

INCH - POUND

MIL-B-3180E  
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SUPERSEDING  
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## MILITARY SPECIFICATION

### BOILERS AND RELATED EQUIPMENT PACKAGING OF

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

#### 1. SCOPE

1.1 Scope. This specification covers the requirements for preservation, packing, and marking of boilers and related equipment.

#### 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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research, Development, and Engineering Center, ATTN: STRBE-TSE, Fort Belvoir, VA 22060-5606 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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## SPECIFICATIONS

## FEDERAL

- |           |   |
|-----------|---|
| TT-P-664  | - Primer Coating, Alkyl, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant. |
| UU-S-48   | - Sacks, Shipping, Paper.   |
| UU-T-81   | - Tags, Shipping and Stock.   |
| PPP-B-601 | - Boxes, Wood, Cleated-Plywood.   |
| PPP-B-621 | - Boxes, Wood, Nailed and Lock-Corner.  |
| PPP-B-636 | - Boxes, Shipping, Fiberboard.  |
| PPP-C-96  | - Cans, Metal, 28-Gage and Lighter.   |
| PPP-C-843 | - Cushioning Material: Cellulosic.  |
| PPP-D-711 | - Drum, Metal Shipping, Steel, Lightweight (55 Gallon).                               |
| PPP-E-911 | - Excelsior, Wood, Fabricated Pads and Bulk Form.                                     |
| PPP-P-40  | - Packaging and Packing of Hand Tools.  |

## MILITARY

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|-------------|---|
| MIL-V-3     | - Valves, Fittings, and Flanges (Except for Systems Indicated Herein): Packaging of.            |
| MIL-C-104   | - Crates, Wood; Lumber and Plywood Sheathed, Nailed and Bolted.                                 |
| MIL-P-116   | - Preservation, Methods of.   |
| MIL-B-121   | - Barrier Material, Greaseproofed, Waterproofed, Flexible.                                      |
| MIL-L-2105  | - Lubricating Oil, Gear, Multipurpose.  |
| MIL-C-3774  | - Crates, Wood; Open 12,000- and 16,000-Pound Capacity.   |
| MIL-C-5501  | - Cap and Plug, Protective, Dust and Moisture Seal.   |
| MIL-E-10062 | - Engines: Preparation for Shipment and Storage of.   |
| MIL-E-16298 | - Electric Machines Having Rotating Parts and Associated Repair Parts: Packaging of.            |
| MIL-D-16791 | - Detergent, General Purpose (Liquid, Nonionic).  |
| MIL-E-17555 | - Electronic and Electrical Equipment, Accessories, and Repair Parts, Packaging and Packing of. |
| MIL-T-22085 | - Tape, Pressure-Sensitive Adhesive, Preservation and Sealing.                                  |
| MIL-B-22191 | - Barrier Material, Transparent, Flexible, Heat Sealable.                                       |

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| MIL-B-26195 | - Box, Wood-Cleated, Skidded, Load-Bearing Base.             |
| MIL-C-52950 | - Crate, Wood, Open and Covered.                             |
| MIL-V-62038 | - Vehicle, Wheeled, Preparation for Shipment and Storage of. |

## STANDARDS

## FEDERAL

- |             |  |
|-------------|--|
| FED-STD-101 | - Preservation, Packaging, and Packing Materials: Test Procedures. |
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- |              |  |
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| MIL-STD-105  | - Sampling Procedures and Tables for Inspection by Attributes.                               |
| MIL-STD-129  | - Marking for Shipment and Storage.  |
| MIL-STD-1186 | - Cushioning, Anchoring, Bracing, Blocking and Waterproofing; with Appropriate Test Methods. |

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 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 SOCIETY FOR TESTING AND MATERIAL (ASTM)

- |        |  |
|--------|--|
| D 3953 | - Strapping, Flat Steel and Seals.               |
| D 4675 | - Selection and use of Flat Strapping Materials. |

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

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

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3.1 Materials. Materials shall be as specified herein and in applicable specifications and standards. Materials not specified shall be selected by the contractor and shall be subject to all provisions of this specification. Materials shall be free of defects.

3.2 Caution. Only type P-14 preservative (see 3.4.1.3) shall be used on metal surfaces that will contact potable water.

3.3 First article. Unless otherwise specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.4 Preservation. Preservation shall be level A or C as specified (see 6.2).

