

MIL-P-16789D(SH)  
30 October 1986  
SUPERSEDING  
MIL-P-16789C(SH)  
10 September 1974  
(See 6.9)

## MILITARY SPECIFICATION

### PUMPS (INCLUDING PRIME MOVERS AND SUPPORT ITEMS); PACKAGING OF

This specification is approved for use within 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 packaging (preservation, packing and marking) of pumps; reciprocating, centrifugal, axial flow, positive displacement, oxygen, hydraulic, prime movers, and associated support items (see 6.1).

#### 1.2 Levels of protection.

##### 1.2.1 Preservation.

Level A (see 3.8.1.1)  
Level C (see 3.8.1.2)  
Commercial (see 3.8.1.3)

##### 1.2.2 Packing.

Level A (see 3.9.1.1, 3.9.2.1, table II and 3.9.2.1.1.1)  
Level B (see 3.9.1.1, 3.9.2.1, table II and 3.9.2.1.1.2)  
Level C (see 3.9.1.1, 3.9.2.1, table II and 3.9.2.1.1.3)  
Commercial (see 3.9.2.2)

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents.

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

DISTRIBUTION STATEMENT A Approved for public release; distribution unlimited

AREA PACK

## MIL-P-16789D(SH)

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

## SPECIFICATIONS

## FEDERAL

- L-P-378 - Plastic Sheet and Strip, Thin Gauge, Polyolefin.
- P-D-680 - Dry Cleaning Solvent.
- NN-P-530 - Plywood, Flat Panel.
- TT-T-291 - Thinner, Paint, Mineral Spirits, Regular and Odorless.
- UU-P-268 - Paper, Kraft, Wrapping.
- LLL-B-810 - Building Board, (Hardboard) Hard Pressed, Vegetable Fiber.
- PPP-B-566 - Boxes, Folding, Paperboard.
- PPP-B-576 - Boxes, Wood, Cleated, Veneer, Paper Overlaid.
- PPP-B-585 - Boxes, Wood, Wirebound.
- PPP-B-591 - Boxes, Shipping, Fiberboard, Wood-Cleated.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
- PPP-B-636 - Boxes, Shipping, Fiberboard.
- PPP-B-640 - Boxes, Fiberboard, Corrugated, Triple-Wall.
- PPP-B-665 - Boxes, Paperboard, Metal Edged and Components.
- PPP-B-676 - Boxes, Setup.
- PPP-B-1055 - Barrier Material, Waterproofed, Flexible.
- PPP-B-1672 - Boxes, Shipping, Reusable with Cushioning.
- PPP-C-795 - Cushioning Material, Flexible, Cellular, Plastic Film for Packaging Applications.
- PPP-C-843 - Cushioning Material, Cellulosic.
- PPP-C-850 - Cushioning Material, Polystyrene, Expanded, Resilient (For Packaging Uses).
- PPP-C-1120 - Cushioning Material, Uncompressed Bound Fiber for Packaging.
- PPP-C-1752 - Cushioning Material, Packaging, Unicellular Polyethylene Foam, Flexible.
- PPP-C-1797 - Cushioning Material, Resilient, Low Density, Unicellular, Polypropylene Foam.
- PPP-C-1842 - Cushioning Material, Plastic, Open Cell (For Packaging Applications).
- PPP-F-320 - Fiberboard; Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.
- PPP-H-1581 - Hardware (Fasteners and Related Items), Packaging of.
- PPP-P-40 - Packaging and Packing of Hand Tools.
- PPP-P-291 - Paperboard, Wrapping and Cushioning.
- PPP-T-60 - Tape: Packaging, Waterproof.

## MILITARY

- 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-P-16789D(SH)

## MILITARY (Continued)

- MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible.
- MIL-P-149 - Plastic Coating Compound, Strippable (Hot-Dripping).
- MIL-R-196 - Repair Parts, Accessories, and Kits, Mechanical; Packaging of.
- MIL-B-197 - Bearings, Antifriction; Associated Parts and Sub-assemblies; Preparation for Delivery of.
- MIL-B-233 - Boxes, Repair Parts, Storage.
- MIL-P-775 - Packaging of Hose, Hose Assemblies; Rubber, Plastic, Fabric, or Metal (Including Tubing); and Fittings, Nozzles, and Strainers.
- MIL-B-3106 - Board, Composition, Water-Resistant, Solid (For Filler or Cushioning Pads).
- MIL-C-3774 - Crates, Wood; Open 12,000- and 16,000- Pound Capacity.
- MIL-C-4150 - Cases, Transit and Storage, Waterproof and Water-Vaporproof.
- MIL-P-4861 - Packing, Preformed, Rubber, Packing: Packaging of.
- MIL-R-5001 - Rubber Cellular Sheet, Molded and Hand Built Shapes; Latex Foam.
- MIL-C-5584 - Containers, Shipping and Storage, Metal Reusable.
- MIL-D-6054 - Drum, Metal-Shipping and Storage.
- MIL-D-6055 - Drums, Metal, Reusable Shipping and Storage (Cap. from 88 to 510 Cubic Inches).
- MIL-H-6083 - Hydraulic Fluid, Petroleum Base, For Preservation and Operation.
- MIL-R-6130 - Rubber, Cellular, Chemically Blown.
- MIL-I-8574 - Inhibitors, Corrosion, Volatile, Utilization of.
- MIL-C-9897 - Crates, Slotted Angle, Steel or Aluminum, For Lightweight Airframe Components and Bulky Items (For Maximum Loads of 3000 Pounds).
- MIL-E-10062 - Engine Preparation for Shipment and Storage of.
- MIL-V-13811 - Varnish, Waterproofing, Electrical, Ignition.
- MIL-C-15074 - Corrosion Preventive, Fingerprint Remover.
- MIL-C-15348 - Cleaning Oil, Turbine (Compounded).
- MIL-C-16173 - Corrosion Preventive Compound, Solvent Cutback, Cold-Application.
- MIL-E-16298 - Electric Machines Having Rotating Parts and Associated Repair Parts: Packaging of.
- MIL-P-17286 - Propulsion and Auxiliary Steam Turbines and Gears (Including Repair Parts, Tools, Accessories and Instruments): Packaging of.
- MIL-L-17331 - Lubricating Oil, Steam Turbine and Gear, Moderate Service.
- MIL-E-17341 - Engines, Gas Turbine, Propulsion and Auxiliary Naval Shipboard.
- MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Repair Parts; Packaging and Packing of.
- MIL-H-17672 - Hydraulic Fluid, Petroleum, Inhibited.
- MIL-H-19457 - Hydraulic Fluid, Fire-Resistant, Non-Neurotoxic.
- MIL-P-19644 - Plastic Molding Material (Polystyrene Foam, Expanded Bead).
- MIL-R-20092 - Rubber Sheets and Assembled and Molded Shapes, Cellular, Synthetic, Open Cell (Foamed Latex).

## MIL-P-16789D(SH)

## MILITARY (Continued)

- MIL-L-21260 - Lubricating Oil, Internal Combustion Engine, Preservative and Break-In.
- MIL-B-22019 - Barrier Materials, Transparent, Flexible, Sealable, Volatile Corrosion Inhibitor Treated.
- MIL-B-22020 - Bags, Transparent, Flexible, Sealable, Volatile Corrosion Inhibitor Treated.
- MIL-I-22110 - Inhibitors, Corrosion, Volatile, Crystalline.
- MIL-B-22191 - Barrier Materials, Transparent, Flexible, Heat Sealable.
- MIL-I-24092 - Insulating Varnish, Electrical, Impregnating, Solvent Containing.
- MIL-I-24453 - Inhibitor, Corrosion, Soluble-Oil.
- MIL-A-25175 - Air Transport, Nontactical, Packing for.
- MIL-P-26514 - Polyurethane Foam, Rigid or Flexible, For Packaging.
- MIL-C-26861 - Cushioning Material, Resilient Type, General.
- MIL-T-45542 - Tool Sets, Shop Sets and Kits Maintenance, Modification and Tool Packaging of.
- MIL-C-52211 - Components and Assemblies for Industrial Gas Production, Storage and Transport Equipment, Packaging of.
- MIL-C-52950 - Crates, Wood, Open and Covered.
- MIL-C-55442 - Cable Assemblies and Cord Assemblies, Packaging of.
- MIL-P-58102 - Plastic Sheet and Laminant, Flexible, For Environmental Protective Storage and Shipping System.
- MIL-C-58104 - Cover, Protective, For Parts and Equipment.
- MIL-F-81334 - Foam, Plastic, Flexible, Open Cell, Polyester Type, Polyurethane.
- MIL-F-87090 - Foam, Combustion Retardant, For Cushioning Supply Items Aboard Navy Ships.

## STANDARDS

## FEDERAL

- FED-STD-313 - Material Safety Data Sheets Preparation and the Submission of.

## MILITARY

- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-648 - Design Criteria for Specialized Shipping Containers.
- MIL-STD-740 - Airborne and Structureborne Noise Measurements and Acceptance Criteria of Shipboard Equipment.
- MIL-STD-758 - Packaging Procedures for Submarines Repair Parts.
- MIL-STD-794 - Parts and Equipment, Procedures for Packaging of.
- MIL-STD-834 - Packaging Data Forms, Instructions for Preparation and Use of.
- MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking And Waterproofing; With Appropriate Test Methods.
- MIL-STD-1330 - Cleaning and Testing of Shipboard Oxygen And Nitrogen Gas Piping Systems.
- MIL-STD-1367 - Packaging, Handling, Storage, And Transportability Program Requirements (For Systems and Equipments).

MIL-P-16789D(SH)

MILITARY (Continued)

- MIL-STD-2073-1 - DOD Materiel Procedures for Development and Application of Packaging Requirements.  
MS90363 - Box, Fiberboard with Cushioning for Special Minimum Cube Storage and Limited Reuse Applications.

