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MIL-STD-798 (SHIPS)
16 DECEMBER 1965

DEPARTMENT OF DEFENSE
STANDARD PRACTICE

NONDESTRUCTIVE TESTING, WELDING, QUALITY
CONTROL, MATERIAL CONTROL AND IDENTIFICATION
AND HI-SHOCK TEST REQUIREMENTS FOR PIPING
SYSTEM COMPONENTS FOR NAVAL SHIPBOARD USE



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MIL-STD-798(SHIPS)
16 December 1965

DEPARTMENT OF THE NAVY

BUREAU OF SHIPS

WASHINGTON, D. C. 20360

**Nondestructive Testing, Welding,
Quality Control, Material Control
and Identification and HI Shock
Test Requirements for Piping System
Components for Naval Shipboard Use**

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1. This standard has been approved by the Bureau of Ships and is published to establish the requirements for nondestructive testing, welding, quality control, material control and identification and HI shock test requirements for piping systems components for Naval shipboard use.

2. Use of this standard by activities under the cognizance of the Bureau of Ships shall be mandatory only when:

- (a) Specific directives have been received from the Bureau of Ships.
- (b) Standard is referenced in applicable Ships Specifications or piping system component specifications.

Until specifically invoked by (a) or (b), the standard will be considered only as an advisory document furnished for guidance purposes only in the procurement of the piping system components.

3. Recommended corrections, additions or deletions should be addressed to the Chief, Bureau of Ships, Department of the Navy, Washington, D. C. 20360.

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1. SCOPE AND APPLICABILITY

1.1 Scope.—This standard covers the requirements for nondestructive testing, welding, quality control and identification and HI shock for piping system components. It does not apply to primary side components of nuclear ships.

1.2 Applicability.—When this standard is referenced in a specification (ships specification, piping system component specification or purchase order), all sections are applicable. If only certain sections are applicable, they shall be as specified by the purchasing activity.

2. REFERENCED DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this standard to the extent specified herein.

SPECIFICATION

MILITARY

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

STANDARDS

MILITARY

MIL-STD-271 - Nondestructive Testing Requirements for Metals.

MIL-STD-278 - Welding and Allied Processes for Machinery for Ships of the United States Navy.

MIL-STD-775 - X-Ray Standards for Welding Electrode Qualification and Quality Conformance Tests.

PUBLICATIONS

NAVSHIPS 250-537-1 - Radiographic Standards for Bronze Castings.

NAVSHIPS 250-537-2 - Radiographic Standards for Bronze Castings for Radium, Cobalt (60). and High Voltage X-Rays (1000 KVP and Over).

(NAVSHIPS 250-537-1 available as P. B. #131854 and 250-537-2 available as P. B. #151351 from the Clearing House for Federal Scientific and Technical Information, Department of Commerce, 2585 Port Royal Road, Springfield, Virginia 22151.)

NAVSHIPS 250-692-13 - Radiographic Standards for Steel Castings - Supplement 1 for Nickel-Copper, Copper-Nickel and Aluminum Bronze Alloy Castings (Copies of Supplement 1 should be obtained from Chief, Bureau of Ships, Code 634, Department of the Navy, Washington, D. C. 20360).

0900-003-8000 - Surface Inspection Standards for Metals.

(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 document forms 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)

E71-64 - Industrial Radiographic Standards for Steel Castings Up to 2 Inches in Thickness.

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

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3. DEFINITIONS

3.1 Ferrous component primary service rating. —Ferrous component primary service is the hot pressure rating.

3.2 Nonferrous component primary service rating. —Nonferrous component primary service rating is the cold pressure rating.

3.3 Flanges. —All sections beyond the backface surface. All other sections of the flange (hub end) shall be handled in the same manner as "valves" and "fittings."

3.4 Size. —Size refers to the component nominal size.

3.5 Pressure containing sealing surface. —Pressure containing sealing surfaces are all of the surfaces which come into direct contact with the sealing member.