3.4.1 Level A.

3.4.1.1 Disassembly. Disassembly of the boilers and related equipment shall be the minimum necessary to safeguard parts vulnerable to damage, pilferage, and loss. The extent of further disassembly shall be confined to the removal of protruding parts that would otherwise increase cubage; however, disassembly shall be limited to those parts that can be removed and reinstalled without special tools and skilled personnel. Removed bolts, nuts, pins, screws, and washers shall be reinstalled in mating parts and secured to prevent their loss. Removed keys shall be secured in the keyway of the shaft.

3.4.1.2 Matchmarking. Removed parts and mating parts on the boilers and related equipment shall be matchmarked when necessary to facilitate reassembly. Matchmarking information shall be on tags conforming to UU-T-81, type A, and the tags attached to the mating parts. Waterproof ink shall be used for marking the information on the tags.

3.4.1.3 Cleaning, drying, and preservation. Surfaces to which a preservative is to be applied shall be cleaned and dried in accordance with MIL-P-116. Preservatives specified herein by "P" numbers shall conform to the applicable specifications listed in and shall be applied in accordance with MIL-P-116.

3.4.1.4 Unprotected surfaces. Unprotected exterior metal surfaces requiring the application of a contact preservative in accordance with MIL-P-116 and not specifically specified herein or in the end item specification shall be coated as follows.

3.4.1.4.1 Unfinished (not machined) surfaces. Unfinished exterior metal surfaces shall be coated with type P-1 preservative.

3.4.1.4.2 Machined surfaces. Exposed machined surfaces shall be coated with P-6 or P-11 preservative and wrapped or covered as applicable with barrier material conforming to MIL-B-121, type I or II, grade A, class 2 or MIL-B-22191, type II. The material shall be secured in place with tape conforming to MIL-T-22085, type II.

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3.4.1.5 Pumps. Water pumps shall be drained and the interior surfaces coated with type P-3 preservative. Oil and fuel pumps shall be drained and the interior surfaces coated with P-10, type I, grade 30 preservative. The pumps shall be actuated during application of the preservatives to insure coating of all interior surfaces. Excess preservative shall be drained and the drain and fill plugs coated with the applicable type of preservative (for water or oil) specified herein, and the plugs reinstalled. Openings into the pumps shall be sealed with caps or plugs as applicable conforming to MIL-C-5501 or with tape conforming to MIL-T-22085, type II. Unpainted exterior surfaces of pumps requiring a contact preservative in accordance with MIL-P-116 shall be coated with type P-1 preservative.

3.4.1.6 Drive belts and pulleys. Drive belts shall be removed from the equipment or released from tension. Pulley faces shall be coated with primer conforming to TT-P-664. Removed belts shall be preserved in accordance with MIL-P-116, method IC-1 or IC-3.

#### 3.4.1.7 Gears.

3.4.1.7.1 Exposed gears. Exposed gears shall be coated with primer conforming to TT-P-664 or with type P-1 preservative.

3.4.1.7.2 Enclosed gears. Gears operating on lubricating oil (SAE 10, 30, or 50) shall have the housing filled to the operating level with P-10, type I, grade 10, 30, or 50 preservative as applicable and the gears operated to insure complete coverage. A tag shall be attached indicating: "The preservative contained in the gear housing is adequate for operating and shall remain in the housing until the first required lubrication change." Gears operating on lubricant (SAE 80 or 90) shall be filled to the operating level with lubricant conforming to MIL-L-2105, grade as applicable. A tag shall be attached indicating: "The lubricant contained in the gear housing is adequate for operation and shall remain in the housing until the first required lubricant change." Gears not operating on lubricating oil (SAE 10, 30, or 50) or lubricant (SAE 80 or 90) shall have the housing filled to the operating level with the approved lubricant required for operation. A tag shall be attached indicating: "The housing contains the lubricant required for operation and the lubricant shall remain in the housing until the first required lubricant change." Tags shall conform to UU-T-81, type A and shall be attached in a conspicuous location. Information on the tags shall be applied with waterproof ink.

#### 3.4.1.8 Chains.

3.4.1.8.1 Exposed roller chains. Exposed roller chains shall be coated with enough type P-3 or P-9 preservative to insure penetration of the preservative to the inner surfaces of the rollers, pins, and bushings. After the excess preservative has drained, the entire chain and the sprockets shall be coated with type P-1 preservative. Chains, if removed from the equipment,

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shall be coated with preservatives specified herein, individually coiled and each coil wrapped with barrier material conforming to MIL-B-121, type II, grade A, class 2 or MIL-B-22191, type II. The barrier material shall be secured in place with tape conforming to MIL-T-22085, type II.