(Copies of specifications and standards, required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)  
MH15.1 - Glossary of Packaging Terms.

(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 996 - Standard Terminology of Packaging and Distribution Environments.  
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.)

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. When an equipment or item is acquired in conformance with a commodity specification having detailed packaging or preparation for delivery requirements which differ from this specification, the packaging or preparation for delivery specified in the commodity specification shall apply.

### 3. REQUIREMENTS

3.1 Definitions or explanation of packaging terms. Definitions or explanations of packaging terms applicable to this specification shall be as stated in the applicable referenced specification and 6.4. For definitions or explanation of packaging terms not specified therein, ANSI MH15.1 and ASTM D 996 shall apply.

3.2 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4.1 and 6.3).

## MIL-P-16789D(SH)

3.2.1 Dummy or simulated load. When specified (see 6.2.1), a dummy or simulated load may be used for rough handling tests (see 4.4.2). When a dummy or simulated load is substituted for the actual equipment or item in performing the rough handling tests, instrumentation of the pack is required for assurance that the acceleration of the packed item during the tests is less than the fragility rating of the item. The details of the instrumentation including location shall be included with the test results (see 4.4.3). When specified in the contract or order, notification of tests shall be prepared (see 6.2.2).

3.3 Materials. The materials shall be as specified herein and in the applicable referenced specifications.

3.3.1 Recovered materials. Unless otherwise specified herein, all equipment, material, 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 allowed under this specification unless otherwise specifically specified.

3.3.2 New materials. The use of newly developed packaging materials or procedures are encouraged and recommended and will be permitted under the conditions specified herein, provided they are equal to or better than the specified materials or procedures.

3.3.2.1 Certification of alternate materials. When specified in the contract or order, a certificate of compliance shall be prepared, if the contractor desires to use alternate materials or procedures other than those specified herein (see 6.2.2).

3.3.3 Asbestos. (See 6.5)

3.3.3.1 Packaging materials. Asbestos or material and items containing asbestos shall not be used in the packaging of material or items covered by this specification (see 6.5).

3.3.3.2 Packaged items. Asbestos and separately packaged components containing asbestos that is predominately distributed throughout the item, shall be packaged in sealed, dust and siftproof packages. Flexible packages shall be heat sealed. Packages shall be marked as specified (see 3.9.3).

3.3.3.3 Dusting material. Dusting material such as talc and talcum shall be asbestos free. When specified in the contract or order, a certificate of compliance shall be prepared (see 6.2.2).

3.3.4 Cushioning and wrapping materials. The use of excelsior, newspaper, shredded paper (all types) and similar hydroscopic or nonneutral materials and all types of loosefill materials for applications such as cushioning, filler, stuffing, and dunnage is prohibited. Materials selected for cushioning and wrapping shall have properties (characteristics) resistant to fire (see 3.8.1.1.6.3).



## MIL-P-16789D(SH)

3.4 Data and drawings. Complete descriptive packaging details on drawings, test results, and packaging and transportation data requirements are not required when such were previously submitted and accepted by the contracting activity. When specified in the contract or order, complete descriptive packaging details on drawings of the sample pack shall be prepared (see 6.2.2).

3.4.1 Preservation and packing data. When specified in the contract or order, coded and in-the-clear preservation and packing data shall be prepared (see 6.2.2).

3.4.2 Packaging, handling, storage and transportability plan (PHST). When required (see 6.2.1), the system or equipment acquisition or program manager shall establish the PHST requirement. The plan, when required, shall be tailored for the applicable system or equipment acquisition in accordance with the requirements of MIL-STD-1367.

3.4.3 Material safety data sheet. For items containing a hazardous material, the contracting activity shall be provided a material safety data sheet (MSDS) at the time of contract award. The MSDS is Department of Labor OSHA-20, Department of Defense DD Form 1813 or one essentially similar, approved by Occupational Safety and Health Administration (OSHA) found in and part of FED-STD-313. The MSDS shall be included with each shipment of the material covered by this specification.

3.5 Disassembly and matchmarking.

3.5.1 Disassembly. Equipment disassembly shall be the minimum necessary to make accessible for cleaning, drying, and preservation of equipment and its machined or critical surfaces. Removal of secondary assemblies, accessories and projecting parts which will facilitate protection of the equipment from damage, pilferage, and loss, or reduction of cube is permitted where such removal will not affect permanent settings or alignments, and where the removed part can be readily assembled at the installation site without the need for special tools or gauges. Removed hardware (bolts, nuts, pins, screws, washers, and others) shall be reinstalled in mating parts and secured to prevent their loss. Removed parts or items, other than hardware, shall be packaged to the same level of protection as the basic or prime equipment.

3.5.2 Matchmarking. Removed parts of the equipment shall be matchmarked to facilitate reassembly. Removed parts shall be tagged, marked, and tags attached to each mating item. The tags and printing thereon shall be resistant to water, oil, and fading.

3.6 Painting and lubrication. Painted surfaces on which the paint is damaged or defective shall be cleaned and repainted with the original specified paint of the same quality and color. Rotating joints, bearings and similar moving items, and assembled units requiring lubrication for service shall be thoroughly lubricated with the required service lubricant. Excess lubricants shall be removed prior to packaging.

3.7 New items. Where equipment or items are not specified in table I herein, a method of preservation may be selected from the applicable appendix in accordance with MIL-STD-794.

## MIL-P-16789D(SH)

TABLE I. Preservation.

| Item                                      | Method of preservation | Applicable type of preservative MIL-P-116 |                              | Special remarks (see note 8) |
|---|------------------------|---|------------------------------|------------------------------|
|   |                        | Internal                                  | External                     |                              |
| Accumulators                              | I                      | P-15                                      | P-19                         | See note 1                   |
| Actuator, hydraulic                       | I                      | P-15                                      | P-2                          | See note 1                   |
| Armature (non-electrical)                 | I                      | ----                                      | P-2                          | See notes 2 and 3            |
| Armature complete with shaft and impellor | I                      | ----                                      | P-2                          | ----                         |
| Bearing:                                  |                        |   |                              |                              |
| Anti-friction                             | ----                   | ----                                      | ----                         | Use MIL-B-197                |
| Friction sleeve, ferrous                  | I                      | P-2                                       | P-2, P-18                    | See 3.8.1.1.6.2.1            |
| Impregnated, ferrous                      | IB, IC                 | ----                                      | P-2, P-10                    | See note 4                   |
| non-ferrous                               | IC, III                | ----                                      | ----                         | ----                         |
| Radial hydrodynamic                       | III                    | ----                                      | ----                         | ----                         |
| Belt:                                     |                        |   |                              |                              |
| Leather fabric-inserted                   | IC                     | ----                                      | ----                         | ----                         |
| Rubber                                    | III                    | ----                                      | ----                         | See notes 5 and 6            |
| Block, cylinder rotor head                | I                      | P-2                                       | P-18, P-19, P-21             | See 3.8.1.1.6.2.1            |
| Bushing, sleeve                           | ----                   | ----                                      | ----                         | See bearing: Friction sleeve |
| Cable, cord and wire assemblies           | ----                   | ----                                      | ----                         | Use MIL-C-55442              |
| Cam                                       | IC                     | ----                                      | P-2, P-18                    | See 3.8.1.1.6.2.1            |
| Camshaft                                  | IC                     | P-2                                       | P-2, P-18                    | See 3.8.1.1.6.2.1            |
| Case                                      | I                      | P-2                                       | P-18, P-19                   | See 3.8.1.1.6.2.1            |
| Casing                                    | I                      | P-2                                       | P-18, P-19                   | See 3.8.1.1.6.2.1            |
| Clutch:                                   |                        |   |                              |                              |
| Non-ferrous                               | III                    | ----                                      | ----                         | ----                         |
| Ferrous (without lining)                  | IC                     | ----                                      | P-2, P-18                    | See 3.8.1.1.6.2.1            |
|   | IB                     | ----                                      | P-2, P-18, Type II MIL-P-149 | See note 4 and 3.8.1.1.6.2.1 |
| Collar, thrust or sleeve                  | I, IB                  | ----                                      | P-2, P-18, Type II MIL-P-149 | See note 4 and 3.8.1.1.6.2.1 |
| Coupling:                                 |                        |   |                              |                              |
| Hose                                      | ----                   | ----                                      | ----                         | Use MIL-P-775                |

See notes at end of table.