3.6 Finished surface. —Finished surfaces are the surfaces which are finished machined, in their entirety.

3.7 Actual seating surface. —Actual seating surface is the portion of a valve or trap seat or seating face which comes in direct contact with a mating face, including 1/8 inch on either side of the direct contact area.

3.8 Included seating surface. —Included seating surface is the portion of a valve or trap seat or seating face which borders the actual seating face, is finished machined in the same manner as the actual seating face, but does not come into contact with the mating seat or face.

3.9 Linear defects. —Linear defects are the defects which have a length to width ratio equal to or exceeding three which cannot be defined as porosity or shrink, where the length equals 1/8 inch or more.

3.10 Body. —The body is the main pressure enclosure including bonnet and cover attachment area.

3.11 Valve bonnet. —Valve bonnet includes all pressure containing sections from the body attachment area up to but not including the packing gland area.

3.12 Wall thickness. —The wall thickness is the section thickness under examination or otherwise being discussed or worked.

3.13 Nozzles. —

- (a) For weld end components, that section from the end preparation back to the interface between the inlet and outlet and the main body section.
- (b) For flanged end components, that section from the flange backface back to the interface between the inlet and outlets and the main body section.

3.14 Forged. —Forged, where the term is used, includes items manufactured from wrought materials as well as those manufactured from forgings.

3.15 Purchaser. —The purchaser is the shipyard or government stocking agency.

3.16 Specifications and drawings. —Specifications and drawings are those issued by the United States Government.

3.17 Manufacturer. —Manufacturer is the activity responsible for the design of the part or component, except in those cases where the Government provides the design. In such cases, the manufacturer is the activity producing the item and as such is the responsible party for satisfactory operation.

3.18 Vendor. —Vendor is the activity providing materials or parts to the manufacturer.

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3.19 Procedures.—Procedures are the actual steps taken, forms used, and so forth, in the manufacture and production of the item with regard to quality control, material control and identification applied to the product.

3.20 Objective evidence.—Objective evidence is documentation or other physical proof which indicates the acceptability and correctness of any part or assembly.

3.21 Auxiliary equipment.—Auxiliary equipment includes strainers, line desuperheaters, air and steam desuperheaters, pipe fittings, manifolds and unions.

4. RADIOGRAPHY

4.1 Radiographic examination shall be performed in accordance with MIL-STD-271. It shall be applied to all castings for bodies, bonnets, covers, tailpieces, discs for quick opening valves or relief valves, flanges and fittings covered in this standard, when both the size and primary pressure rating of the component equal or exceed the values listed in table I. The acceptance criteria for this examination shall be in accordance with table II.

Table I - Size and pressure rating

| Item | Material | Size | Primary service rating |
|--|-------------------------|---|-------------------------------------|
| Valves, flanges, fittings, and auxiliary equipment (except for hydrogen and oxygen services) | Ferrous and non-ferrous | Over 2 inches, ips 1/2 inch ips and larger | 300 psi and higher Over 3000 psi |
| Valves, flanges, fittings and auxiliary equipment (for hydrogen and oxygen services) | Ferrous and non-ferrous | 1/2 inch ips and larger | 550 psi and higher |

Table II - Acceptance criteria

| Alloy type | Wall thickness | Acceptance standard | Acceptance class |
|--|-------------------------------------|---|---|
| Ferrous | Less than 1 inch 1 inch and over | NAVSHIPS 250-692-13 or ASTM-E71 | Class 1 Class 2 |
| Nickel base, copper or aluminum bronze | Less than 1 inch Over 1 inch | NAVSHIPS 250-692-13 and Supplement 1 thereto and ASTM-E71 | Class 2 Class 3 |
| Tin Bronze | 1/2 inch and less Over 1/2 inch | NAVSHIPS 250-537-1 and NAVSHIPS 250-537-2 | Class 2 with no area restriction or shrink- age Class 3 except shrinkage maybe class 4 |

5. MAGNETIC PARTICLE INSPECTION

5.1 Magnetic particle inspection shall be performed in accordance with MIL-STD-278 on ferrous components only. Inspection shall be performed in accordance with table III. Acceptance criteria shall be in accordance with table III. Inspection shall be applied when both the size and primary pressure rating exceed the values shown and shall be performed after rough machining and final heat treatment.

