

INCH-POUND

MIL-T-2118C(SH)

22 August 1990

SUPERSEDING

MIL-T-2118B(SHIPS)

4 February 1972

(See 6.8)

MILITARY SPECIFICATION

TRAP, STEAM, ANGLE, THERMOSTATIC

This specification is approved for use by 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 the requirements for thermostatic steam traps for services up to 100 pounds per square inch (lb/in²).

1.2 Classification. Steam traps shall be of the following classes and sizes, as specified (see 6.2).

Class I - Low pressure (0 to 25 lb/in², 268 degrees Fahrenheit (°F) maximum).

Class II - High pressure (25 to 100 lb/in², 338°F maximum).

1.2.1 Size. Sizes are listed in table I and range from 1/2 to 2 inches nominal pipe size (nps) on the inlet side of the trap.

1.2.2 Working pressure. Class I shall include working pressures of 5 lb/in², 15 lb/in² and 25 lb/in². Class II shall include working pressures of 25 lb/in², 35 lb/in², 50 lb/in², and 100 lb/in².

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.

AMSC N/A

FSC 4730

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

MIL-T-2118C(SH)

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

PPP-F-320 - Fiberboard; Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.

MILITARY

MIL-P-116 - Preservation, Methods of.
 MIL-F-1183 - Fittings, Pipe, Cast Bronze, Silver-Brazing, General Specification for.
 MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.

STANDARDS

MILITARY

MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking and Waterproofing; with Appropriate Test Methods.
 MIL-STD-2073-1 - DoD Materiel Procedures for Development and Application of Packaging Requirements.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

B46.1 - Surface Texture (Surface Roughness, Waviness and Lay).
 (DoD adopted)

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

D 3951 - Standard Practice for Commercial Packaging. (DoD adopted)

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

MIL-T-2118C(SH)

(Non-Government standards and other publications are normally available from the organizations that prepare or 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 document and the references cited herein, 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 6.2), a sample shall be subjected to first article inspection (see 6.4) in accordance with 4.4.

3.2 Material. The material for each part shall be as specified herein. However, where a definite material is not specified, an appropriate ASTM, AISI, or Federal specification material shall be used which will enable the traps to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product (see 4.6.1).

3.2.1 Covers and bodies. Covers and bodies shall be made of ASTM, AISI, or Federal specification brass, bronze, or copper-nickel alloy acceptable for steam service.

3.2.2 Valve pins and renewable seats. Valve pins and renewable seats shall be made of the following ASTM, AISI, or Federal specification materials: corrosion-resisting (chrome) steel, nickel, or copper-nickel alloy.

3.2.3 Thermostatic elements. Thermostatic elements shall be of corrosion-resisting materials capable of long life without physical changes, such as cracking, softening, or stretching, at the maximum pressure and temperature required for the class.

3.3 Recovered materials. Unless otherwise specified herein, all equipment, materials, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is permitted under this specification.

3.4 Construction. Thermostatic elements and valve pins of the same design and manufacture for any given size of a class shall be interchangeable, without adjustment, in that size and class (see 6.3 and appendix). Thermosensitive valves, when placed in the trap bodies and with covers properly secured, shall be correctly positioned and distanced from the valve seats (see 4.6.1).

3.4.1 Thermostatic elements (and strainers when provided). Traps shall be easily removed for examination and cleaning without breaking the inlet and outlet connections. Removal of the element while hot shall not result in distortion (of the element) that would affect future operation.

MIL-T-2118C(SH)

3.4.2 End connections. End connections of traps shall be union ends with silver-brazed tailpieces in accordance with MIL-F-1183.

3.4.3 Trap configuration. Unless otherwise specified (see 6.2), traps shall be of the angle pattern with (side, inlet/bottom, outlet).

3.4.4 Class I traps. Strainers as specified for class II traps may be provided at the option of the manufacturer.

3.4.5 Class II traps. Each class II steam trap shall be provided with a rugged strainer of ASTM, AISI, or Federal specification corrosion-resisting material. The strainer shall be integral with the trap inlet side, if possible, but it may be furnished in a separate fitting connected to the trap on the inlet side.

3.4.6 Valve joints. Joints in the thermostatic valve element shall be mechanical, soldered, or a combination of both. Where solder is used for class I traps, it shall have a softening point of not less than 315°F. Where solder is used for class II traps, it shall have a softening point of not less than 425°F.

3.4.7 Valve seats. Class II traps shall have renewable valve seats.

3.5 Performance.

3.5.1 Steam leakage. When exposed to saturated steam at working pressure, the thermostatic element shall cause the steam trap valve to close causing a major reduction in flow through the steam trap (see 4.6.3).

3.5.2 Discharge capacity. Steam traps shall discharge the minimum continuous discharge capacities specified in table I (see 4.6.3) for the size, class, and working pressure specified.

TABLE I. Minimum continuous discharge capacity (pounds of water per hour).

Size	Trap inlet nps (inches)	Class I			Class II			
		Class and working pressure (lb/in ²)			Class and working pressure (lb/in ²)			
		A (5)	B (15)	C (25)	D (25)	E (35)	F (50)	G (100)
1	1/2	500	900	1,200	1,200	1,550	1,950	2,600
2	3/4	900	1,400	1,800	1,800	2,200	2,600	3,500
3	1	1,300	2,000	2,500	2,500	2,900	3,400	4,500
4	1-1/4	3,000	5,000	6,500	6,500	7,500	8,500	11,000
5	1-1/2	4,000	7,000	9,000	9,000	10,000	12,000	18,000
6	2	5,000	9,000	11,000	11,000	14,000	16,000	21,000

MIL-T-2118C(SH)

3.5.3 Temperature differentials. Class I and class II traps in table I shall function within the following temperature differentials. Class I traps shall start discharging with a temperature differential (that is the difference between the temperature of the discharge water and that of the saturated steam of the same pressure as on the trap) of 10 to 25°F. Class II traps shall start to discharge at a temperature differential of 30 to 40°F (see 4.6.3).

3.5.4 Hydrostatic strength. Thermostatic traps shall be hydrostatically tested to 150 percent of the maximum working pressure for the class of service to determine that trap bodies and covers are not porous. Class I traps shall be tested to a hydro (body) cold rating pressure of 37.5 lb/in², and class II traps shall be tested to a hydro (body) cold rating pressure of 150 lb/in² (see 4.6.4). Hydrostatic testing of class I and class II traps shall be conducted without thermostatic valves installed.

3.5.4.1 Pressure rating. Thermostatic traps shall have a maximum allowable working pressure of 25 lb/in² for class I and 100 lb/in² for class II.

3.6 Identification marking. Each trap shall be marked legibly and permanently as specified below:

- (a) Manufacturer's name or trademark (see 3.6.1).
- (b) Model number (see 3.6.1).
- (c) Pressure class number (for example CL. II - H.P.).

3.6.1 Manufacturer's name or trademark and model designation. The manufacturer's name or trademark and model designation shall be permanently and visibly marked on a nonoperating part.

3.7 Special tools. Steam traps shall not require special tools for installation and routine maintenance. Special tools are defined as those tools not listed in the Federal Supply Catalog. (Copies of this catalog may be consulted in the office of the Defense Contract Administration Services Management Area (DCASMA)).

3.8 Exterior finish. Machined surfaces shall not exceed 125 roughness height rating (RHR) as defined in ANSI B46.1. When specified (see 6.2), castings shall be nickel-plated internally and externally.

3.9 Workmanship. Components shall be free from defects which affect their appearance or which may affect their operation (see 4.6.1). Castings shall be clean, sound, smoothly cored, true to form, uniform in texture, and free from cold shunts, porosity, blow holes, and other injurious defects. Castings shall be thoroughly cleaned, both inside and outside, and all fins and roughness shall be removed.