## MIL-P-16789D(SH)

TABLE I. Preservation. - Continued

| Item   | Method of preservation | Applicable type of preservative MIL-P-116 |                       | Special remarks (see note 8)    |
|--|------------------------|---|-----------------------|---------------------------------|
|  |                        | Internal                                  | External              |                                 |
| Flexible, metal, non-metal, combination  | I                      | ----                                      | P-19                  | ----                            |
| Metallic   | I                      | ----                                      | P-18, P-19            | See 3.8.1.1.6.2.1               |
| Controller, motor  | ----                   | ----                                      | ----                  | Use MIL-E-17555                 |
| Cover:   |                        |   |                       |                                 |
| Connection box   | III                    | ----                                      | ----                  | ----                            |
| Handhold   | I                      | ----                                      | P-18, P-19            | See 3.8.1.1.6.2.1               |
| Cylinder, hydraulic  | I                      | P-15                                      | P-2                   | See note 1                      |
| Diaphragm:   |                        |   |                       |                                 |
| Ferrous  | I, IC                  | ----                                      | P-2, P-18<br>P-19     | See 3.8.1.1.6.2.1<br>and note 5 |
| Non-ferrous  | IC                     | ----                                      | ----                  | See note 5                      |
| Non-metallic   | IC                     | ----                                      | ----                  | See note 5                      |
| Disc valve:  |                        |   |                       |                                 |
| Leather  | IC                     | ----                                      | ----                  | ----                            |
| Fiber  | IC                     | ----                                      | ----                  | ----                            |
| Electrical items, general  | ----                   | ----                                      | ----                  | Use MIL-E-17555                 |
| Electrical machines with rotating parts and similar electrical equipment and associated repair parts | ----                   | ----                                      | ----                  | Use MIL-E-16298                 |
| Flange   | ----                   | ----                                      | ----                  | Use MIL-V-3                     |
| Flinger  | III                    | ----                                      | ----                  | ----                            |
| Float  | III                    | ----                                      | ----                  | ----                            |
| Gauge: fuel, oil and temperature:  |                        |   |                       |                                 |
| Open   | II                     | ----                                      | ----                  | ----                            |
| Hermetically sealed  | III                    | ----                                      | ----                  | ----                            |
| Electrical   | ----                   | ----                                      | ----                  | Use MIL-E-17555                 |
| Mechanical, dipstick   | I                      | ----                                      | P-2, P-18,<br>P-19    | See 3.8.1.1.6.2.1               |
| Gasket:  |                        |   |                       |                                 |
| Metal-ferrous  | IC                     | ----                                      | P-7, P-10<br>grade 30 | See note 5                      |
| Metal-non-ferrous  | IC                     | ----                                      | ----                  | See note 5                      |

See notes at end of table.

## MIL-P-16789D(SH)

TABLE I. Preservation. - Continued

| Item   | Method of preservation | Applicable type of preservative MIL-P-116 |                 | Special remarks (see note 8)        |
|--|------------------------|---|-----------------|-------------------------------------|
|  |                        | Internal                                  | External        |                                     |
| Metal and asbestos ferrous and non-ferrous                                 | IC                     | ----                                      | P-19            | See notes 5 and 3.4                 |
| Nonmetal: cork, felt, fiber, leather, paper                                | IC                     | ----                                      | ----            | See note 5                          |
| teflon, rubber or neoprene   | III                    | ----                                      | ----            | See notes 5 and 6                   |
| Gear box - complete assembly   | I                      | P-2                                       | P-2, P-19       | See note 7                          |
| Gear case (housing)  | I                      | P-2                                       | P-2, P-19       | See note 7                          |
| Gear, metal, precision and semi-precision (up to and including 25 pounds): |                        |   |                 |                                     |
| Ferrous  | IC                     | ----                                      | P-2, P-18, P-19 | See notes 2 and 3 and 3.8.1.1.6.2.1 |
| Non-ferrous  | I                      | ----                                      | P-2, P-19       | See notes 2 and 3                   |
| Gear, metal, precision and semi-precision over 25 pounds):                 |                        |   |                 |                                     |
| Ferrous  | I                      | ----                                      | P-2, P-18, P-19 | See notes 2 and 3 and 3.8.1.1.6.2.1 |
| Non-ferrous  | I                      | ----                                      | P-2, P-19       | See notes 2 and 3                   |
| Gear non-metallic  | III                    | ----                                      | ----            | See note 2                          |
| Hardware, loose (nuts, keys, bolts, screws, rivets, washers)               | ----                   | ----                                      | ----            | Use PPP-H-1581                      |
| Hose, hose assemblies and fittings   | ----                   | ----                                      | ----            | Use MIL-P-775                       |
| Housing  | I                      | P-2                                       | P-18, P-19      | See note 7 and 3.8.1.1.6.2.1        |
| Impellor:  |                        |   |                 |                                     |
| Ferrous  | I                      | ----                                      | P-2, P-19, P-18 | See 3.8.1.1.6.2.1                   |
| Non-ferrous  | IC                     | ----                                      | ----            | ----                                |
| Impellor assy w/shaft  | I                      | ----                                      | P-2             | ----                                |
| Isolator   | IC                     | ----                                      | ----            | ----                                |
| Key, machine-metal   | ----                   | ----                                      | ----            | Use PPP-H-1581                      |
| Motors, electrical   | ----                   | ----                                      | ----            | Use MIL-E-16298                     |

See notes at end of table.

## MIL-P-16789D(SH)

TABLE I. Preservation. - Continued

| Item                        | Method of preservation | Applicable type of preservative MIL-P-116 |  | Special remarks (see note 8)    |
|-----------------------------|------------------------|---|--|---------------------------------|
|                             |                        | Internal                                  | External                                       |                                 |
| Nozzle, ejection            | I                      | P-2                                       | P-2  | ----                            |
| Oxygen equipment, parts     | ----                   | ----                                      | ----   | See 3.8.1.1.1.3.4               |
| Packing, preformed (O-ring) | ----                   | ----                                      | ----   | Use MIL-P-4861                  |
| Packing, pump shaft         | IC                     | ----                                      | ----   | See note 5                      |
| Pin (metal), cotter         | ----                   | ----                                      | ----   | Use PPP-H-1581                  |
| Pin, wrist, piston, drive   | IC                     | P-7, P-10<br>grade 30                     | P-7, P-10<br>grade 30,<br>P-18                 | -----<br>See 3.8.1.1.6.2.1      |
| Pinion                      | IC                     | P-7, P-10<br>grade 30                     | P-7, P-10<br>grade 30,<br>P-18                 | See 3.8.1.1.6.2.1               |
| Piston                      | IC                     | P-2, P-10<br>grade 30                     | P-2, P-10<br>grade 30                          | -----                           |
| Piston rings                | IC                     | ----                                      | P-18   | See 3.8.1.1.6.2.1               |
| Plug, drain                 | I                      | ----                                      | P-2, P-18                                      | See 3.8.1.1.6.2.1               |
| Ring, casing wear:          |                        |   |  |                                 |
| Ferrous                     | I                      | ----                                      | P-2, P-18                                      | See 3.8.1.1.6.2.1               |
| Non-ferrous                 | III                    | ----                                      | ----   | -----                           |
| Ring, sealing:              |                        |   |  |                                 |
| Ferrous                     | I                      | ----                                      | P-2, P-18                                      | See 3.8.1.1.6.2.1               |
| Non-ferrous                 | III                    | ----                                      | ----   | -----                           |
| Rod, piston valve           | I                      | P-2                                       | P-2  | -----                           |
| Rotor assembly              | I                      | P-2                                       | P-2, P-18                                      | See 3.8.1.1.6.2.1               |
| Multi-stage water pumps     | III                    |   |  | See 3.8.1.1.1.3.3.3             |
| Seal:                       |                        |   |  |                                 |
| carbon                      | III                    | ----                                      | -----  | See note 2                      |
| oil (leather, rubber)       | IC                     | ----                                      | ----   | See note 5                      |
| Mechanical                  | IC                     | P-7, P-10                                 | P-7, P-10                                      | See note 2                      |
| Packing                     | IC                     | ----                                      | ----   | -----                           |
| Shaft                       | I, IC,<br>or IB        | ----                                      | P-2, P-18,<br>P-19 or<br>Type II,<br>MIL-P-149 | See note 4<br>and 3.8.1.1.6.2.1 |
| Sleeve, shaft,              |                        |   |  |                                 |
| journal                     | ----                   | ----                                      | ----   | See bearing:<br>friction sleeve |
| Slinger                     | III                    | ----                                      | ----   | -----                           |
| Solid state devices         | ----                   | ----                                      | ----   | Use MIL-E-17555                 |
| Strainer                    |                        |   |  |                                 |

See notes at end of table.

## MIL-P-16789D(SH)

TABLE I. Preservation. - Continued

| Item                          | Method of preservation | Applicable type of preservative MIL-P-116 |  | Special remarks (see note 8)  |
|-------------------------------|------------------------|---|--|-------------------------------|
|                               |                        | Internal                                  | External                               |                               |
| Ferrous                       | I                      | P-2, P-10                                 | P-2, P-10<br>P-18                      | See 3.8.1.1.6.2.1             |
| Non-ferrous                   | III                    | ----                                      | ----                                   | ----                          |
| Spring                        |                        |   |  |                               |
| Flat (packing)                | IC                     | ----                                      | ----                                   | ----                          |
| Garter (packing)              | IC                     | ----                                      | ----                                   | ----                          |
| Coil                          | I                      | ----                                      | P-18, P-19                             | See 3.8.1.1.6.2.1             |
| Tools, tool kits (hand)       | ----                   | ----                                      | ----                                   | See 3.8.1.1.7 and MIL-T-45542 |
| Valves, fittings, and flanges | ----                   | ----                                      | ----                                   | Use MIL-V-3                   |
| Vane, diffuser                | I, IC, or IB           | ----                                      | P-2, P-18, P-19, or Type II, MIL-P-149 | See notes 2, 3, and 4         |

## Notes:

1. Unless otherwise specified (see 6.2.1), preserve in accordance with 3.8.1.1.1.3.3.
2. Cushioning shall be applied to protect item from damage.
3. Preserved items shall be wrapped with greaseproof barrier material prior to application of cushioning materials.
4. Contact preservative shall be applied to items preserved by method IB-2.
5. Provide protection against deformation.
6. When packaged in multiples, items shall be dusted with talc, talcum or soapstone powder (see 3.3.3.3).
7. Preservative shall be applied to unpainted surfaces only. The interior of unit shall be completely drained following cleaning. The drain plugs, if applicable, shall be replaced.
8. Reusable containers for spares (repairable) (see 3.8.1.1.6.10).

3.8 Level of protection. (See 6.4.1).

3.8.1 Preservation. Preservation (unit protection) shall be level A, C or commercial as specified (see 6.2.1).

3.8.1.1 Level A. Unless otherwise specified herein, cleaning, drying, preservatives, and methods of preservation (unit protection), shall be in accordance with MIL-P-116 and table I herein. Table I applies to processing of supply support material (spares and repair parts), accessories, and tools. Requirements in table I are assigned by category; methods are assigned on the basis of the type of unit protection most commonly required for a specific item. Unless otherwise specified (see 6.2.1), selection of the submethod under a particular method shall be at the option of the contractor.

## MIL-P-16789D(SH)

3.8.1.1.1 Pump unit. Except oxygen pumps (see 3.8.1.1.1.3.4), pumps shall be cleaned, dried and preserved as specified herein and shall meet the cleanliness and the preservative retention requirements for method I. When specified (see 6.2.1), method II shall apply including the preservative application requirements specified herein. When method II is specified in the acquisition document and when specified (see 6.2.1), a flexible, reusable container in accordance with MIL-C-58104, type I shall be used, utilizing plastic sheet in accordance with MIL-P-58102, class and grade as specified (see 6.2.1).

3.8.1.1.1.1 Cleaning and drying. Units, assemblies or parts shall be cleaned and dried by a process and procedure which will accomplish thorough cleaning and drying without damage to the items. Critical functioning or close tolerance surfaces shall be given such additional cleaning as necessary to remove fingerprints and perspiration residue. Fingerprint remover shall be in accordance with MIL-C-15074. Fingerprint remover residues shall be removed with a clean petroleum solvent in accordance with P-D-680 or grade 1 of TT-T-291. Cleaning solvents shall not be applied to nonmetallic parts (gaskets, leather, paper, rubber) and electrical insulation.

3.8.1.1.1.2 Preservatives. Preservatives specified herein, identified by "P" numbers shall conform to the applicable specification listed in accordance with MIL-P-116.

3.8.1.1.1.3 Application of preservative. Immediately after cleaning and drying, pump exterior and interior surfaces subject to corrosion shall be treated with preservative. During and after preservative application, the product shall be handled in such a manner as to produce a uniform film. Type P-19 preservatives shall be limited to external areas and surfaces where the preservative would not normally have to be removed prior to placing the pump in operation, or where the preservative removal by scraping or solvent action would not damage the part or equipment. Type P-19 preservative shall remain untouched to allow the film to set before undertaking packing operations. Submersible pumps requiring external preservative shall be preserved with type P-2 in lieu of type P-19 specified above. Submersible pumps requiring external preservative shall be tagged as follows:

"THE EXTERIOR OF THIS ITEM IS COATED WITH TYPE P-2 PRESERVATIVE OF MIL-P-116. BEFORE INSTALLATION, REMOVE PRESERVATIVE WITH CLEANING OIL CONFORMING TO MIL-C-15348."

Preservation of internal surfaces (see 3.8.1.1.1.3.3) may be facilitated by operating the units to ensure a thorough coating of the surfaces with the preservatives. Anti-friction bearings not directly connected to the lubrication system shall be treated with the type lubricant normally used in operation.

3.8.1.1.1.3.1 Threaded and other unpainted non-critical metal surfaces. Unless otherwise specified (see 6.2.1), threaded and other unpainted, non-critical, corrodible metal surfaces shall be coated with preservative type P-2. Exterior surfaces coated with preservative type P-2 shall be overwrapped as specified in 3.8.1.1.1.3.2.

## MIL-P-16789D(SH)

3.8.1.1.1.3.2 Machined exterior surfaces. Machined exterior surfaces shall be coated with type P-2 preservative and shall be wrapped or covered with greaseproof, barrier material conforming to type I or II, grade A of MIL-B-121. When components are packed in unsheathed crates, as permitted (see 3.9.1.1), additional wrappings as follows shall be applied.

3.8.1.1.1.3.2.1 Irregular surfaces. Preserved surfaces of irregular contour shall be over-wrapped with greaseproof barrier material conforming to type I or II, grade A of MIL-B-121. Edges of the wrapped surfaces shall be sealed with waterproof, pressure-sensitive tape.

3.8.1.1.1.3.2.2 Regular surfaces. Surfaces of regular contour, such as exposed areas of shafts of flat machined faces, shall be over-wrapped with a non-bleeding, waterproof, barrier material conforming to type C-1 or C-2 of PPP-B-1055. Edges of the waterproof wrap shall be sealed with waterproof, pressure-sensitive tape.

3.8.1.1.1.3.3 Internal surfaces. The required preservative as specified herein shall be thoroughly worked into the pump by operating the unit for short intervals, by fill and drain, or by spraying or fogging procedure that will ensure complete coating of all internal pump surfaces. After preservative action is completed the excess fluid shall be drained to prevent subsequent coagulation of the preservative in pockets or in low places. Openings shall be sealed and secured as specified in 3.8.1.1.1.4 except when method II preservation applies. Drain plugs shall be treated with type P-19 preservative and the drain plugs replaced and tightened. With the exception of water pumps (see 3.8.1.1.1.3.3.3), a tag shall be affixed to the pump stating the following:

"THE INTERIOR OF THIS PUMP IS COATED WITH (brand name, type, and military specification number), MANUFACTURED BY (name of company). PRESERVED ON (date), AND SHOULD BE RE-PRESERVED ONE YEAR FROM THAT DATE. PRIOR TO RE-PRESERVATION THE PUMP SHOULD BE CLEANED AND DRIED IN ACCORDANCE WITH AN APPLICABLE PROCESS AND PROCEDURE OF MIL-P-116. PRESERVATIVE REPLACEMENT DOES NOT REQUIRE DISASSEMBLY OF THE PUMP. RE-PRESERVATION CAN BE DONE IN ACCORDANCE WITH (state procedure)."

3.8.1.1.1.3.3.1 Petroleum pumps (except pumps in contact with hydraulic fluids). Internal surfaces which normally are in contact with oil, fuel oil, gasoline and lubricating oil shall be preserved with type P-2 preservative. Tagging as specified 3.8.1.1.1.3.3 is not required.

3.8.1.1.1.3.3.2 Hydraulic pumps. Unless otherwise specified (see 6.2.1), hydraulic pumps shall be preserved as follows:

- (a) Pumps installed in systems handling petroleum based fluids, including those handling lubricating oils conforming to MIL-H-17672 and MIL-L-17331, shall be preserved using preservative conforming to MIL-H-6083. Closure and tagging shall be as specified in 3.8.1.1.1.3.3 and shall include the following:

"REMOVAL OF THIS FLUID PRIOR TO USE IS NOT REQUIRED"



## MIL-P-16789D(SH)

- (b) Pumps handling phosphate ester type fluids shall be preserved using preservative fluid conforming to MIL-H-19457 with the addition of a vapor phase inhibitor conforming to MIL-I-22110 (in accordance with manufacturer's instructions). Closure and tagging shall be as specified in 3.8.1.1.1.3.3 except the preservative replacement date shall state "two years" in lieu of "one year".
- (c) Pumps handling other types of hydraulic fluids such as waterbased, or silicones shall be preserved as specified in the applicable system specification (see 6.2.1).

3.8.1.1.1.3.3.3 Water pumps (except potable water). Contact preservatives shall not be applied to pump internal surfaces where all internal surfaces are resistant to corrosion in humid air and where dissimilar materials will not result in corrosion. Otherwise, the pump's internal surfaces shall be protected by coating with type P-21 preservative, and a tag shall be affixed to the pump stating the following:

"THE INTERIOR OF THIS PUMP IS COATED WITH MIL-C-16173 GRADE 5 PRESERVATIVE. REMOVE BY FLUSHING WITH HOT (180°F) WATER OR STEAM. DO NOT DISASSEMBLE PUMP TO REMOVE PRESERVATIVE."

3.8.1.1.1.3.3.4 Potable water pumps. Interior and exterior pump surfaces requiring preservative (see 3.8.1.1.1.3.3.3), shall be coated with type P-14 preservative. A tag shall be affixed to the pump stating the following:

"PRIOR TO INSTALLATION (USE), PRESERVATIVE ON OR IN THIS PUMP SHALL BE REMOVED UTILIZING HOT WATER (180°F) OR STEAM AS THE CLEANING AGENT."

3.8.1.1.1.3.4 Gas production equipment. Gas production equipment such as oxygen, including spares and repair parts shall be prepared for shipment in accordance with MIL-P-52211 as specified (see 6.2.1), except that processing shall be accomplished in an area not conducive to item contamination by hydrocarbons and which shall meet the cleanliness and hydrocarbon requirements in accordance with MIL-STD-1330.

3.8.1.1.1.4 Closure of openings. Inlet and outlet openings shall be covered with barrier material in accordance with grade A of MIL-B-121, and a blank flange of mild steel, tempered hardboard, or fully waterproof plywood as follows:

- (a) Mild steel flanges of not less than 1/16 inch thickness.
- (b) Tempered hardboard in accordance with type I of LLL-B-810, 1/8 inch thickness for openings having a diameter up to and including 9 inches, 1/4 inch thickness for openings having a diameter over 9 inches.
- (c) Fully waterproof plywood in accordance with group A, type I of NN-P-530; 1/4 inch thickness for openings having a diameter over 9 inches.

Flanges shall be secured with not less than four bolts, nuts and lockwashers. On openings up to 2-1/2 inches in diameter plastic plugs or caps may be used in lieu of barrier material and blank flanges. Preserved surfaces and shaft extensions coated with a preservative compound, other than type P-19, shall be wrapped with barrier material in accordance with grade A of MIL-B-121 (see 3.8.1.1.1.5), or

## MIL-P-16789D(SH)

transparent flexible greaseproof film in accordance with type II of MIL-B-22191. Barrier wraps shall be secured in place by taping, tying or other suitable means. Tape, when used, shall be in accordance with PPP-T-60. Plastic caps or plugs shall not be used on any pump or related part thereto where contamination from plastic chips or shredding could cause damage or impair operation of the system.

3.8.1.1.1.5 Preservation protection. Preserved surfaces including the couplings, if any, shall be wrapped with barrier material in accordance with type I or II, grade A of MIL-B-121 and secured in place with waterproof pressure sensitive tape. The greaseproof side of grade A material shall be in contact with the part or surface. Pump shaft packing shall be removed from stuffing boxes and packaged in accordance with method IC-2 of MIL-P-116, labeled and packed with the complete unit inside the shipping container. Drive belts shall be removed or released from tension. Pulley faces, grooves, and sheave grooves shall be coated with a light coat of clear air drying varnish. Drive belts not removed for shipment shall have strips of type I or II, grade A barrier material in accordance with MIL-B-121 placed between the belts and pulleys after the insulating compound has dried. The pulleys and belts shall not be rotated thereafter. When drive belts are removed for shipment, they shall be wrapped either individually or in sets and unit protected in accordance with method IC-1 or IC-2 of MIL-P-116, labeled and packed as specified for shaft packing.

### 3.8.1.1.2 Prime movers.

3.8.1.1.2.1 Electrical motors. Electrical motors shall be preserved in accordance with level A of MIL-E-16298. Electrical motors attached to the equipment shall be unit protected in accordance with method IIa of MIL-P-116. When the mounting of the motor does not permit enclosure within a water-vaporproof barrier, unit protection shall be in accordance with the alternate packaging method of MIL-E-16298.

3.8.1.1.2.2 Internal combustion engines (diesel and gasoline). The basic equipment shall be cleaned and preserved in accordance with type III, method I of MIL-E-10062 to the extent specified herein. Engines shall not be dismantled during cleaning and preservation unless it is essential for complete coverage with preservative. Gasoline engines shall have those requirements for diesel engines eliminated which are not applicable to gasoline engines.

3.8.1.1.2.2.1 Lubricating oil, fresh and sea water systems. Preservative P-10, grade 30 in accordance with MIL-L-21260, shall be used throughout the engine and gear, fresh and sea water, and lubricating oil systems in lieu of the P-2, P-3, P-5, and P-9 preservative specified in MIL-E-10062. When required, engine manufacturers may revise MIL-L-21260 by imposing a maximum zinc content limit. Clean filter elements shall be installed in the lubricating oil systems after completion of preservation. In addition, the fresh water system with the thermostats removed, shall be drained and completely dried with dry, warm air prior to preservation. If it is impractical to perform a drying-out procedure, the cooling system shall be flushed with a soluble-oil, corrosion inhibitor material in accordance with MIL-I-24453, which will emulsify the water and remove it on draining. The system shall then be flushed with the specified preservative and the thermostat replaced. The preservative oil shall be drained from all systems including the crankcase.

## MIL-P-16789D(SH)

3.8.1.1.2.2.2 Fuel oil system. Preservative P-10, viscosity grade 10W in accordance with MIL-L-21260, shall be used throughout the fuel system. A substitute, satisfactory to the Command or agency concerned, may be used for those fuel systems where passages and orifices are so small as to prevent pumping of the preservative throughout the system. A mixture of four parts diesel fuel and one part grade 10 is satisfactory. Injectors shall not be removed from engines for the purpose of preservation. Clean filter elements shall be installed in the fuel system after completion of preservation.

3.8.1.1.2.2.3 Valve mechanism. Access covers shall be removed and all surfaces within the valve compartment, including rocker mechanisms, valve stems, springs, guides, push rods, and the inside surfaces of the cover plate shall be coated with viscosity grade 30 preservative.

3.8.1.1.2.3 Turbines.

3.8.1.1.2.3.1 Steam turbines. Steam turbines shall be unit protected level A in accordance with MIL-P-17286 except that the steam and water sides of the turbine shall be preserved in accordance with 3.8.1.1.1.3.3.3 herein.

3.8.1.1.2.3.2 Gas turbines. Gas turbines shall be cleaned and preserved level A in accordance with MIL-E-17341, except that pumps shall be preserved as specified herein.

3.8.1.1.3 Valves, fittings and flanges. Attached valves, fittings, and flanges shall be preserved in accordance with the applicable procedure prescribed herein. Removed valves, fittings, and flanges shall be preserved in accordance with table I herein.

3.8.1.1.4 Accessories. Accessories such as gauges, thermometers, governors, pulleys, or parts of the unit that may be removed to prevent damage to the part or reduce cube (see 3.5.1), shall be packaged in accordance with table I herein, MIL-R-196 or MIL-E-17555 as applicable.

3.8.1.1.5 Electrical components.

3.8.1.1.5.1 Electrical components not detached from basic equipment. Except when specified in the equipment specification, miscellaneous meters, switches, power distribution panels and similar electrical devices which cannot be practically detached for separate packaging shall, unless otherwise specified (see 6.2.1), be cleaned, oiled and lubricated as required for service and sealed as specified in 3.8.1.1.1.4. Glass faces of indicating devices shall be cushioned (see 3.3.4 and 3.8.1.1.6.5) to prevent breakage.

3.8.1.1.5.2 Electrical components detached from the basic unit. Electrical components such as motors, electric brakes, control panels, regulators and switches which are detached from the basic unit for shipment shall be packaged in accordance with table I herein, MIL-E-17555 or MIL-E-16298 as applicable to the type component involved, and commensurate with the pump packaging level.

3.8.1.1.5.3 Electrical wiring. Exposed ends of wires, openings, sockets, coupling plugs or terminals shall be sealed with pressure sensitive tape in accordance with PPP-T-60. The tape and all electrical wiring, both

## MIL-P-16789D(SH)

shielded and nonshielded shall be coated by spraying with clear, air drying insulating compound in accordance with MIL-I-24092 or MIL-V-13811. Care shall be taken not to contaminate conducting areas and mating parts.

3.8.1.1.6 Supply support items. Supply support items (spares and repair parts accompanying equipment, for stock, or as on board items) shall be processed as specified herein. Items not covered under table I shall be processed in accordance with MIL-R-196 or MIL-E-17555 as applicable. Items accompanying equipment shall not be consolidated for shipment within the basic equipment container. They shall be packed in separate shipping containers and shipped concurrently with the applicable basic equipment. When specified (see 6.2.1), spares and repair parts shall be packed in repair boxes (see 3.8.1.1.6.7).

3.8.1.1.6.1 Cleaning and drying. Cleaning and drying of supply support items shall be in accordance with 3.8.1.1.1.1.

3.8.1.1.6.2 Preservatives. Preservatives shall be in accordance with 3.8.1.1.1.2.

3.8.1.1.6.2.1 Volatile corrosion inhibitor (VCI). When VCI is selected (see table I, column 3, P-18), the preservation procedure shall be in accordance with MIL-I-8574. Unless otherwise specified (see 6.2.1), application of contact preservative compound shall not be required. Transparent flexible VCI-treated films or bags, when used, shall be in accordance with MIL-B-22019 or MIL-B-22020, respectively. Items that are unit protected with VCI-treated materials shall have each unit pack marked or provided with a caution label stating the following:

"WASH HANDS AFTER HANDLING VCI MATERIAL  
TO AVOID EYE OR SKIN IRRITATION."

3.8.1.1.6.3 Cushioning and wrapping materials. Cushioning or wrapping material shall be provided as required to prevent damage to the item and to prevent puncture or tearing of the barrier materials utilized in packaging. Excessive use of cushioning within the unit pack shall be avoided since an unnecessary increase in tare weight and cube will result. The performance requirements shall be given consideration when determining the quantity of cushioning material actually required (see 6.6). Cushioning materials which have not been chemically refined for noncorrosiveness shall only be used when such are contained in a sealed waterproof barrier conforming to PPP-B-1055. Cushioning materials used within the unit pack shall conform to any of, or combinations of the following specifications at the contractor's option and which will provide the required protection.

| <u>Specification</u> | <u>Material</u>                     | <u>Special requirements</u>          |
|----------------------|-------------------------------------|--------------------------------------|
| UU-P-268             | Paper, kraft wrapping               | For Navy, use type II, grade C or D  |
| PPP-P-291            | Paperboard, wrapping and cushioning |                                      |
| PPP-C-795            | Plastic film, flexible, cellular    |                                      |
| PPP-C-843            | Cellulosic                          |                                      |
| PPP-C-850            | Polystyrene, expanded, resilient,   | For Navy, use grade SE               |
| PPP-C-1120           | Bound fiber                         | For Navy, use type II or IV, class C |

## MIL-P-16789D(SH)

| <u>Specification</u> | <u>Material</u>   | <u>Special requirements</u> |
|----------------------|---|-----------------------------|
| PPP-C-1752           | Polyethylene foam, unicellular  |                             |
| PPP-C-1797           | Resilient, low density,<br>unicellular, polypropylene foam                            |                             |
| PPP-C-1842           | Cushioning material, plastic,<br>open cell  |                             |
| PPP-F-320            | Fiberboard, corrugated and solid,<br>sheet stock (container grade),<br>and cut shapes |                             |
| MIL-B-3106           | Board, composition, water-<br>resistant, solid  |                             |
| MIL-R-5001           | Rubber, latex foam, sponge  |                             |
| MIL-R-6130           | Rubber, cellular  | For Navy, use grade A       |
| MIL-P-19644          | Plastic molding material<br>(polystyrene foam, expanded<br>bead)                      | For Navy, use type II       |
| MIL-R-20092          | Rubber sheets and molded<br>shapes, cellular, synthetic,<br>exploded cell             | For Navy, use class 5       |
| MIL-P-26514          | Polyurethane foam   |                             |
| MIL-C-26861          | Resilient type, general   |                             |
| MIL-F-81334          | Foam, plastic, flexible, open<br>cell, polyester type,<br>polyurethane                |                             |
| MIL-F-87090          | Foam, combustion retardant, for<br>cushioning supply items aboard<br>Navy ships       |                             |

3.8.1.1.6.4 Quantity per unit pack. Unless otherwise specified (see 6.2.1), items shall be unit protected one to a unit pack except that all items comprising a single set, kit, or assembly shall be individually unit protected within a unit pack. When unit protected as a set, kit, or quantity greater than one, each item shall be wrapped or cushioned to prevent damage resulting from direct surface contact with the surfaces of the adjacent items.

3.8.1.1.6.5 Transparent unit protection. Except as otherwise specified herein, when transparent unit protection is selected by the contractor, or required by the acquisition document, selection of materials (cushioning, films and bags) shall be in accordance with the material requirements of MIL-P-116 for the applicable method or submethod of preservation. Intimate wraps or cushioning applied to the item shall also be transparent. Transparent wrapping or cushioning materials shall be in accordance with MIL-B-22191 type II or III, PPP-C-795 or L-P-378.

#### 3.8.1.1.6.6 Interior containers.

3.8.1.1.6.6.1 Unit containers. Unless otherwise specified (see 6.2.1), unit containers, except those specified in MIL-P-116 for the applicable method or submethod of preservation, shall conform to any one of the following specifications, at the contractor's option, and which will provide the required protection. Paperboard and fiberboard boxes shall be of the weather-resistant type, class or grade.



## MIL-P-16789D(SH)

| <u>Specification</u> | <u>Container</u>              |
|----------------------|-------------------------------|
| PPP-B-566            | Box, paperboard, folding      |
| PPP-B-636            | Box, fiberboard               |
| PPP-B-665            | Box, paperboard, metal-stayed |
| PPP-B-676            | Box, paperboard, setup        |
| PPP-B-1672           | Box, reusable with cushioning |

Sealing and closure, as applicable, of unit containers shall conform to the applicable container specification or appendix thereto, and as specified herein. Closure of fiberboard boxes shall conform to method V. Bags may be used for packaging small parts by method III, when practicable. Bag closure shall be effected by heat-sealing, adhesives, or taping. Other type bag closure such as pressure-fit, zipper, and others, is acceptable for method III, provided that loss of contents will not result. Staples shall not be used. When the items exceed the weight limitations of the preceding unit containers, parts shall be packed directly into shipping containers for the level of packing specified (see 3.9.1.1.).

3.8.1.1.6.6.2 Intermediate containers. Unit quantities in an intermediate container shall be as specified (see 6.2.1). Intermediate containers shall be uniform in size and shape, and shall contain equal quantities in multiples of five, not exceeding 100 unit packs within the weight limitations specified herein. Unless otherwise specified (see 6.2.1), intermediate containers shall conform to any one of the following specifications, at the contractor's option, and which will provide the required protection. Paperboard and fiberboard boxes shall be of the weather-resistant type, class or grade.

| <u>Specification</u> | <u>Container</u>              |
|----------------------|-------------------------------|
| PPP-B-566            | Box, paperboard, folding      |
| PPP-B-636            | Box, fiberboard               |
| PPP-B-665            | Box, paperboard, metal-stayed |
| PPP-B-676            | Box, paperboard, setup        |
| PPP-B-1672           | Box, reusable with cushioning |

Box closure shall conform to the applicable container specification or appendix thereto and as specified herein. Closure of fiberboard boxes shall be in accordance with method V. The gross weight of paperboard boxes shall not exceed 10 pounds. Unless otherwise specified (see 6.2.1), the gross weight of fiberboard boxes shall not exceed 20 pounds.

3.8.1.1.6.7 Repair parts boxes. When required, repair parts shall be packed in type M or type W repair parts boxes as specified (see 6.2.1), in accordance with MIL-B-233. The gross weight of parts shall not exceed 200 pounds in any one box. Where the combined weight of a set exceeds 200 pounds, such parts shall be grouped and packed in two or more boxes numbered consecutively to show the number of boxes in a complete set; except when an individual part exceeds 200 pounds, the part shall be individually packed in one repair parts box.

3.8.1.1.6.8 Index list of repair parts. When specified in the contract or order, an index list of repair parts shall be prepared (see 6.2.2). The list shall be inserted in the index list support located on the interior side of the cover of the repair parts box or suitably placed on the inside of the box for



## MIL-P-16789D(SH)

quick accessibility. The list shall be placed in a transparent, waterproof plastic bag, minimum 4 mils thick. Closure shall be by heat sealing. The list shall give a complete itemized list of the contents of the container, including stock numbers, nomenclatures, and quantities.

3.8.1.1.6.9 Submarine support items. Packaging procedures for submarine spares and repair parts shall be in accordance with MIL-STD-758.

3.8.1.1.6.10 Spares. Spares (repairables) which are subject to shipment to a repair or overhaul activity for restoration and for further reissue to and from the supply system shall be packaged in materials and containers capable of reuse. Unless otherwise specified (see 6.2.1), the following packaging guidance shall apply:

- (a) Packaging in accordance with MS90363 where a limited reuse is anticipated of the packaging materials.
- (b) Packaging in long life reusable containers or containers expected to equal the item's service life. Such containers shall be capable of withstanding repeated openings and closures, repeated handlings, and the hazards of shipment, storage, and stowage. Unless otherwise specified (see 6.2.1), long life reusable containers shall be in accordance with MIL-STD-648. Containers in accordance with MIL-C-4150, MIL-D-6054, MIL-D-6055, and MIL-C-5584 are considered acceptable. External mounted humidity indicators shall not be required for containers in accordance with MIL-D-6054 and MIL-D-6055.

#### 3.8.1.1.7 Tools.

3.8.1.1.7.1 Standard tools. Standard tools shall be prepared for shipment in accordance with PPP-P-40.

3.8.1.1.7.2 Special tools. Special tools shall be cleaned and preserved, in accordance with MIL-P-116 as follows:

- (a) Tools made of ferrous metal with non-critical surfaces shall be cleaned by process C-1, dried as required, in accordance with 3.8.1.1.1.1, coated with type P-2 preservative and unit protected in accordance with method I of MIL-P-116. In lieu of the greaseproof wrap required, tools may be wrapped in transparent, flexible greaseproof film in accordance with type II of MIL-F-22191.
- (b) Tools made of ferrous metal with critical surfaces shall be cleaned as specified in 3.8.1.1.1.1, coated with type P-9 preservative and unit protected by method IA. Selection of the preservation submethod shall be at the contractor's option. Transparent, flexible, greaseproof film in accordance with type II of MIL-F-22191 may be used in lieu of barrier material in accordance with MIL-B-121.
- (c) Tools fabricated completely of non-ferrous materials or ferrous materials that are plated or otherwise treated to resist corrosion shall be unit protected in accordance with method III of MIL-P-116.

## MIL-P-16789D(SH)

As an alternative to the preservative and greaseproof wrap specified in (a) and (b), preservative P-18 in accordance with 3.8.1.1.6.2 may be used at the contractor's option.

3.8.1.2 Level C. Cleaning, drying, preservatives and methods of preservation (unit protection) shall be as specified for level A (see 3.8.1.1) except that interior containers (see 3.8.1.1.6.6) may be of the non-water resistant, non-weather resistant domestic type, class or grade, with selection at the contractor's option.

3.8.1.2.1 Water pumps. Internal surfaces of all, except potable water pumps (see 3.8.1.1.1.3.3.4), equipments and parts normally in contact with water or steam shall be processed in accordance with the requirements of 3.8.1.1.1.3.3.3.

3.8.1.3 Commercial. Commercial preservation shall be in accordance with ASTM D 3951 except that the internal preservation of water pumps shall be in accordance with 3.8.1.2.1.

3.9 Packing. Packing shall be level A, B, C or commercial, as specified (see 6.2.1).

3.9.1 General requirements.

3.9.1.1 Levels A, B and C. Shipping containers shall be of a minimum weight and cube consistent with the protection required, and of uniform size. Containers listed herein shall not preclude the use of other containers not listed, provided they have been approved by the contracting activity (see 6.2.1). Unless otherwise specified (see 6.2.1), spares, repair parts and tools shall be shipped separately and concurrently with the basic equipment. The gross weight of wood, plywood, and cleated boxes shall not exceed 200 pounds unless the weight of a single item exceeds 200 pounds. Crates shall be used for the shipment of individual equipments exceeding the weight limitations of wood and plywood boxes. With the approval of the agency concerned (see 6.2.1), unsheathed or open type crates may be substituted for sheathed crates. Open crates, when approved, shall be waterproofed (shrouded) in accordance with MIL-STD-1186 or the appendix to the applicable crate specification. Upon approval of the contracting activity (see 6.2.1), triple wall corrugated boxes modified with reinforcing strength members and skidded (see 3.9.1.3) may be used for individual items weighing more than 200 pounds. This requirement is not applicable for level A packing applications (see table II).

3.9.1.2 Clearance. Normally, a minimum of 1 inch clearance is required between the container contents and the nearest framing member of the container sides, ends, and top. Items that are fragile in nature, shock mounted, or items unit protected in a floating barrier bag (submethod IIa) require from 2 to 4 inches of clearance. The additional clearance allows for distortion and vibration which container may be subjected to or encounter during handling and transit.

3.9.1.3 Skids, and skid- or sill-type bases. Wood, plywood and cleated type containers exceeding 200 pounds gross weight shall be modified by the addition of skids in accordance with the applicable specification, or when appropriate, a skid- or sill-type base in accordance with MIL-C-104.

## MIL-P-16789D(SH)

3.9.1.4 Shipping container closure, reinforcing, and weight. Container closure, reinforcement or strapping, and container weight limitation shall be as specified herein and in the applicable container specification.

3.9.1.5 Anchoring, blocking, bracing, cushioning, and waterproofing. Anchoring, blocking, bracing, cushioning (see 3.8.1.1.6.3), and waterproofing of container contents shall be in accordance with MIL-STD-1186, MIL-P-116, herein, and the applicable container specification or appendix thereto. Equipment packed in boxes for shipment shall have the equipment secured to the container base and modification (see 3.9.1.3), in accordance with the appendix to MIL-C-104, the bolting method. Supplemental information is provided in 6.6.

3.9.1.6 Air shipments. Packing for air shipments shall be in accordance with MIL-A-25175.

3.9.1.7 Critical close tolerance operating equipment. In addition to the preservation and packing requirements specified by the product or packaging process specification or packaging requirements code, equipments which are identified to MIL-STD-740 shall be shipped on mountings with captive features to provide shock protection as specified in MIL-STD-740.

3.9.2 Basic equipment, accessories, spares, repair parts and tools.

3.9.2.1 Levels A, B and C. Exterior (shipping) containers shall be in accordance with table II.

MIL-P-16789D(SH)

TABLE II. Container selection.

| Specification | Container                                    | Packing application    |                   |                       | Use criteria                  |            |            |                   |
|---------------|--|------------------------|-------------------|-----------------------|-------------------------------|------------|------------|-------------------|
|               |  | Level A                | Level B           | Level C               | Gross weight maximum (pounds) |            |            | Over 1000         |
|               |  | (Style, type or class) |                   |                       | Under 100                     | 100-200    | 200-1000   |                   |
| PPP-B-636     | Box fiberboard                               | Not applicable         | Weather resistant | Domestic              | See note 1                    | See note 1 | No         | No                |
| PPP-B-640     | Fiberboard, corrugated, triple wall          | Not applicable         | Weather resistant | Non-weather resistant | Yes                           | Yes        | See note 2 | No                |
| PPP-B-576     | Wood, cleated veneer, paper overlaid         | Not applicable         | Class 2           | Class 1               | See note 3                    | Yes        | See note 1 | No                |
| PPP-B-585     | Box, wood, wirebound                         | Class 3                | Class 2           | Class 1               | See note 3                    | Yes        | See note 1 | No                |
| PPP-B-591     | Wood, cleated, fiberboard                    | Not applicable         | Class 2           | Class 1               | See note 3                    | See note 1 | See note 1 | No                |
| PPP-B-601     | Wood, cleated, plywood                       | Overseas type          | Overseas type     | Domestic type         | See note 3                    | Yes        | See note 1 | No                |
| PPP-B-621     | Wood, nailed and lock-corner                 | Class 2 overseas       | Class 2 overseas  | Class 1 domestic      | See note 3                    | Yes        | See note 1 | No                |
| MIL-C-9897    | Slotted angle, steel or aluminum             | Grade 1                | Grade 2           | Grade 2               | See note 4                    | See note 4 | Yes        | Yes<br>See note 1 |
| MIL-C-3774    | Wood, open, 12,000 and 16,000 pound capacity |                        |                   |                       | See note 4                    | See note 4 | See note 4 | Yes<br>See note 1 |

See notes at end of table.

MIL-P-16789D(SH)

TABLE II. Container selection. - Continued

| Specification | Container  | Packing application    |         |         | Use criteria                  |            |            |                   |
|---------------|--|------------------------|---------|---------|-------------------------------|------------|------------|-------------------|
|               |  | Level A                | Level B | Level C | Gross weight maximum (pounds) |            |            |                   |
|               |  | (Style, type or class) |         |         | Under 100                     | 100-200    | 200-1000   | Over 1000         |
| MIL-C-104     | Wood, lumber and plywood sheathed, nailed and bolted |                        |         |         | See note 4                    | See note 4 | See note 4 | Yes<br>See note 1 |
| MIL-C-52950   | Crate, wood, open and covered                        |                        |         |         | See note 4                    | See note 4 | Yes        | Yes<br>See note 1 |

## NOTES:

1. Maximum gross weight, container plus contents, shall not exceed the applicable requirements for style, type or class container selected for the applied degree of packing.
2. For weights greater than 200 pounds (see 3.9.1.1).
3. For weights under 100 pounds, container may be used, however, lighter weight, minimum cube and less expensive fiberboard containers should be given consideration for level B and level C shipments.
4. Not recommended for this weight category.

### 3.9.2.1.1 Closure and caseliners.

3.9.2.1.1.1 Level A. Shipping containers shall be closed, strapped, banded or reinforced in accordance with the applicable container specification or appendix thereto. When containers are packed with products or interior packs meeting the following requirements, no caseliners will be required.

- (a) Items which are completely painted and have no unprotected critical surfaces.
- (b) Large items which are completely coated with paint or preservative type P-19, and where the critical interior surfaces are preserved.
- (c) Method IA and IC packages.
- (d) Method II packages when all materials exterior to the water-vapor barrier have water resistance equal to or exceeding the water resistance in accordance with PPP-B-636 fiberboard boxes, types V or W.
- (e) Intermediate packs (or unit packs when no intermediate pack is required) for which the container conforms to weather-resistant class in accordance with PPP-B-636, and is closed and sealed as specified in 3.9.2.1.1.2.

3.9.2.1.1.2 Level B. Shipping containers shall be closed, reinforced, or banded in accordance with the applicable container specification or appendix thereto except that fiberboard boxes in accordance with PPP-B-636 shall be closed, waterproofed, and reinforced in accordance with the requirements for method V of the appendix to the box specification. Waterproofing (caseliners) is not required for fiberboard boxes or containers with products or interior packs meeting the criteria specified in 3.9.2.1.1.1. The special permit as required in accordance with PPP-B-640 shall be furnished to the contracting activity, when the triple-wall, fiberboard box exceeds the size and weight limitations of the carrier's classification. When specified, drawings on the triple-wall, fiberboard box proposed pack shall be prepared in accordance with MIL-STD-2073-1.

3.9.2.1.1.3 Level C. Shipping containers shall be closed, reinforced, or banded in accordance with the applicable container specification or appendix thereto, except that method I closure using pressure sensitive tape is applicable to boxes in accordance with PPP-B-636. Intermediate fiberboard boxes in accordance with PPP-B-636, closed, sealed, and banded as specified herein and used as shipping containers, need not be overpacked.

3.9.2.2 Commercial. Commercial packing shall be in accordance with ASTM D 3951.

3.9.2.3 Repair parts boxes. Repair parts boxes (see 3.8.1.1.6.7) shall require overpacking for shipment in accordance with the applicable level of packing as specified (see 3.9).

3.9.2.4 Container modification. Containers exceeding 200 pounds gross weight shall have a minimum of two, 3 by 4 inch nominal wood skids laid flat, or a skid or sill type base which will support the item and facilitate handling by mechanical handling equipment during transportation, storage, and stowage.



MIL-P-16789D(SH)

3.9.2.5 Technical manuals. Technical manuals, which accompany shipments shall be unit packed in a transparent, waterproof, plastic bag a minimum 4 mils thick. Closure shall be by heat sealing. Technical manuals shall not be placed within any flexible, sealed barrier enclosing components. The copies of the manual shall be placed in the shipping container housing the main unit. Packing lists shall indicate which container contains the technical manuals and shall also state the approximate location therein. For ease of removability, the location of the manual shall be such that it is readily accessible when the container is opened. Technical manuals, when shipped in bulk quantities, shall not be individually wrapped, but shall be packed in accordance with the requirements of the applicable technical manual specification or packed in containers conforming to the requirements for the level of packing specified (see 3.9 and 6.2.1).

3.9.3 Marking. In addition to any special marking required (see 6.2.1) herein, marking of interior and exterior packs for levels A, B and C shall be in accordance with MIL-STD-129 and unless otherwise specified (see 6.2.1), shall include bar code markings. Marking for commercial interior and exterior packs shall be in accordance with ASTM D 3951 and unless otherwise specified (see 6.2.1), shall include bar code marking in accordance with MIL-STD-129.

#### 3.9.3.1 Special marking.

3.9.3.1.1 Expiration of preservation. Pumps protected in accordance with 3.8.1.1.1.3.3 shall be conspicuously labeled on the unit package and shipping container.

3.9.3.1.2 Method II. Method IIa packages shall have the following markings affixed adjacent to the specified method II markings: "STORE RIGHT SIDE UP - WARNING SEE UNPACKING INSTRUCTIONS". When unpacking instructions are provided (see 3.11) shipping containers shall be stenciled as follows: "CAUTION - THIS EQUIPMENT MAY BE SERIOUSLY DAMAGED UNLESS UNPACKING INSTRUCTIONS ARE CAREFULLY FOLLOWED. UNPACKING INSTRUCTIONS ARE LOCATED (state where located)". When practical, this marking shall be applied adjacent to the identification marking on the side of the container.

3.9.3.1.3 Critical close tolerance operating equipment. In addition to any marking required by the equipment specification, shipping containers shall be marked in accordance with MIL-STD-740.

3.9.3.1.4 Gas production equipment. Gas production equipment such as oxygen shall have the interior and exterior packs marked in accordance with MIL-C-52211.

3.9.3.1.5 Structural marking. When applicable, structural markings "arrows, center-of-gravity, lift and sling points", in accordance with MIL-STD-129 and the appendix to the applicable container specification shall apply.

3.9.3.1.6 Technical manuals. Shipment of equipment which includes technical manuals (see 3.9.2.5), shall have the manual location annotated on the packing list. In addition, the shipping container housing the manuals shall be marked, "MANUALS ENCLOSED".

## MIL-P-16789D(SH)

3.10 Unpacking instructions. In addition to any special marking required (see 6.2.1), unpacking instructions shall be provided for complex equipment and floating bag (method IIa) type packs. The instructions shall contain, but not be limited to the following information:

"To unpack, remove the top and sides, leaving the unit resting on the bottom of the packing case. Remove the packing bolts that hold the unit on the base of the packing case and slip the unit off the base. In unpacking the item, the following precautions shall be observed to prevent possible damage:

- (a) Observe the arrows marked on the shipping container. These point to the cover which can be removed most readily.
- (b) Remove nails with a nail-puller only.
- (c) Remove screws with a screwdriver only.
- (d) Never pound or hammer the shipping container.
- (e) Keep all levers and crowbars away from the interior of the container."

3.10.1 Placement of unpacking instructions. A set of these instructions shall be placed in a sealed, waterproof, plastic envelope prominently marked "UNPACKING INSTRUCTIONS" and firmly affixed to the outside of the shipping container in a protected location (preferably between the cleats on the end of the container adjacent to the identification marking). If the instructions cover a set of equipment packed in multiple containers, the instructions shall be affixed to the number one container of the set or system.

3.10.2 Depreservation instructions. A set of instructions covering the depreservation of the equipment shall be furnished. Instructions shall show all information necessary for depreservation, such as, but not limited to: the addition of lubricants prior to operation, flushing of water, hydraulic lines, and the location of detached components. Instructions shall be packaged in a transparent, waterproof, plastic bag of minimum 4 mils thick. Closure shall be by heat sealing. The shipping container in which the instructions are packed shall be marked to indicate the instructions location.

3.11 Workmanship. Workmanship shall be such that, when the proper procedure is followed, materials and equipment being processed will be provided the required protection to prevent corrosion, deterioration, and damage during shipment, stowage, and storage and will require the minimum of processing for service.

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

4.1.1 Responsibility for compliance. All items must 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. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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 conditions. Unless otherwise specified (see 6.2.1), all inspections shall be performed in accordance with the test conditions specified in the applicable specification.

4.4 First article.

4.4.1 First article inspection. When specified (see 6.2.1 and 3.2), the contractor shall conduct inspection on one complete package, packed for shipment, to ascertain that the cleaning, drying, preservation, packing and marking of the items conform to this specification. The first article sample will not be required when such a pack has previously been inspected and accepted for the same method for an identical or similar item by the same contractor and satisfactory evidence can be furnished to the Government that the equipment or items have been prepared identically with the previously approved pack. First article inspection shall be repeated when changes are made in preservation and packing materials, processes, or designs.

4.4.2 First article testing. When specified (see 3.2.1 and 6.2.1), a complete single item or equipment pack shall be subjected to the examination and tests in accordance with MIL-P-116, including rough handling tests. Method IC shall be tested for leakage in accordance with the hot water technique in accordance with MIL-P-116. Unless otherwise specified (see 6.2.1), cyclic exposure tests will not be required. Upon completion of the rough handling tests, the item shall be inspected, as applicable, in accordance with the initial acceptance limits of the item specification to determine freedom from operational malfunction.

4.4.3 Test results. When specified in the contract or order, detailed test results shall be prepared (see 6.2.2).

4.4.4 First article test exceptions. First article testing will not be required when:

- (a) Commercial packaging is specified.
- (b) Detailed packing instructions are furnished by the contracting activity.
- (c) Previous submittal (see 4.4.1).

## MIL-P-16789D(SH)

4.5 Quality conformance inspection.4.5.1 Levels A and B.

4.5.1.1 Sampling. Sample items and packaging shall be selected in accordance with MIL-P-116 to determine compliance with section 3 herein.

4.5.1.2 Test and procedures. Tests of cleaning, preservation, interior packs, and packing procedures, shall be performed as specified in MIL-P-116.

4.5.1.3 Examination. Samples selected in accordance with 4.5.1.1 shall be examined for the defects specified in table III for the applicable level.

TABLE III. Classification of defects.

| Defects         |   | Level of protection |   |   |
|-----------------|---|---------------------|---|---|
|                 |   | A                   | B | C |
| <u>Critical</u> |   |                     |   |   |
| 1               | Hydrocarbon requirements exceed limitation (see 3.8.1.1.1.3.4)                              | X                   | X | X |
| <u>Major</u>    |   |                     |   |   |
| 101             | First article sample not submitted for examination (see 3.2).                               | X                   | X | X |
| 102             | Materials not as specified (see 3.3).   | X                   | X | X |
| 103             | Disassembly not as specified (see 3.5.1).   | X                   | X | X |
| 104             | Removed hardware not reinstalled or secured to prevent loss (see 3.5.1).                    | X                   | X | X |
| 105             | Matchmarking and tags not provided (see 3.5.2).   | X                   | X | X |
| 106             | Moving parts not properly lubricated (see 3.6).   | X                   | X | X |
| 107             | Parts cleanliness do not meet specified requirement (see 3.8.1.1.1.1).                      | X                   | X | X |
| 108             | Improper application of preservatives (see 3.8.1.1.1.2).                                    | X                   | X | X |
| 109             | Units not operated to insure internal preservative coverage (see 3.8.1.1.1.3.3).            | X                   | X | X |
| 110             | Preservative not drained (see 3.8.1.1.1.3.3).   | X                   | X | X |
| 111             | Openings not properly closed (see 3.8.1.1.1.4).   | X                   | X | X |
| 112             | Preserved surfaces not wrapped (see 3.8.1.1.1.5).   | X                   | X | X |
| 113             | Drive belts not removed or released from tension (see 3.8.1.1.1.5).                         | X                   | X | X |
| 114             | Material and methods of table I not properly applied.                                       | X                   | X | X |
| 115             | Prime movers not processed in accordance with the referenced specification (see 3.8.1.1.2). | X                   | X | X |
| 116             | Accessories not processed as specified (see 3.8.1.1.4).                                     | X                   | X | X |

MIL-P-16789D(SH)

TABLE III. Classification of defects. - Continued

| Defects      |  | Level of protection |   |   |
|--------------|--|---------------------|---|---|
|              |  | A                   | B | C |
| <u>Major</u> |  |                     |   |   |
| 117          | Electrical components not processed (see 3.8.1.1.5).                               | X                   | X | X |
| 118          | Glass dials of meters and gates not protected (see 3.8.1.1.5.1).                   | X                   | X | X |
| 119          | Support items or special tools not processed (see 3.8.1.1.6 and 3.8.1.1.7.2).      | X                   | X | X |
| 120          | Improper clearance (see 3.9.1.2).  | X                   | X | X |
| 121          | Boxes not modified when gross weight exceeds 200 pounds (see 3.9.1.3).             | X                   | X | X |
| 122          | Improper anchoring, blocking, bracing, cushioning and waterproofing (see 3.9.1.5). | X                   | X | X |
| 123          | Marking illegible, incomplete or incorrect (see 3.9.3).                            | X                   | X | X |
| <u>Minor</u> |  |                     |   |   |
| 201          | Damaged or defective paint not corrected (see 3.6).                                | X                   | X | X |
| 202          | Excess lubricant not removed (see 3.6).  | X                   | X | X |
| 203          | Pulley sheaves not protected (see 3.8.1.1.1.5).                                    | X                   | X | X |

4.5.2 Commercial. Unless otherwise specified (see 6.2.1), sampling and inspection for commercial packaging shall be in accordance with the contractor's procedures.

## 5. PACKAGING

5.1 Not applicable to this specification.

## 6. NOTES

6.1 Intended use. The packaging requirements specified in this specification are intended to assure proper and safe delivery, storage, stowage, and transportation of equipment, accessories and supply support items for direct shipment to the Government activities; for material processed at a military activity; for a reference source in the preparation of section 5 of the commodity specifications; and for the preparation of packaging requirements in acquisitioning documents.

## 6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

## MIL-P-16789D(SH)

- (a) Title, number, and date of this specification.
- (b) When a first article sample is required (see 3.2).
- (c) When a dummy or simulated load may be used (see 3.2.1).
- (d) When PHST plan is required (see 3.4.2).
- (e) Preservation if other than specified (see table I, note 1).
- (f) Selection of applicable levels of preservation and packing required (see 3.8.1, 3.8.1.2, 3.8.1.3, 3.9, and 3.9.1.1).
- (g) When selection of the preservation submethod is not optional (see 3.8.1.1).
- (h) When method II and reusable, flexible container is required (see 3.8.1.1.1).
- (i) When threaded and unpainted surfaces are to be preserved other than specified (see 3.8.1.1.1.3.1).
- (j) Preservation of hydraulic pumps if other than specified (see 3.8.1.1.1.3.3.2).
- (k) Gas production equipment packaging requirements (see 3.8.1.1.1.3.4).
- (l) Special cleaning, oiling and lubricating requirements for electrical component (see 3.8.1.1.5.1).
- (m) Whether repair parts boxes are required (see 3.8.1.1.6), if required, the type required (see 3.8.1.1.6.7).
- (n) When application of a preservation compound shall be used with VCI (see 3.8.1.1.6.2.1).
- (o) Unit pack quantity other than specified (see 3.8.1.1.6.4).
- (p) Unit containers other than specified (see 3.8.1.1.6.6.1).
- (q) Unit quantities required in an intermediate container (see 3.8.1.1.6.6.2).
- (r) Selection of intermediate containers if other than contractor's choice (see 3.8.1.1.6.6.2).
- (s) When the gross weight of fiberboard boxes may exceed 20 pounds (see 3.8.1.1.6.6.2).
- (t) Packaging guidance other than specified (see 3.8.1.1.6.10).
- (u) Long life reusable containers if other than specified (see 3.8.1.1.6.10(b)).
- (v) Levels of packing or commercial packing required (see 3.9 and 6.4).
- (w) Approval of unlisted containers (see 3.9.1.1).
- (x) