	2	3
801 to 1,300	110	3	4
1,301 and over	150	4	5

4.4 Examination. Each sample valve selected in accordance with table V shall be visually examined for compliance with this specification as follows:

- (a) Materials as specified.
- (b) Design of valve (see 3.4).
- (c) Piping connection dimensions and tolerances (see 3.4.4).
- (d) Marking (see 3.5).

4.5 Tests.

4.5.1 Pressure test. Each sample valve selected in accordance with table VI shall be tested at a pressure of 450 psig. The test shall be made initially with the test pressure applied under the valve closed to determine leakage of the seat and disk. If there is no evidence of leakage at the valve seat, the valve shall be opened but not backseated and the pressure applied to determine the soundness and strength of the complete valve.

4.5.2 Operating test. Each sample valve selected in accordance with table V shall be tested for satisfactory operation. Valves shall be tested to open and close with a pressure of 300 psig applied below the seat disk. Type III valves shall also be tested to open and close with a pressure of 300 psig applied above the valve seat disk. The valves shall readily open and close against this pressure.

4.5.3 Leak test. Each valve shall be tested for leakage with 300 psig air pressure with the valve submerged in a liquid. On valves with forged bodies, the test pressure shall be applied above the valve disk with the valve closed to determine leakage of the seat and disk and in the bonnet and cap assemblies. On valves with cast bodies, the test shall be accomplished as indicated for forged valves. Additionally, the entire valve shall be subjected to the test pressure to determine casting porosity leakage.

4.5.3.1 Valves which fail to pass the test specified in 4.5.3 shall no be offered for delivery.

4.6 Inspection of preparation for delivery. The preservation, packaging, packing and marking of the valves shall be inspected to determine conformance with the applicable requirements of section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Unless otherwise specified, levels of preservation, packaging and packing shall be in accordance with MIL-V-3 as specified (see 6.1).

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type, class, and size of valves required (see 1.2 and 3.3).
- (c) If first article sample is not required (see 3.1).
- (d) Whether fixed or removable handwheels shall be furnished (see 3.2.2).
- (e) Quality assurance provisions (see 4.1.1).
- (f) Level of preservation, packaging and packing required (see 5.1).

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6.2 Management control system document. The following management control system document should be listed on DD Form 1660:

(a) MIL-I-45208 (see 4.1.1).

6.3 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously procured 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 procurement.

6.4 CHANGES FROM PREVIOUS ISSUE. THE OUTSIDE MARGINS OF THIS DOCUMENT HAVE BEEN MARKED "#" TO INDICATE WHERE CHANGES (DELETIONS, ADDITIONS, ETC.) FROM THE PREVIOUS ISSUE HAVE BEEN MADE. THIS HAS BEEN DONE AS A CONVENIENCE ONLY AND THE GOVERNMENT ASSUMES NO LIABILITY WHATSOEVER FOR ANY INACCURACIES IN THESE NOTATIONS. BIDDERS AND CONTRACTORS ARE CAUTIONED TO EVALUATE THE REQUIREMENTS OF THIS DOCUMENT BASED ON THE ENTIRE CONTENT AS WRITTEN IRRESPECTIVE OF THE MARGINAL NOTATIONS AND RELATIONSHIP TO THE LAST PREVIOUS ISSUE.

Custodians:

Army - ME
Navy - SH
Air Force - 82

Review Activities:

Army - ME, GL
Navy - SH, YD
Air Force - 82

Preparing Activity:

Navy - SH
(Project 4130-0199)