3.4.1.8.2 Enclosed roller chains. Enclosed roller chains and chain housings shall be preserved, filled, and tagged as specified in 3.4.1.7.2 for enclosed gears.

3.4.1.8.3 Nonprecision chains. Nonprecision chains shall be coated with primer conforming to TT-P-664 or with type P-1 preservative.

3.4.1.9 Rotating electrical equipment and components. Electrical equipment having rotating parts such as motors, fans, and blowers shall be preserved in accordance with MIL-E-16298, level A, using the alternate method specified for equipment assembled to machines. Electrical components such as rheostats, converters, transformers, control panels, switches, instruments, and warning devices removed from the equipment shall be preserved in accordance with the MIL-E-17555, level A or in accordance with MIL-P-116, using the submethod most applicable to provide the degree of protection required, as established by the intended use criteria of MIL-P-116. Electrical components not removed from the equipment shall be wrapped or covered with barrier material conforming to MIL-B-121, type II, grade A, class 2 or MIL-B-22191, type II. The wraps or covers shall be secured in place with tape conforming to MIL-T-22085, type II.

3.4.1.10 Pressure gages, flow meters, and water column gages. Openings into the interior of the cases enclosing pressure gauges, flow meters, and water column gauges, installed on the equipment, shall be covered with barrier material conforming to MIL-B-121, type II, grade A, class 2 or small openings shall be sealed with tape conforming to MIL-T-22085, type II. Barrier material shall be secured in place with tape specified herein. Glass surfaces of gauges, meters, and water column glass not protected by a cover shall be protected against damage by a fitted bridge of hardboard secured in place with tape specified herein. Gauges, meters, and water column glass not installed or removed from the equipment shall be individually preserved in accordance with method III. Containers shall conform to PPP-B-636, W5c or W6c. Closure shall be in accordance with the appendix to the box specification.

3.4.1.11 Waterside of boilers. The waterside of boilers shall be drained and dried. Except for lined boilers, and unless otherwise treated to resist corrosion, all interior surfaces of the tanks shall be coated with type P-3 preservative, accomplished by spraying, fogging, or by completely filling the system with preservative and draining, or by partially filling the system with preservative and rotating the boiler to insure complete coverage of all interior surfaces with preservative. Excess preservative shall be drained. The boiler shall be tagged to indicate that the preservative shall be removed prior to placing the boiler in operation and the method of removal. Tags shall conform to UU-T-81, type A and shall be attached in a conspicuous location. Information on the tags shall be applied with waterproof ink. Removal of the type P-3 or P-14 preservative (when applicable) from water

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contacting surfaces may be accomplished by filling the waterside of the boiler or tank with 1/2-ounce of detergent conforming to MIL-D-16791, type I, to each 1 gallon of water. This cleaning shall be followed by a rinse of clear hot water. The required quantity of detergent shall be furnished with each boiler or tank. Threads shall be coated with the preservative and the threaded openings shall be closed with plastic caps or plugs conforming to MIL-C-5501. Other openings shall be sealed with tape conforming to MIL-T-22085, type II or large openings shall be covered with barrier material conforming to MIL-B-121, type II, grade A, class 2 or MIL-B-22191, type II, secured in place with tape specified herein.

3.4.1.12 Surge, condensate, and hot water tanks. Interior surfaces of the tanks shall be drained and dried. Except for lined tanks, and unless otherwise treated to resist corrosion, all interior surfaces of the tanks shall be coated with type P-3 preservative, unless the tank is intended to be used for disbursement of potable water, such as those water tanks used in mess halls, hospitals, and housing facilities, in which case the interior surfaces of the tanks shall be coated with type P-14 preservative. Excess preservative shall be drained and the openings sealed as specified in 3.4.1.11. Metal surfaces of any equipment contained within the tanks such as circulating coils, piping, and related fittings, requiring the application of a contact preservative in accordance with MIL-P-116, shall be coated with the applicable type preservative specified herein. The tanks shall be tagged as specified in 3.4.1.11. A quantity of detergent as specified in 3.4.1.11 shall be included with each tank.

3.4.1.13 Steam injectors. Internal surfaces of the injectors shall be coated with type P-3 preservative. Injectors removed from the equipment shall be individually preserved in accordance with method IC-1 or IC-3.

3.4.1.14 Valves and fittings. Valves and fittings not installed on equipment and those removed during disassembly shall be preserved in accordance with MIL-V-3, level A.