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Table III - Magnetic particle inspection and acceptance criteria

| Item | Size | Primary pressure rating | Material | Area to be inspected | Acceptance criteria |
|---|---|-------------------------|--------------|--|--|
| All items | 1/2 inch and larger | 225 psi and higher | Cast, forged | Butt weld ends | Remove all defects |
| Valves, auxiliary equipment (bodies only) | 1/2 inch and larger (see acceptance criteria) | 600 psi and higher | Cast, forged | Pressure containing surfaces (see acceptance criteria) | 2 inches and smaller; remove all linear defects Over 2 inches; external and accessible internal surface—remove all linear defects |

6. DYE PENETRANT INSPECTION

6.1 Dye penetrant inspection shall be performed in accordance with MIL-STD-278. Inspection shall be performed in accordance with table IV when both the size and pressure rating exceed the values shown and after final heat treatment. Acceptance criteria shall be in accordance with table IV.

Table IV - Dye penetrant inspection and acceptance criteria

| Item | Location (surface) to be inspected | Size | Primary pressure rating | Material | Surface condition | Acceptance criteria |
|----------------------------------|--------------------------------------|---------------------|-------------------------|------------|-------------------|---------------------------|
| All | Butt weld end preparations | 1/2 inch and larger | 225 psi and higher | Nonferrous | Finished machined | Remove all defects |
| All | Actual seating surfaces | All | All | All | Finished machined | Remove all defects |
| All | Included seating surfaces | All | All | All | Finished machined | Remove all linear defects |
| Weld inlaid or overlaid surfaces | Pressure sealing containing surfaces | All | All | All | Finished machined | Remove all defects |

7. WELDING

7.1 The following shall comply with all the requirements of MIL-STD-278 and shall apply to both production and repair welding on castings and forgings.

- (a) Welding procedure approvals.
- (b) Welder qualifications.
- (c) Nondestructive testing of welds.

7.2 Welding shall not be performed until the applicable procedures have been approved and the applicable welders have obtained the necessary qualification approvals.

7.3 Radiographic, magnetic particle and dye penetrant inspection of welds as required shall be performed in accordance with MIL-STD-271.

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7.4 The radiographic examination acceptance criteria shall be in accordance with MIL-STD-775.

7.5 The dye penetrant and magnetic particle inspection acceptance criteria shall be in accordance with NAVSHIPS 0900-003-8000, grade II, except as otherwise noted herein.

7.6 The welding requirements specified in 7.1 through 7.5 are applicable to all the items specified in this standard.

8. QUALITY CONTROL

8.1 Each place of manufacture shall have an established quality control system which has been accepted by a Government representative prior to production.

8.2 The procedures used to insure conformance with the minimum requirements specified in 8.3 through 8.8 shall be determined by the manufacturer and these procedures, as determined, are subject to disapproval for cause by the cognizant Government representative. In such case, procedures shall be modified until mutual acceptance has been reached between the Government representative and the manufacturer.

8.3 Manufacturers furnishing piping system components under contracts which reference this standard are responsible for the correctness and acceptability of raw materials and finished parts received from their vendors which are to be used in the manufacture of items required under contracts or purchase orders. It is the manufacturer's responsibility to insure that vendors furnish the materials in a manner which assures their acceptability and that sufficient documentation and objective quality control evidence is made available by the vendor with each shipment to the manufacturer to permit verification of the material by the manufacturer upon receipt.

Evidence will be adequately maintained by the manufacturer and made available to the cognizant government representative upon request.

8.4 Government acceptance of the quality control system notwithstanding, the manufacturer shall be responsible to ascertain that any and all items furnished under contracts or purchase orders which reference this standard are correct and can be adequately supported by objective quality control evidence prior to shipment. The absence of any necessary documentation, including the documentation which should have been provided by a sub-vendor, is considered the responsibility of the manufacturer and any costs due to delays in obtaining missing documentation will be borne by the manufacturer.

