

MIL-W-16642D(SH)  
12 August 1980  
SUPERSEDING  
MIL-W-16642C(SHIPS)  
6 April 1966  
(See 6.5)

## MILITARY SPECIFICATION

### WATER TESTING OUTFIT, BOILER

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 boiler water testing outfits for use with boiler-water testing chemicals covered by MIL-C-15000.

#### 2. APPLICABLE DOCUMENTS

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

#### SPECIFICATIONS

##### FEDERAL

QQ-S-698 - Steel, Sheet and Strip, Low-Carbon.  
TT-C-490 - Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings.  
TT-P-645 - Primer, Paint, Zinc-Chromate, Alkyd Type.  
NNN-B-1194 - Bottles: Dropper, and Dropping TK.  
PPP-B-591 - Boxes, Shipping, Fiberboard, Wood-Cleated.  
PPP-B-601 - Boxes, Wood, Cleated-Plywood.  
PPP-B-636 - Boxes, Shipping, Fiberboard.  
PPP-B-640 - Boxes, Fiberboard, Corrugated, Triple Wall.

##### MILITARY

MIL-P-116 - Preservation-Packaging , Methods of.  
MIL-L-10547 - Liners, Case and Sheet, Overwrap: Water-Vaporproof and Waterproof Flexible.  
MIL-E-15090 - Enamel, Equipment, Light-Gray (Formula No. 11).

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 3112, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 6640

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STANDARD

MILITARY

MIL-STD-129 - Marking for Shipment and Storage.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific acquisition functions should be obtained from the contracting 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.

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification Ratings, Rules and Regulations

(Application for copies should be addressed to the Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC. AGENT

National Motor Freight Classification

(Application for copies should be addressed to the National Motor Freight Traffic Association, Inc., ATA TRAFFIC Dept., 1616 "P" Street. N.W., Washington, DC 20036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A 611 - Steel, Cold-Rolled Sheet, Carbon, Structural, Specification for.

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

(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.)

39 REQUIREMENTS

**3.1 Material.** Material shall be as specified hereinafter.

**3.1.1 Recovered materials.** Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and shall 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 allowed under this specification unless otherwise specifically specified.

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3.2 Component parts. Each boiler-water testing outfit shall consist of the following:

- One cabinet.
- Three 1-liter (L) reagent bottles.
- Three automatic-zero burets, 10-milliliter (mL) capacity.
- Three aspirator-bulb assemblies for filling burets.
- One 340-mL white porcelain casserole.
- One 100-mL graduated cylinder.
- One 60-mL dropping TK - bottle for phenolphthalein indicator.
- One 60-mL dropping TK - bottle for methyl purple indicator.
- One 60-mL dropping TK - bottle for chloride indicator.
- Six stirring rods.
- One collapsible tube of stopcock lubricant.
- One 8-ounce square bottle.

3.2.1 Cabinet. The cabinet shall be as shown in Figure 1. The case shall be made of cold rolled steel sheet at least 0.035 inch in thickness conforming to commercial quality of ASTM A 611. The edges of the body shall be turned over and all corners shall be brazed or welded. The door shall be made of cold rolled steel sheet at least 0.035 inch in thickness conforming to commercial quality of ASTM A 611 or equivalent. The edges of the door shall have a double turn-over.

3.2.1.1 Door fittings. The door shall be carried on at least two suitable plain steel hinges and arranged with a stop to permit half-open and full-open positions. A combined latch and lock with key shall be provided.

3.2.1.2 Finish. The interior surfaces shall be prepared for painting in accordance with type I of TT-C-490. Painting shall consist of one coat primer conforming to TT-P-645 and two coats of gray enamel in accordance with type III, class 2 of MIL-E-15090.

3.2.1.3 Spring clamps. Spring clamps shall be mounted and positioned as shown on figure 1. The clamps shall be made of corrosion-resistant steel or other corrosion-resistant metal, and shall be so shaped as to firmly grip the removable components of the testing outfit.

3.2.1.4 Casserole ring. The casserole ring shall be fabricated from one-quarter inch plain steel rod and shall be provided with a pivoted arrangement to permit folding into the cabinet. The pivoted arrangement shall lock the ring when in the vertical position. The circumference of the ring shall be covered with rubber tubing.