3.4.1.15 Float-controlled valves. Float-controlled valves and mechanisms shall be removed from the equipment. Interior and exterior surfaces of the valves, if subject to corrosion, shall be coated with type P-3 preservative. The float-controlled valve and mechanism shall be preserved together, in accordance with method IC-1 or IC-3. If for any reason, the float-controlled valve and mechanism cannot be removed, the interior and exterior surfaces of the valves shall be coated with preservative as specified herein. Mechanisms, if liable to damage by vibration, shall be secured by blocking or with tape conforming to MIL-T-22085, type II.

3.4.1.16 Pipe and boiler tubes. Uncoated steel pipe, installed and not installed on the equipment, shall be coated on the inside and outside with type P-3 preservative, unless the pipe is intended to be used with hot water tanks for potable water as defined in 3.4.1.12, in which case the pipe shall be coated with type P-14 preservative. Uncoated steel boiler tubes not installed on the equipment when the inside is the waterside shall be coated on



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the waterside with type P-3 preservative. When the waterside is on the outside of the tube, the tube shall be coated both on the waterside and the fireside with type P-3 preservative, and each tube shall be wrapped with barrier material conforming to MIL-B-121, type II, grade A, class 2 or MIL-B-22191, type II, secured in place with tape conforming to MIL-T-22085, type II. The ends into all pipe and tubes shall be sealed with plastic plugs or caps conforming to MIL-C-5501 or with barrier material as specified herein. The barrier material shall be secured with tape as specified herein.

3.4.1.17 Burners, blowers, and connecting piping. The interior surfaces of burners, blowers, and piping of equipment shall be coated with P-10, type I, grade 30 preservative. Nozzles and jets shall be sealed with tape conforming to MIL-T-22085, type II. Unpainted exterior surfaces of the burners, blowers, and piping requiring the application of a contact preservative in accordance with MIL-P-116 shall be coated with type P-1 preservative. Electric motors for burners or blowers installed on equipment shall be preserved in accordance with MIL-E-16298, level A, using the alternate method specified for equipment assembled to machines. Electric motors removed from burners and blowers shall be preserved in accordance with MIL-E-16298, level A, method as required by machine enclosure and weight in table I, therein.

3.4.1.18 Burner fuel tanks. Interior surfaces of burner fuel tanks, if unlined or otherwise not treated to resist corrosion, shall be coated with P-10, type I, grade 30 preservative, applied by fogging, spraying, or completely filling and draining, as applicable.

3.4.1.19 Ashpits, fireboxes, tube ends, smoke boxes, and stacks. Unpainted exposed surfaces of ashpits, fireboxes, exposed fireside of tube ends, smoke boxes, and stacks shall be coated with type P-1 preservative.

#### 3.4.1.20 Refractories.

3.4.1.20.1 Installed linings. Linings that remain installed in the equipment shall be protected with blocking, bracing, and cushioning to prevent breaking or loosening due to shock and vibration encountered during shipment and handling.

3.4.1.20.2 Linings not installed. Refractory linings including brick, block, and shapes required for installation after delivery shall be placed in close-fitting boxes conforming to PPP-B-621, class 1, style optional or PPP-B-601, domestic type, style optional. To prevent damage to the linings, each piece of lining shall be separated from the others and from the inside faces of the boxes by cushioning with excelsior conforming to PPP-E-911, type I, class B, grade 6 or with cushioning material conforming to PPP-C-843, type I, class B, not less than 3/8-inch thick. Strapping shall not be required. The gross weight of each box shall not exceed 200 pounds. The boxes shall be packed with the basic unit of equipment. When specified (see 6.2), refractory linings required for each basic unit of equipment, in quantities as to prohibit packing with the basic unit, shall be placed in boxes as specified herein not to exceed the weight limitation of the boxes, except the boxes



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shall be class 2 or overseas type as applicable. Boxes shall be closed and strapped in accordance with the appendix to the applicable box specification. Strapping shall conform to ASTM D 3953, type 1 or 2, zinc-coated, size as applicable and ASTM D 4675. The boxes shall be shipped without overpacking at the same time as the basic unit of equipment for which intended.

3.4.1.20.3 Dry refractory and portland cement. Dry refractory (fire clay) shall be placed in paper sacks conforming to UU-S-48, 9-9X, in quantities of 60 pounds. Portland cement shall be contained in quantities of 94 pounds (0.48 cubic foot by absolute volume), or a lesser quantity when required for a single installation, in paper sacks conforming to UU-S-48, 17-17X. The sacks shall be closed in accordance with the sack specification.