8.5 The manufacturer shall maintain and provide upon request, a descriptive manual of his quality control procedures and associated facilities at the place of manufacture. The procedures must be acceptable to the Government representative before any acceptance of the in-plant quality control system can be granted. At such time as the Government representative indicates that changes or corrections are necessary to the procedures, the manufacturer shall take prompt action to either comply with the request or explain why any alterations are not necessary or would be incorrect. Failure to do either within 30 days from date of notification by the Government representative will automatically rescind any previously granted notices from the Government that the in-plant quality control system was acceptable.

8.6 The quality control procedures shall adequately describe the following as applicable to the item and the place of manufacture:

- (a) Plant organization.
- (b) Quality control responsibilities. (Personnel, and so forth)
- (c) Drawing and change control.
- (d) Receiving inspection. (Frequency of spot checks, records, and so forth)
- (e) Raw materials handling, stocking and coding.
- (f) In-process inspection. (Frequency of inspector and operator checks, and so forth)
- (g) Final inspections. (Visual, nondestructive tests, hydros, and so forth)
- (h) Sampling inspection.
- (i) Welding procedures and facilities.
- (j) Nondestructive testing facilities and procedures. (RT, MT, PT)
- (k) Inspection status. (Status of received supplies, including in-process and final)

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- (l) Tool and gage control.
- (m) Special manufacturing procedures. (Grinding, cleaning, heat treating, and so forth)
- (n) Quality control records.
- (o) Vendor material records. (Receipt inspection)
- (p) Record keeping other than quality control records.
- (q) Packaging, preservation, shipping records, and so forth.
- (r) Machine tool listing.
- (s) Inspection equipment listing.
- (t) Plant layout.
- (u) Control of reject materials.
- (v) Exhibit of all forms used with explanations as necessary.
- (w) Personnel training.

8.7 The in-plant procedures followed in the actual manufacture shall reflect the contents of the quality control procedures. Any continuing deviations where no attempt has been made by the manufacturer to correct the deviations, shall be cause to rescind all previously granted acceptance actions until the necessary corrective action has been taken to the satisfaction of the cognizant Government representative.

8.3 The manufacturer shall make the procedures available to the Government or the Government's prime contractor upon request. The Government may inspect the place of manufacture at any time during the period of manufacture of any items.

9. MATERIAL CONTROL

9.1 All manufacturers of piping system components performing under contracts, specifications or purchase orders which reference this standard shall have an effective material control system in operation which will permit the issuance of sufficient objective evidence regarding materials and components at the time of shipment. Evidence will include the following with regard to materials, and will be required only for "Level I" (BUSHIPS Instruction 4410.17) type items. The determination of "Level I" shall be made by the purchasing activity and shall be stated in the contract or purchase order.

- (a) Chemical properties.
- (b) Physical properties.
- (c) Elongation properties.
- (d) Information concerning appropriate nondestructive tests, such as radiography, as applicable.

9.2 The material control evidence provided shall be representative of the properties of the item being shipped and shall not merely reflect the material properties provided in any applicable material specification under which the item was manufactured. The evidence shall include information on lot identity and a definition of lot as determined by the manufacturer.

9.3 Material control objective evidence will be required for the following parts, when valves are shipped in the assembled form.

- (a) Valve bodies.
- (b) Valve bonnets.
- (c) Valve tailpieces. (Including tailpiece attachments.)
- (d) Valve bonnet fasteners. (Nuts, bolts, union nuts.)
- (e) End connection union nuts.
- (f) Valve covers. (Access plates, and so forth.)
- (g) Flanges.
- (h) Fittings.
- (i) Valve stems.

9.4 Material control objective evidence will be required for the following valve repair parts, when the repair parts are shipped separately:

- (a) Balls, discs or wedges.
- (b) Springs.
- (c) Gaskets and "O" ring seals and seal rings.

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- (d) Valve seats.
- (e) Stem bushings and washers.
- (f) Seal retainers.
- (g) Parts listed in 9.3.