3.2.1.5 Light fixture. The cabinet shall be provided with a light fixture (regular base) mounted on a metal angle bracket so positioned to contain either a tubular 40-Watt bulb or a standard 25-Watt incandescent bulb. The fixture shall be provided with a "T" rated toggle switch. The electrical cord to the lamp fixture shall be rubber or plastic insulated, at least 6 feet long measured from the exit from the cabinet: shall enter the cabinet through a rubber grommet, and shall have a standard male plug at the end outside the cabinet.

3.2.1.6 Rubber mat. A rubber mat shall be snugly fitted and cemented to the cabinet floor with an acid resistant cement.

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3.2.1.7 Identification plate. An identification plate made from 16 gage (approximately 0.0598 inch) stainless steel shall be affixed to the exterior of the door at the center with the inscription "Boiler-Water Testing Outfit".

3.2.2 Reagent bottles. Reagent bottles shall be 1 L capacity rugged glass bottles for holding testing solutions. A high quality of clear glass shall be used to prevent any etching of the glass by the reagents. Each bottle shall have a horizontal line and the letters "1,000 mL" raised and ground or other permanent labeling at or near the neck or throat. Each reagent bottle when filled to the horizontal line, shall contain 1000 mL  $\pm$  10 mL when calibrated as specified in 4.3.2. The bottles shall be approximately 4-1/4-inches in diameter with an overall height of approximately 8 inches. Two of the bottles shall be labeled respectively with the words "NITRIC ACID" and "MERCURIC NITRATE", in raised or ground letters or other permanent labeling, all of equal height and of such size as to be easily readable. The mercuric nitrate bottle shall be made of amber or brown glass. The mercuric nitrate bottle is unlabeled. Two No. 9 rubber stoppers shall be required for each bottle: one being solid and the other having two holes for the automatic-zero buret and the aspirator bulb assembly.

3.2.3 Automatic-zero burets. Automatic-zero burets shall have a capacity of 10 mL. The buret shall be so constructed that solution in excess of that required to bring the level of liquid in the filled buret exactly to the zero mark will drain back in the reagent bottle. Each buret shall be graduated in tenths of a milliliter, with the numbers placed to the side so that interference with taking readings by the inner feed tube is avoided. The graduations shall be easily readable. Each buret shall be made from a glass tubing and shall have the following dimensions:

Feed tube: 8 millimeter (mm) outside diameter (O.D.) by 1 mm thick and 9-inches long.  
 Inside siphon tube: 1 mm wall thickness by not more than 5 mm O.D. diameter.  
 Outside tube: wall thickness of 1-1.5 mm.  
 Discharge tube containing stopcock: 4-inches long.  
 Vent hole: Not more than 1 mm diameter.  
 Length of graduations: 14-16 centimeters (cm).  
 Stopcocks: Standard 5/16-inch tube by 1 mm opening in plug.  
 Overall length of buret: 18 inches.

The discharge tube shall be attached as near the bottom of the buret as possible to facilitate complete drainage and shall be directly in front of the graduations. The axis of the stopcock plug shall be set at an angle of approximately 15 degrees to the horizontal, with the handle up and to the right, and with a rubber washer on the lower end to prevent the plug from pulling out. The graduations shall end just above the opening of the discharge tube so that there will be a clear length of at least 1.5 inches above the zero graduation. The entire buret shall be of the good workmanship and shall deliver 10 mL  $\pm$  0.1 mL when calibrated as specified in 4.3.2. Subsequent to manufacture, the buret assembly shall be annealed to remove all strains.

3.2.4 Aspirator-bulb assemblies. The 2-ounce size aspirator-bulb shall be made from natural or synthetic rubber. A small, glass, short-arm T-tube shall be provided between the bulb and the bottle so that the open

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end of the arm can be covered with the thumb when the buret is filled, pressure in the bottle being released by removal of the thumb. The T-tube shall be made of 6 mm O.D. tubing. All ends shall be fire-polished.