3.4.1.20.4 Liquid paste and plastic cement. Wet-type pastes and cements shall be contained in the quantities required for the basic unit of equipment, in 1-gallon or 5-gallon cans as applicable, conforming to PPP-C-96, type V, class 1, plan B, or when applicable, in 55-gallon metal drums conforming to PPP-D-711, type III.

3.4.1.20.5 Sand. Sand and similar materials shall be contained in quantities of 80 pounds in paper sacks conforming to UU-S-48, 13-13X, type II.

#### 3.4.1.21 Insulation.

3.4.1.21.1 Blanket. Blanket insulation in rolls shall be individually placed in boxes conforming to PPP-B-636, W5c, W6c, or V3c, as applicable, style optional.

3.4.1.21.2 Board or block. Board or block insulation of like description shall be placed in boxes conforming to PPP-B-636, W5c, W6c, or V3c. Quantities shall not exceed the weight limitation of the boxes.

3.4.1.21.3 Loose fill. Loose fill insulation shall be contained in paper sacks conforming to UU-S-48, type II, 6-6X.

3.4.1.22 Boiler type bitumen heaters. The components of boiler type bitumen heaters, such as oil burners, fuel pumps, air blowers, feed water pumps, combustion controls, fuel tanks, and water tanks with necessary appurtenances to make a complete installation shall be preserved as specified herein for similar components of other boilers.

3.4.1.23 Engines for boiler type bitumen heaters. Engines and engine accessories shall be preserved in accordance with MIL-E-10062, level A, method I, for type I classification. The cooling system shall be processed by the preservative and drain method.

3.4.1.24 Trailer chassis. Trailer chassis components shall be preserved in accordance with MIL-V-62038, level A (mobile).

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3.4.1.25 Fire extinguishers. Unprotected metal surfaces of the fire extinguishers requiring a contact preservative in accordance with MIL-P-116, shall be coated with type P-1 preservative. Each fire extinguisher shall be placed in a close-fitting box conforming to PPP-B-636, W5c or W6c, style optional.

3.4.1.26 Repair parts. The preservative application and applicable method(s) of preservation of MIL-P-116 shall be used to preserve the repair parts, except only type P-14 preservative shall be applied to those parts that will contact potable water when placed in the equipment.

3.4.1.27 Maintenance tools. Maintenance tools shall be preserved in accordance with PPP-P-40, level A.

3.4.1.28 Technical publications. Technical publications for each basic unit of equipment shall be preserved together in accordance with MIL-P-116, method IC-1 or IC-3. The technical publications shall be secured in a conspicuous location to the unit for which intended.

3.4.1.29 Other components. Other components not specifically mentioned herein requiring protection from corrosion or physical or mechanical damage shall be preserved as specified for components of similar design and construction.

3.4.1.30 Consolidation. Components of the boilers and equipment such as drive belts, gages, meters, float-controlled valves and mechanisms, repair parts, tools, and components removed by disassembly and requiring the protection of a consolidated container shall be consolidated as follows: For complete units such as water tanks and heaters that are to be packed in wood boxes, the components shall be consolidated in boxes conforming to PPP-B-636, W5c, W6c, or V3c, as applicable. For complete units that are to be packed in crates, the components shall be consolidated in boxes conforming to PPP-B-601, domestic type, style optional. Strapping shall not be required. For complete units to be shipped mobile, the components shall be consolidated in a minimum number of boxes conforming to PPP-B-601, overseas type, style I or J. The number, size, weight and configuration of the boxes shall be determined by the available space and convenience for securing on the unit.

3.4.2 Level C. The boilers and related equipment shall be preserved in accordance with the contractor's standard practice in a manner to prevent deterioration and damage during shipment from the contractor to the initial destination. All equipment requiring lubrication for operation service shall be lubricated in accordance with the operator's manual.

3.4.2.1 Trailer chassis. Trailer chassis components shall be preserved in accordance with MIL-V-62038, level C (mobile).

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

3.5.1 Level A.

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3.5.1.1 Boxed equipment. Each complete boiler and equipment, including consolidation containers and disassembled components, shall be packed in a close-fitting box conforming to PPP-B-621, class 2, style optional; PPP-B-601, overseas type, style optional; or MIL-B-26195, type II, style and class optional, with rubbing strips and plywood superstructure. Blocking, bracing and anchoring of the contents within the box to prevent movement or damage shall be in accordance with MIL-STD-1186. Box closure and strapping shall be in accordance with the box specification or appendix, as applicable. Strapping shall conform to ASTM D 3953, type 1 or 2, zinc-coated, size as applicable and ASTM D 4675.