9.5 The manner in which the necessary objective evidence is developed shall be left to the discretion of the manufacturer, but shall be a written procedure approved by the cognizant Government representative. Evidence shall be based on individual heats, batch process, continuous cast or pour process or other manufacturing processes. All are acceptable provided that the manufacturer can adequately prove that control is being correctly maintained over whichever process is employed.

9.6 In the case of batch, continuous cast or continuous pour processes the lot size from which objective material control evidence is generated shall be left to the discretion of the manufacturer. Evidence shall apply to the time period defined by the lot. A definition of the lot shall be included in all required objective material control evidence, including that which is provided to the user.

9.7 All objective material control evidence and data which applies to the items or assemblies shall be maintained at the place of manufacture and shall be produced upon request. This should not be interpreted as meaning that no records and so forth are required to be forwarded with the item. The manufacturer shall provide a synopsis of all the required objective evidence covering each item or assembly shipped on a suitable format. The actual data to support this synopsis shall be retained at the place of manufacture.

9.8 Records covering quality control and material control shall be maintained for a period of not less than 5 years from date of the shipment.

9.9 Objective evidence, either those retained at the place of manufacture or sent forward with the item, which contain statements such as "is equal to," "is to the best of my knowledge and belief," "complies with specification," and so forth are not acceptable.

9.10 The following general information shall be included in all objective evidence documents forwarded on each item to the user.

- (a) A statement that all items in the defined lot comply with the material control specified in 9.1 through 9.9.
- (b) A statement that all such items are suitably marked "LI." (Indicate marking location.)
- (c) A statement that lot numbers, where applicable, are marked on all items, and indicate the number.
- (d) A statement that heat or serial numbers, where applicable, are marked on the items, and indicate the numbers.
- (e) A statement that the manufacturer's symbol is marked on the items.
- (f) A statement that the contract number is marked on the material.

10. MATERIAL IDENTIFICATION

10.1 The manufacturer must have a material identification system for all the parts listed in section 9 including those listed under "Repair parts." If additional parts require the marking, it shall also be noted in the contract or purchase order. A material identification mark or marks will be required for all valve assemblies, the designated valve repair parts and for flanges and fittings which are designated as "Level I" components in any contract or purchase order.

10.2 All material identification marks applied to the following parts shall be visible after assembly:

- (a) Valve bodies.
- (b) Valve bonnets.
- (c) Valve tailpieces.
- (d) Valve covers.
- (e) Valve bonnet fasteners.
- (f) End connection union nuts.
- (g) Flanges.
- (h) Fittings.

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10.3 The following repair parts intended for installation or as backup repair parts shall have the necessary identification attached either by tag or on the wrapper or packaging when the size or shape precludes permanent marking.

- (a) Valve stems.
- (b) Valve balls, discs and wedges.
- (c) Gaskets, "O" rings, pressure seals.
- (d) Valve seats.
- (e) Springs.
- (f) Bellows.
- (g) Diaphragms.
- (h) Stem bushings and washers.
- (i) Seal retainers.
- (j) All items listed in 10.2

10.4 Material identification marking required is defined as any one of the following:

- (a) Individual heat numbers.
- (b) Serial or code numbers applied on a lot basis.
- (c) Identification marking required by individual material specifications, particularly those covering bolting.

10.5 Where a specification requires particular marking, such as a bolt material specification, the marking requirements shall be in accordance with the specification.

10.6 All identification marking, regardless of the type used, shall be accompanied with the marking "LI." In the case of valve assemblies, "LI" need only be marked in one place on the assembly.

10.7 The material identification permanent marking and record of marking starting point may be generated any time prior to production testing of the applicable item, but must be covered by a written procedure that has been approved by the cognizant Government representative.

10.8 All bolts and nuts shall be individually marked whether they are intended for a valve assembly or as repair parts.

10.9 All marking, when not applied at the time of manufacture, such as a casting heat number, shall be placed on a raised pad or similar low stress area, and shall be permanent.