3.2.5 Casserole. The casserole shall conform to NNN-C-25, type I, class 1, 340 mL capacity.

3.2.6 Graduated cylinder. The graduated cylinder shall be of 100 mL capacity. This shall be a standard laboratory TD type having 1 mL graduations. The graduated cylinder shall be made of glass and shall deliver 100 mL  $\pm$  0.5 mL when calibrated as specified in 4.3.2.

3.2.7 Dropping TK-bottles. The dropping TK-bottles shall conform to NNN-B-1194, type I, class 2, grade B, size 2. The bottles shall bear permanent labels which read "Phenolphthalein", "Methyl Purple", and "Chloride Indicator", respectively. Raised ground-glass letters on the bottle are considered satisfactory.

3.2.8 Stirring rods. Stirring rods shall be 7-inch glass rods of 3/16-inch diameter. Each rod shall be fire-polished to smooth and round the ends.

3.2.9 Stopcock lubricant. A collapsible tube containing approximately 1-ounce of high quality stopcock grease shall be furnished.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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.

#### 4.2 Sampling.

4.2.1 Lot. For purposes of sampling, a lot shall consist of all complete testing outfits or component parts presented at one time for acceptance.

4.2.2 Sampling for inspection. A random sample of complete testing outfits or component parts shall be selected in accordance with MIL-STD-105 with a AQL of 4.0.

#### 4.3 Inspection.

4.3.1 Visual and dimensional examinations. Each of the sample complete testing outfits or component parts selected shall be visually and dimensionally examined to verify compliance with this specification. If any complete testing outfit or component part in the sample contains one or more visual or dimensional defect, such shall be cause for rejection of the defective outfit or part, and if the number of defective testing outfits or component parts in any sample exceeds the acceptance number for that sample, this shall be cause for rejection of the lot represented by the sample.

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4.3.2 General calibration instructions. The reagent bottles shall be calibrated by weighing the quantity of distilled water they contain and calculating the volume. The automatic-zero burets and graduated cylinder shall be calibrated by weighing the quantity of water they deliver, and then calculating the volume. To calculate the volume, it is necessary to determine the temperature of the distilled water used, and then obtain its density at the observed temperature from any reference or text book. The volume shall then be calculated by dividing the weight of water contained or delivered by the density of the water. The glassware used in the various calibration tests shall be thoroughly cleaned, prior to test, using a cleaning solution consisting of concentrated sulfuric acid which is saturated with sodium bichromate. The glassware shall then be thoroughly rinsed with distilled water. A thin film of stopcock lubricant shall be applied to each stopcock before use.

4.3.2.1 Calibration of reagent bottles. Weigh the dry reagent bottle on a platform balance to the nearest 1.0 gram (g). Then fill the bottle with distilled water to the 1000 mL mark and reweigh to the nearest 1.0 g. Calculate the volume. The difference between the nominal and calculated volume of the bottle shall not be greater than plus or minus 10 mL.

4.3.2.2 Calibration of the automatic-zero burets. Support the buret in a vertical position on a bottle provided with a means of filling the buret with an aspirator bulb. The assembly used shall simulate or duplicate actual use (see figure 1). Fill the bottle with distilled water, then fill the buret with the water by means of the aspirator bulb and allow to drain completely. Refill the buret, and drain a small quantity of water to fill the tip of the buret. Refill. Slowly drain the water contained from the zero to the 10 g L graduation into a weighed, dry weighing bottle. Allow sufficient time for the water to completely drain from the internal surfaces of the buret. Touch the tip of the buret to the inside of the bottle. Weigh the water delivered to the nearest 1.0 milligram (mg), and calculate the volume of the buret. The difference between the nominal and calculated volume of the buret shall not be greater than plus or minus 0.1 mL.

4.3.2.3 Calibration of the graduated cylinder. Fill the graduate with distilled water, then discard the water. Refill the graduate to the 100 mL graduation. Pour the water into a weighed dry weighing bottle. Allow sufficient time for the water to completely drain from the internal surfaces of the graduate. Touch the tip of the graduate to the inside lip of the weighing bottle. Weigh the water delivered to the nearest 1.0 mg and calculate the volume of the graduate. The difference between the nominal and calculated volume for the 100 mL graduate shall not be greater than plus or minus 0.5 mL.

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

## 5. PACKAGING

(The preparation for delivery requirements specified herein apply only for direct Government acquisitions. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.3.).

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5.1 Preservation-packaging. Preservation-packaging shall be level A or C, as specified (see 6.2).

5.1.1 Level A. Each complete testing outfit shall be unit protected in accordance with method III of MIL-P-116 and as follows: Components of each test outfit shall be contained within the cabinet (see 3.2 and 3.2.1) in their specific positions by the use of interior blocking, individual wrapping, molded forms, partitions or other such media that will insure the integrity of each component from breakage, loss, contact between items and to prevent dislodgement or movement.

5.1.2 Level C. Each testing outfit shall be packaged to afford protection against deterioration, loss of contents and plupical damage during shipment from the supply source to the first receiving activity for immediate use. The contractor's normal retail or wholesale packaging methods may be utilized when such meets the requirements of this level.

5.2 Packing. Packing shall be level A, B or C as specified (see 6.2).

5.2.1 Level A. Testing outfits packaged as specified in 5.1 shall be individually packed in containers conforming to any one of the following specifications at the option of the contractor.

<u>Specification</u>	<u>Container</u>	<u>Class or Type</u>
PPP-B-591	Fiberboard, wood cleated	Class II
PPP-B-601	Wood, cleated-plywood	Overseas type
PPP-B-636	Fiberboard	Weather-resist- ant
PPP-B-640	Fiberboard-corrugated Triple wall	Class 2

Wood cleated fiberboard and plywood containers shall be closed, strapped or banded in accordance with the applicable container specification or appendix thereto. Unless otherwise specified (see 6.2), wood cleated fiberboard and plywood boxes shall have case liners conforming to MIL-L-10547. Case liners shall be closed and sealed in accordance with MIL-L-10547. Fiberboard shipping containers shall be closed and water-proofed in accordance with the appendix to the applicable fiberboard box specification or appendix thereto with method V closure applicable to PPP-B-636 boxes. Reinforcing of fiberboard boxes shall be accomplished by the use of non-metallic banding or pressure sensitive reinforced tape at the contractor's option.

5.2.2 Level B. Testing outfits packaged as specified in 5.1, shall be individually packed in containers as specified in 5.2.1, except that the containers shall be of the domestic type or class and case liners or waterproofing of containers is not required. Container closures shall be in accordance with the applicable specification or appendix thereto with method I closure applicable for PPP-B-636 boxes.

5.2.3 Level C. Testing outfits packaged as specified in 5.1 shall be packed in containers acceptable to the common carrier and which will insure safe delivery at distination in a satisfactory condition at the lowest applicable rate.



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## 5.3 Cushioning, dunnage, and wrapping materials.

5.3.1 Level A preservation-packaging and level A and B packing. Use of all types of loose-fill materials for packaging and packing applications such as cushioning filler, or dunnage is prohibited for materials destined for shipboard installation or stowage.

5.3.2 Level C preservation-packaging and packing. when loose fill type materials are used for packaging and packing applications such as cushioning, filler, and dunnage, all containers (unit, intermediate, and shipping) shall be marked or labelled with the following information:

## "CAUTION"

"Contents cushioned with loose-fill material shall not be taken onboard ship. Remove and discard loose-fill material. If requires, recushion with cellulosic material, bound fiber, fiberboard, or transparent flexible cellular material."

5.3.3 Cushioning, filler, dunnage and wrapping materials selected, whenever available, shall exhibit improved performance for resistance to fire. Containers, packing or method of shipment shall comply with Uniform Freight or National Motor Freight Classification Rules or Regulations or other carrier rules as applicable to the mode of transportation.

5.4 Marking. In addition to any special marking required (see 6.2), shipping containers shall be marked in accordance with MIL-STD-129, and MIL-P-116, table V therein.

## 6. NOTES

6.1 Intended use. The testing outfits covered by this specification are intended to hold and disperse the chemicals used for testing of shipboard boiler water and feed water testing.

6.2 Ordering data. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Levels of preservation-packaging and packing required (see 5.1 and 5.2).
- (c) When case liners are not required (see 5.2).
- (d) Special marking required (see 5.4).