3.5.1.2 Crated equipment. Each complete boiler and equipment, including consolidation containers and disassembled components exceeding the weight limitation of a wood box, shall be packed in a crate conforming to MIL-C-104, style A, type and class optional. Blocking, bracing, and anchoring shall be in accordance with the appendix to the crate specification and in accordance with MIL-STD-1186. When specified (see 6.2), a crate conforming to type MIL-C-104, type II, class optional shall be used for packing.

3.5.1.3 Mobile equipment. Each complete trailer-mounted boiler and equipment shall be shipped without packing. Consolidation containers and disassembled components shall be positioned on the unit in a manner not to interfere with lifting the unit with slings or with towing the unit. The containers and components shall be secured to the unit with steel strapping conforming to ASTM D 3953, type 1 or 2, zinc-coated, and shall be sufficient in number and strength to retain the containers and components in their original position during routine handling, shipment, and storage and also ASTM D 4675.

3.5.2 Level B.

3.5.2.1 Boxed equipment. Each complete boiler and equipment, consolidation containers, and disassembled components shall be packed as specified in 3.5.1.1 for level A, except boxes shall be domestic type or class as applicable. Strapping may be zinc-coated.

3.5.2.2 Crated equipment. Each complete boiler and equipment, consolidation containers, and disassembled components shall be packed as specified in 3.5.1.2 for level A, except open crates conforming to MIL-C-3774, type I, style A or MIL-C-52950, type V, style optional, may be used as an alternate to the crate specified in 3.5.1.2. When an open crate is used, the contents shall be protected with a full waterproof shroud, fabricated and installed in accordance with the appendix to MIL-C-52950.

3.5.2.3 Mobile equipment. Each complete trailer mounted boiler and equipment, consolidation containers, and disassembled components shall be prepared for mobile shipment as specified in 3.5.1.3 for level A, except strapping may be zinc-coated.

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3.5.3 Level C. Each complete boiler and all equipment shall be prepared for shipment in a manner which will ensure arrival at destination in a satisfactory condition. Preparation for delivery shall comply with applicable carrier rules and regulations.

3.6 Marking. In addition to any special marking specified in the contract or purchase order (see 6.2), marking shall be in accordance with MIL-STD-129.

3.7 Depreservation guide. A depreservation guide shall be prepared, placed in a waterproof envelope marked "Depreservation Guide", and secured in a conspicuous location on the unit of equipment. Unless otherwise specified (see 6.2 and 6.4), DA Form 2258 - Depreservation Guide for Vehicles and Equipment shall be used.

3.8 Workmanship. Workmanship shall be such as to provide maximum protection to the boiler, components, and equipment, by application of the requirements specified herein, to prevent corrosion, deterioration, and mechanical or physical damage during handling, shipment, and storage.

#### 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 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 ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of section 3. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of 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 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 acceptance of defective material.

4.1.2 Material inspection. The contractor is responsible for ensuring that supplies and materials are manufactured, examined, and tested in accordance with referenced specifications and standards.

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

- a. First article pack inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 First article pack inspection.

4.3.1 Examination. The first article pack shall be examined as specified in 4.4.4. Presence of one or more defects shall be cause for rejection.

4.3.2 Tests. The first article pack of crated or boxed equipment for level A or B shall be tested as specified in 4.3.2.1 or 4.3.2.2, as applicable. Failure of the applicable test shall be cause for rejection.

4.3.2.1 Boxed equipment. Boxed equipment not exceeding 200 pounds shall be subjected to the free-fall drop test in accordance with FED-STD-101, method 5007. Boxed equipment exceeding 200 pounds shall be subjected to the pendulum impact test in accordance with FED-STD-101, method 5102, except the vertical height of drop shall be 18 inches.

4.3.2.2 Crated equipment. Crated equipment shall be subjected to the guided-impact test (railroad car) in MIL-STD-1186, appendix A. Crates not exceeding 9.5 feet in length shall be subject to tests on each end and each side, a total of 4 impacts.

4.3.2.3 Basis for rejection. Any shifting of contents, loosening or breaking of holddown ties, stays, blocking or bracing or any visual damage to the contents shall constitute failure of the first article pack test and shall be cause for rejection.

4.4 Quality conformance inspection.

4.4.1 Inspection stages. Inspection shall be in three stages as follows:

- a. The first stage shall include inspection of materials, methods, containers, and markings prior to consolidation.
- b. The second stage shall include inspection of the marking and closure of the consolidation containers.
- c. The third stage shall include inspection of materials, containers, and markings of the complete boiler or related materials as prepared for shipment. This stage shall include arrangement of consolidation containers and components required to be secured to trailers for shipment.

4.4.2 Unit of product. For the purpose of inspection, a complete unit prepared for any applicable inspection stage shall be considered a unit of product.

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4.4.3 Sampling. Sampling for examination shall be in accordance with MIL-STD-105. Samples shall be determined by using MIL-STD-105, tables I and IIa.

4.4.4 Examination. Samples selected in accordance with 4.4.3 shall be examined for the defects marked "X" for the applicable level in table I.

TABLE I. Classification of defects.

No.	Defect	Level		
		A	B	C
101.	Materials, methods, and containers not as specified. Each incorrect material, method, and container shall constitute one defect (see 3.1, 3.4, and 3.5).	X	X	-
102.	Disassembly not as specified (see 3.4.1.1).	X	-	-
103.	Matchmarking not as specified (see 3.4.1.2).	X	-	-
104.	Information on tags not applied with waterproof ink (see 3.4.1.2, 3.4.1.7.2, 3.4.1.11, 3.4.1.12).	X	-	-
105.	Cleaning, drying, and preservation not as specified (see 3.4.1.3).	X	-	-
106.	Unprotected surfaces not coated with preservative as specified (see 3.4.1.4).	X	-	-
107.	Coated surfaces not wrapped or covered as specified (see 3.4.1.4.2).	X	-	-
108.	Pumps (water or oil) not drained, preserved and sealed as specified (see 3.4.1.5).	X	-	-
109.	Drive belts not removed or released from tension as applicable (see 3.4.1.6).	X	-	-
110.	Pulley faces not coated with primer as specified (see 3.4.1.6).	X	-	-
111.	Exposed gears not coated with primer or type P-1 preservative as specified (see 3.4.1.7.1).	X	-	-
112.	Enclosed gear housings not filled with applicable type preservative or operating oil as specified (see 3.4.1.7.2).	X	-	-
113.	Gear housings not tagged as specified (see 3.4.1.7.2).	X	-	-
114.	Exposed roller chains not coated with preservative as specified (see 3.4.1.8.1).	X	-	-
115.	Removed roller chains not coiled and wrapped as specified (see 3.4.1.8.2).	X	-	-
116.	Enclosed chains not preserved as specified (see 3.4.1.8.2).	X	-	-
117.	Nonprecision chains not coated with primer or type P-1 preservative as specified (see 3.4.1.8.3).	X	-	-
118.	Rotating electrical equipment not preserved in accordance with the referenced document (see 3.4.1.9).	X	-	-
119.	Electrical components not preserved as specified when removed or not protected as specified when not removed (see 3.4.1.9).	X	-	-

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TABLE I. Classification of defects. (continued)

No.	Defect	Level		
		A	B	C
120.	Pressure gages, flow meters, and water column gauges not preserved as specified (see 3.4.1.10).	X	-	-
121.	The waterside of boilers not drained and dried as specified and interior surfaces not coated with preservative as specified, and not tagged to indicate removal of preservative is required (see 3.4.1.11).	X	-	-
122.	Threaded openings not sealed with plugs and caps and other openings not sealed with tape as specified (see 3.4.1.11).	X	-	-
123.	Interior surfaces of surge, condensate, and hot water tanks not drained, dried, preserved, sealed and tagged as specified (see 3.4.1.12).	X	-	-
124.	Internal surface of injectors not coated with type P-3 preservative (see 3.4.1.13).	X	-	-
125.	Removed valves and fittings not preserved as specified (see 3.4.1.14).	X	-	-
126.	Float controlled valves not preserved as specified (see 3.4.1.15).	X	-	-
127.	Pipe and boiler tubes not preserved as specified and the ends not sealed when applicable (see 3.4.1.16).	X	-	-
128.	Burners, blowers, and piping components not preserved as specified and openings into nozzles and jets not sealed with tape as specified (see 3.4.1.17).	X	-	-
129.	Interior surfaces of burner fuel tanks not coated with preservative as specified (see 3.4.1.18).	X	-	-
130.	Ashpits, fireboxes, tube ends, smoke boxes, and stacks not coated with type P-1 preservative as specified (see 3.4.1.19).	X	-	-
131.	Refractories, linings, and insulation not blocked in place or not packaged as specified (see 3.4.1.20, 3.4.1.20.1, 3.4.1.20.2, 3.4.1.20.3, 3.4.1.20.4, 3.4.1.20.5, 3.4.1.21, 3.4.1.21.1, 3.4.1.21.2 and 3.4.1.21.3).	X	-	-
132.	Components of boiler type bitumen heaters not preserved in accordance with the applicable requirements for similar components as specified for other boilers (see 3.4.1.22).	X	-	-
133.	Components of engines for boiler type bitumen heaters not preserved as specified (see 3.4.1.23).	X	-	-
134.	Trailer chassis components not preserved in accordance with the referenced document (see 3.4.1.24 and 3.4.2.1).	X	-	X
135.	Fire extinguishers not preserved as specified (see 3.4.1.25).	X	-	-
136.	Repair parts, tools, and technical publications not preserved as specified (see 3.4.1.26, 3.4.1.27 and 3.4.1.28).	X	-	-