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 (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use

MIL-T-2118C(SH)

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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall 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 (see 6.3). 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 the 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.

4.1.2 Test equipment and inspection facilities. The manufacturer shall ensure that test and inspection facilities of sufficient accuracy, quality, and quantity are established and maintained to permit performance of required inspections.

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

- (a) First article inspection (see 4.4).
- (b) Quality conformance inspection (see 4.5).

4.3 Inspection. Unless otherwise specified (see 6.2), inspections shall be performed in accordance with the conditions specified in 4.3.1 through 4.3.2.

4.3.1 Test temperature. Inspection and tests shall be accomplished at ambient room temperature unless otherwise specified.

4.3.2 Test fluid. Tests shall be conducted using saturated steam at the pressures identified in 3.5.4.

4.4 First article inspection. A first article test shall be conducted on the thermostatic element design. The element may be installed in either a simulated steam trap or an actual steam trap as long as the chamber dimensions where the element is mounted are equal. Inspection shall consist of the performance test of 4.6.3 and shall be caused to cycle at least 10 times. A visual inspection of the element after this test shall show no signs of cracking, deformation or weakness of the element, or erosion of the seating element.

4.5 Quality conformance. Inspection shall be performed on sample units produced with equipment and procedures normally used in production.

4.5.1 Inspection lot. Traps of the same material, type, style, size, and class offered for delivery at the same time are considered to be a lot.

4.5.2 Sampling. A random sample shall be selected from each lot for quality conformance inspection. The sample shall be in accordance with table II.

MIL-T-2118C(SH)

TABLE II. Sampling for examination and tests.

Lot size, number of traps	Samples, number of traps to be examined and tested
2 to 15	7
16 to 25	10
26 to 65	15
66 and over	20

4.5.3 Quality conformance inspection. The sample items selected in accordance with 4.5.2 shall be subjected to the quality conformance inspection shown in table III (see 6.3).

TABLE III. Quality conformance inspection.

Inspection	Requirement	Test method	Notes
Visual and dimensional examination	3.1 through 3.4.7, 3.6, 3.8 and 3.9	4.6.1	
Performance test	3.5.2 and 3.5.3	4.6.3	First article only
Hydrostatic strength test	3.5.4	4.6.4	Housing only

4.5.4 Order of test. Tests shall be conducted in the order shown in table III.

4.5.5 Disposition of sample units. Sample units which have been subjected to quality conformance tests and approved may be delivered on the contract or purchase order in an assembled, ready-for-service condition.

4.6 Methods of inspection.

4.6.1 Visual and dimensional examination. Each sample selected in accordance with 4.5.2 shall be visually and dimensionally examined to determine conformance with this specification including but not limited to 3.6, 3.8 and 3.9. Major and minor defects shall be classified as shown in table IV. Any sample failing to conform to the visual and dimensional examination shall be rejected and shall cause the rejection of the entire lot.

MIL-T-2118C(SH)

TABLE IV. Classification of defects.

<u>Major</u>	
101	Class, pressure, and size not as specified.
102	Improper assembly or valve pins not interchangeable.
103	Materials improper.
104	Dimensions incorrect or out of tolerance.
<u>Minor</u>	
201	Identification markings missing, incorrect, or illegible.
202	Color code painting in adequate.
203	Workmanship requirements not met.

4.6.2 Reinspection. Lots rejected for minor defects may be reworked and reinspected using 100 percent inspection techniques. Any units which conform may be delivered on the contract or purchase order.

4.6.3 Performance test. The first article elements shall be operated at the conditions specified in table I and 3.5.3 to determine that the discharge capacity conforms to 3.5.2. When subjected to the saturated steam temperature and pressure, the element shall close and conform to 3.5.1.

4.6.4 Hydrostatic strength test. All steam trap housings shall be tested to comply with the requirements of 3.5.4. Test pressure shall be held for 3 to 5 minutes. The unit shall not rupture (sustain a fracture of the body or cover) or become deformed.

4.7 Inspection of packaging. Sample packages and packs, and the inspection of the preservation, 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 6.2.)

5.1 General.

5.1.1 Navy fire-retardant requirements.

- (a) Treated lumber and plywood. Unless otherwise specified (see 6.2), all lumber and plywood including laminated veneer material used in shipping containers and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

MIL-T-2118C(SH)

5.3.2.1.2 Weight. Wood, plywood, and cleated type containers exceeding 200 pounds gross weight shall be modified by the addition of skids in accordance with MIL-STD-2073-1 and the applicable container specification or appendix thereto.

5.3.2.1.3 Waterproofing. Unless otherwise specified (see 6.2), level A and, when specified (see 6.2), level B shipping containers shall be provided with caseliners, linings, wraps, or shrouds in accordance with the waterproofing requirements of MIL-STD-1186.

5.3.3 Commercial. Material preserved as specified (see 5.2) shall be packed for shipment in accordance with ASTM D 3951 and herein.

5.3.3.1 Container modification. Shipping containers exceeding 200 pounds gross weight shall be provided with the minimum of 3- by 4-inch nominal wood skids laid flat, or a skid- or sill-type base that will support the material and facilitate handling by mechanical handling equipment during shipment.

5.4 Marking. Marking shall be as specified in 5.4.1.

5.4.1 Level A, B, C, and commercial. In addition to any special marking required (see 6.2), level A, B, and C interior packs and shipping containers shall be marked in accordance with MIL-STD-2073-1, appendix F, and commercial interior packs and shipping containers shall be marked in accordance with ASTM D 3951. In addition, bar coding shall be applied in accordance with the marking requirements of MIL-STD-2073.

6. NOTES

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

6.1 Intended use. Thermostatic traps are installed to drain steam radiators, thermoventilating heating units, laundry and galley equipment, heating coils for exposed tanks, pantries, showers and waterclosets.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification.
- (b) Class and size required (see 1.2).
- (c) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- (d) When first article is required (see 3.1).
- (e) Trap configuration when nonstandard is specified (see 3.4.3 and 6.5).
- (f) When castings are to be nickel plated internally and externally (see 3.8).
- (g) Inspection conditions, if other than specified (see 4.3).
- (h) Navy fire-retardant requirements (see 5.1.1(a)).
- (i) Level of preservation and packing required (see 5.2 and 5.3).

MIL-T-2118C(SH)

- (j) If container selection is at contractor's option (see 5.2.1.1 and 5.3.2).
- (k) When caseliners are required (see 5.3.2.1.3).
- (l) Special marking required (see 5.4.1).
- (m) Applicable part or identifying number (PIN) (see 6.5).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
3.4	DI-M-24037	Literature, descriptive	---
3.4 and appendix	DI-DRPR-80651	Engineering drawings	Level 3
4.1.1	DI-R-4803	Inspection system program plan	---
4.5.3	DI-T-5329	Inspection and test reports	---