6.3 Provisioning. Provisioning Technical Documentation (PTD), spare parts, and repair parts (components, see 3.2), should be furnished as specified in the contract.

6.3.1 When ordering spare parts or repair parts (components, see 3.2), 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.



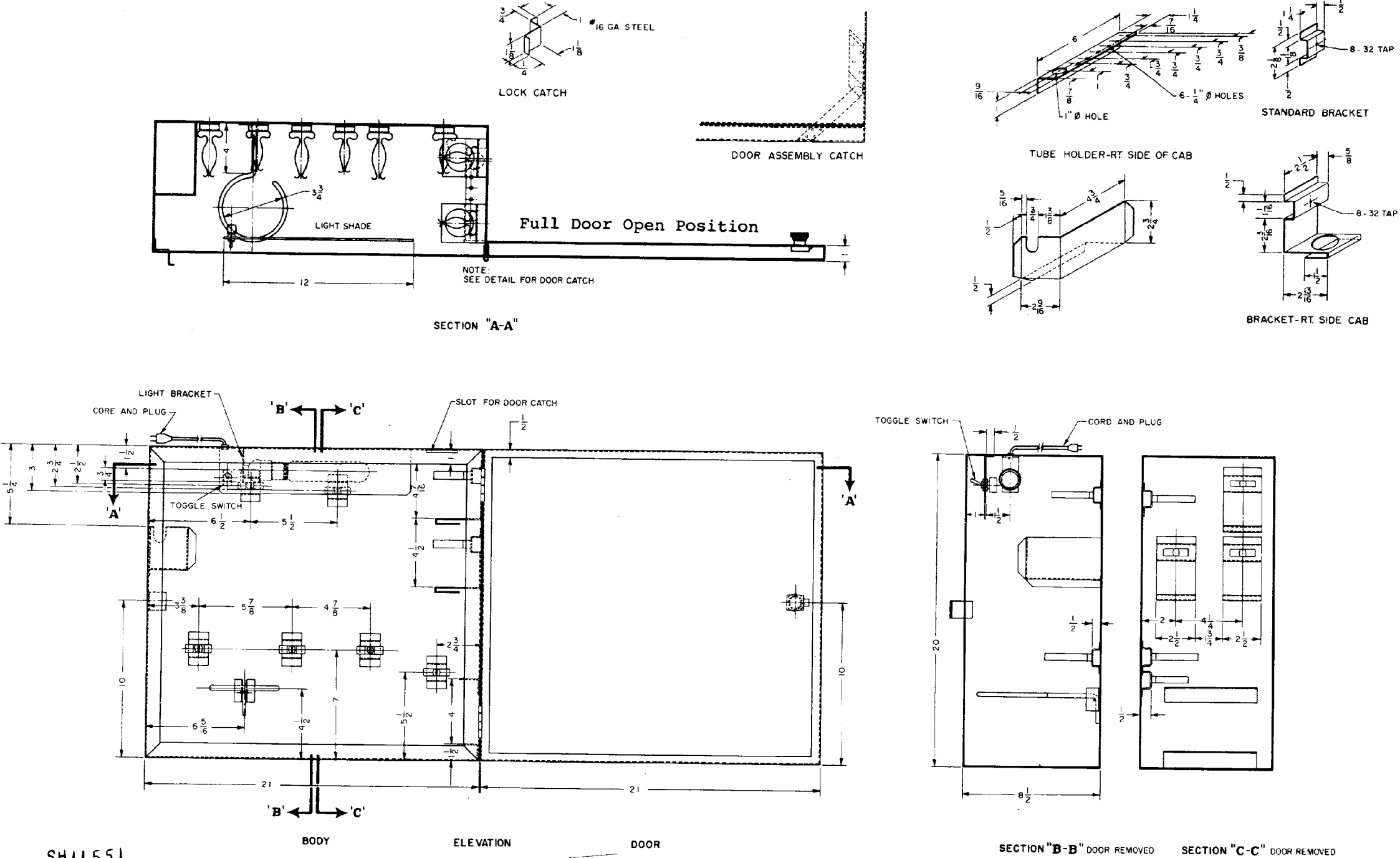
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6.4 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate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

6.5 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  
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