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TABLE I. Classification of defects. (continued)

No.	Defect	Level		
		A	B	C
137.	Consolidation not as specified (see 3.4.1.30).	X	-	-
138.	Equipment requiring lubricant not lubricated in accordance with operator's manual (see 3.4.2).	-	-	X
139.	Boxed or crated equipment not blocked, braced and anchored in accordance with the referenced document (see 3.5.1.1, 3.5.1.2, 3.5.2.1 and 3.5.2.2).	X	X	-
140.	Strapping not as specified (see 3.5.1.1, 3.5.1.3 and 3.5.2.1).	-	X	-
141.	Contents not protected with a shroud when an open crate is used (see 3.5.2.2).	-	X	-
142.	Disassembled components and consolidation containers secured in a manner that will interfere with lifting or towing the unit (see 3.5.1.3 and 3.5.2.3).	X	X	-
143.	Strapping of components and consolidation containers on mobile equipment not of sufficient strength and number to retain their original position during handling and shipment (see 3.5.1.3 and 3.5.2.3).	X	X	-
144.	Packing for level C not as specified (see 3.5.3).	-	-	X
145.	Marking illegible, incomplete, incorrect or missing (see 3.6).	X	X	X
146.	Depreservation guide not prepared and attached in a conspicuous location on the equipment (see 3.7).	X	X	X
147.	Workmanship not as specified (see 3.8).	X	X	X

## 5. PACKAGING

(This section is not applicable to this specification.)

## 6. NOTES

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

6.1 Intended use. It is intended that the requirements of this specification be used for preservation, packing, and marking of boilers and related equipment and be used for reference in section 5 of end item specifications or for direct reference in contracts or purchase orders, or in the preparation of packaging data sheets.

6.2 Acquisition requirements. Acquisition documents should specify the following:

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- a. Title, number, and date of the specification.
- b. 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).
- c. When a first article pack is not required (see 3.3).
- d. Time frame required for submission of the first article pack (see 3.3).
- e. Level of preservation and packing required (see 3.4 and 3.5).
- f. When refractory linings are to be packed separately from the basic item of equipment (see 3.4.1.20.2).
- g. Any special marking (see 3.6).
- h. When a type II crate is required (see 3.5.1.2).
- i. When other than DA Form 2258 is to be used (see 3.7).

6.3 First article pack. The first article pack may be accomplished utilizing either the first preproduction model or a production model. If the preproduction model is utilized, any preservation and packing shall be removed by the contractor at no expense to the Government, when requested by the Government, to facilitate comparison between the preproduction model and the production model. Any changes or deviations of production packs from the approved first article pack will be subject to the approval of the contracting officer. Approval of the first article pack will not relieve the contractor of his obligation to preserve, pack, and mark the pumps and accessories in accordance with this specification.

6.4 Depreservation Guide. The contracting officer should arrange to furnish DA Form 2258 when requested by the contractor.

6.5 Subject term (key word) listing.

Marking  
Packing  
Preservation  
Refrigeration equipment

6.6 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.

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Custodians:

Army - ME  
Navy - YD  
Air Force - 99

Preparing activity:

Army - ME

Project 4520-0337

Review activity:

Army - SM  
Navy - SH  
Air Force - 84  
DLA - CS

User activity:

Army - GL

## 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.

<b>RECOMMEND A CHANGE:</b>		1. DOCUMENT NUMBER MTL-B-3180E	2. DOCUMENT DATE (YYMMDD) 18 Dec 90
3. DOCUMENT TITLE Boilers and Related Equipment Packaging Of			
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	e. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME		b. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON	
c. ADDRESS (Include Zip Code) US Army Belvoir RDE Center ATTN: STRBE-TSE Ft. Belvoir, VA 22060-5606		(703) 664-5717 354-5717	
		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	