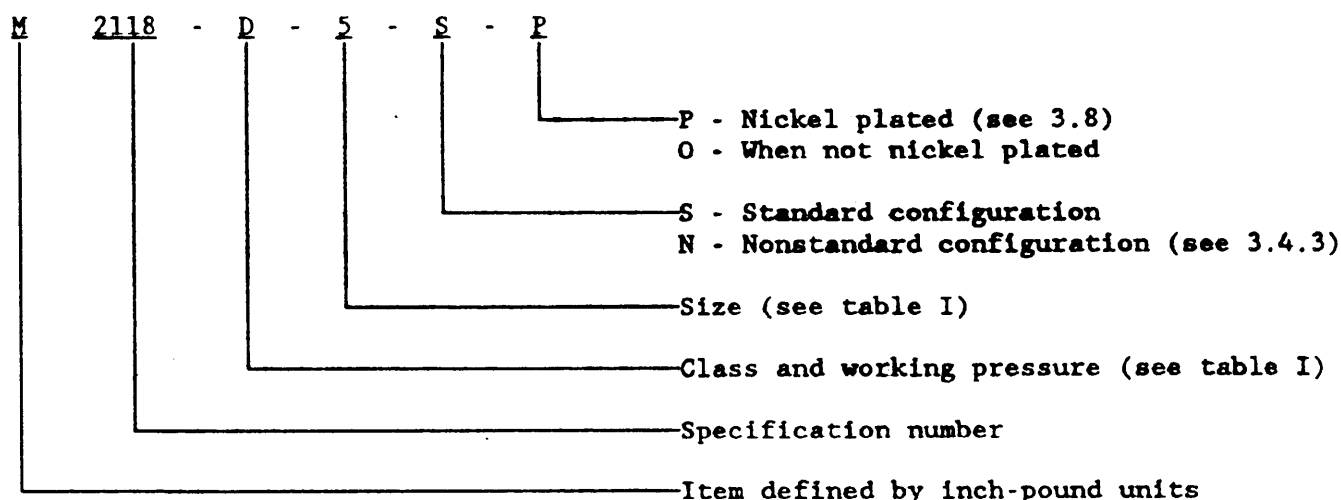
The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first ___ production items, a standard production item from the contractor's current inventory (see 3.1), and the number of items to be tested as specified in 4.4. The contracting officer should also 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. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

MIL-T-2118C(SH)

6.5 Part or identifying number (PIN).

6.5.1 Steam trap assembly. The PIN for steam trap assemblies should be constructed as follows:



6.5.2 Steam trap thermostatic element. The PIN for steam trap thermostatic elements should be constructed the same as for the steam trap assembly except configuration and plating will not apply; for example: M2118-D-5.

6.6 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.

6.7 Subject term (key word) listing.

Equipment, galley
 Equipment, laundry
 Heating coil
 Steam radiator
 Temperature, differential
 Thermostatic element
 Thermoventilating heating unit
 Union end

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

Preparing activity:
 Navy - SH
 (Project 4730-N026)

MIL-T-2118C(SH)

APPENDIX

ENGINEERING DRAWINGS TECHNICAL CONTENT REQUIREMENTS

10. SCOPE

10.1 Scope. This appendix covers the technical content requirements that shall be included on drawings when required by the contract or order. This appendix is mandatory only when data item description DI-DRPR-80651 is cited on the DD Form 1423.

20. APPLICABLE DOCUMENTS

This section is not applicable to this appendix.

30. DRAWINGS

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

(a) Preliminary drawings.

- (1) Sectional assembly of steam trap.
- (2) Identification of operating parts and valve seat.
- (3) Bill of materials listing specification, grade, condition, and any other data required to identify the properties of the proposed materials.

(b) Final drawings.

- (1) Information on the preliminary drawings.
- (2) Outline drawing.
- (3) Overall dimensions and clearances, including those dimensions pertinent to installation.
- (4) Surface finishes with finish marks for machined surfaces.

30.2 Descriptive literature. Descriptive literature sufficient to permit evaluation of the design and materials as necessary to determine conformance with the specification requirements may be prepared in lieu of drawings. When used, the literature shall show the unique requirements required for preliminary drawings.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

1. RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-T-2118C(SH)	2. DOCUMENT DATE (YYMMDD) 22 August 1990
3. DOCUMENT TITLE TRAP, STEAM, ANGLE, THERMOSTATIC			
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER INFORMATION			
a. ADDRESS (Include Zip Code)		b. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (if applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME Technical Point of Contact (TPOC): Joe Pease (SEA 56Y23) PLEASE ADDRESS ALL CORRESPONDENCE AS FOLLOWS:		b. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON TPOC: 703-602-0367 8-322-0367	
c. ADDRESS (Include Zip Code) Commander, Naval Sea Systems Command Department of the Navy (SEA 55Z3) Washington, DC 20362-5101		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	