10.10 The following regulations shall apply to marking tools and methods:

- (a) Permanent marking shall be applied by a method which will not reduce thickness below minimum design requirements, induce detrimental stresses, contaminate, or cause maloperation.
- (b) Marking with impact tools is permitted only on raised pads or low stress areas and only when round nosed tools are used. The impression shall not exceed 0.010 inch.
- (c) Electric arc etching is prohibited.
- (d) Vibrating pencil or electro-chemical etching are permitted on items and assemblies which cannot be impact marked due to size or shape.
- (e) Roll marking is permitted on bar stock where the die imprint shall not occur on a critically stressed surface.

10.11 The identification mark, when applied on a lot basis, shall either be or refer to, the starting point of permanent marking and applicable record keeping, for the item in question. It shall mean that at the time it was applied, the required in process quality control system was in operation and was operating correctly. It shall further mean that objective material control evidence and data which applies to the parts or assemblies is in existence and can be made available at the place of manufacture upon request. The quality control and material control systems are defined as those which comply with the requirements of this standard.

11. HIGH-IMPACT SHOCK TESTS

11.1 Valves shall be tested as specified in table V. All tests shall be conducted with the valve being subjected internally to its maximum pressure or, for control valves, reducing and pressure regulators and so forth, the maximum design pressure differential, for the duration of the test. The sizes to be tested shall be in accordance with table VI, provided the parameters listed herein, whereby shock tests can be extended to other sizes, are complied with. Tests shall be conducted in accordance with MIL-S-901.

Table V - HI Shock Tests

| Component Type | Positions | Pressure Condition |
|--|--|---------------------------|
| Non-throttling: Gate Ball Butterfly Auxiliary | Full open | Pressurized throughout |
| | Full closed | Pressurized on inlet side |
| Throttling: Globe Angle Throttle Dump Reducing Needle Sleeve | Full closed | Pressurized on inlet side |
| | Disc at mid-position not on either seat | Pressure throughout |
| Check: Swing Lift | Full open | Pressure throughout |
| | Full closed | Back pressure on disc |
| Stop check | Full open | Pressurized throughout |
| | Full closed, stem engaged | Pressurized on inlet side |
| | Closed, stem backed off | Back pressure on disc |
| Automatic: Solenoid Relief (see note 1) Safety (see note 1) Poppet (see note 2) | Full open | Pressurized throughout |
| | Full closed | Pressurized on inlet side |

Notes:

1. Relief and safety valves shall be tested in the full closed position only at the minimum and maximum settings permissible with the spring installed.
2. For poppet valves, cycling under shock is permitted provided the disc returns to its original position immediately and no permanent damage, misalignment or continuous leakage past the seat occur.

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Table VI - Sizes to be Shock Tested

| Size Tested (Inches) | Approves All These Sizes (see 11.3) (Inches) |
|-------------------------|--|
| 3/4 | 3/4 and smaller |
| 2 | 1 to 2, inclusive |
| 6 | 2-1/2 to 6, inclusive |
| 8 | 7 and 8 |
| 10 | 9 and 10 |
| over 10 | All sizes shall be tested |

11.2 Post shock examination and testing to determine acceptance of the item shall be as specified in the applicable specification or drawing for production tests, except that the tested unit shall receive a complete visual and dimensional examination before and after the post-shock tests. The "before" visual and dimensional checks shall be performed on the external surfaces only since the valve is not to be disassembled for internal visual and dimensional checking until after all post-shock tests have been completed. No relaxation or deviations in post-shock testing shall be permitted unless specifically approved by the Bureau of Ships.

11.3 The following conditions shall be met to permit an extension of a shock test from one size to another (see table VI), except as specified in 11.4.

- (a) Same geometry and design.
- (b) Same materials.
- (c) Same pressure rating.
- (d) Same bonnet construction.
- (e) Same end connection construction.
- (f) Same methods of sealing throughout.
- (g) Same mode of operation and operator attachment.

11.4 The following conditions shall apply to the requirements governing test extensions:

- (a) The vendor or shipbuilder (or activity requesting extension) should supply supporting evidence which should include:
 - (1) Detailed drawings of tested and untested items.
 - (2) A copy of the report of the shock test which the requested extension is based upon.
 - (3) A detailed comparison of the differences in materials and design showing that the untested item has equal or greater shock resistance than the tested item.
- (b) Extensions should not be granted for equipments based upon tests on different weight classifications or on equipment by different manufacturers.
- (c) The acceptability of the test report should be considered. Was it perfectly acceptable, or marginal, or might it by present standards be unacceptable?
- (d) When a doubt exists, Bureau of Ships technical codes should be contacted to provide general guidance in their cognizant areas as to allowable size spreads between tested and untested items.
- (e) Tests provide assurance of shock resistant equipment. Extension should not be granted whenever reasonable doubt exists in the area of the original shock test, the design or fabrication of the unit or the intended use of the equipment. It should be noted that repeat tests of identical items are sometimes desirable as a quality control measure.
- (f) Where desired, it will be permissible to test separate valves in the principal operating conditions specified, provided the valves tested under each set of conditions are completely identical in all respects.

11.5 Table VI is a representation of the general situation throughout the valve industry, with regard as to where changes occur in the design approach. If a manufacturer has a design series with changes occurring at sizes other than those listed in table VI, an extension to apply different sizes should be requested from the Bureau of Ships.

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11.6 If the purchaser considers that tests, in addition to those specified in table V, should be conducted, the tests shall be specified in the contract or purchase order.

11.7 Shock tests shall be approved only by the purchaser, subject to concurrence by the Bureau of Ships, cognizant Supervisor of Shipbuilding or Commander, Naval Shipyard.

11.8 A request for an extension may be in order, should a manufacturer have a valve or valves which contain minor deviations from the valve tested, such as changes in material of low stressed parts or minor dimensional differences or changes in geometry, extensions may be in order. All such requests should be directed to the Bureau of Ships via the cognizant Government inspector and, if a contract is involved, also via the purchaser. If this forwarding procedure is not followed, the Bureau of Ships will return the correspondence unanswered.

11.9 The following minimum post shock tests are required in all cases whether or not a specification or drawing exists. The tests shall be conducted in the order listed.

- (a) An external visual and dimensional check. Do not disassemble the valve. This may include a dye penetrant or magnetic particle inspection, depending upon the requirements of individual Ships Specifications.
- (b) A hydrostatic test, to the full cold rated pressure. This pressure shall be maintained for at least 10 minutes.
- (c) A seal tightness test, maintained for at least 3 minutes.
- (d) A final visual and dimensional check including valve internals.

11.10 The valve shall pass all post shock tests without exception. In the case of the visual and dimensional checks, any permanent damage which is detrimental to the valve shall be considered cause for rejection. This shall include any permanent deformation of any pressure containing part.

11.11 Adjustments to correct minor malfunctions during shock tests will be permitted within the scope of what a man on watch could be expected to do without leaving his station. (For example, tightening a packing gland is permissible. Replacing a yielded or sheared bolt, is not.)

11.12 A valve or other component shock tested with a hydraulic or pneumatic operator attached thereto, may approve a manually operated valve of the same size or smaller, design and so forth. Other types of operator mountings or operators will not be approved, when a valve is shock tested with a manual operator. Changes in operator type, for example from hydraulic to pneumatic, will require re-shock testing. However, if the change complies in all respects to the requirements specified herein regarding extensions, it will be necessary to shock test only the different type operator. If this is not the case, the entire assembly, valve plus operator, shall be tested.

11.13 Shock tests of the largest valve or other component which a manufacturer intends to furnish with operators attached, and which are located in the most disadvantageous position, from a shock standpoint in which they will be provided will approve all such arrangements involving this type operator and a given type of valve or component which are smaller in size; provided the means of attachment between operator and valve or component remains the same with regard to design, materials and geometry. Also, all the requirements specified herein covering extensions shall be complied with insofar as the valve or component are concerned.

11.14 If a manufacturer changes the design, in any way, of an item which has been satisfactorily shock tested, the Bureau of Ships shall be notified and an extension requested, or new shock tests shall be conducted as specified herein.

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.

Preparing activity:
Navy - SH
(Project MISC-N220Sh)

(See Instructions - Reverse Side)

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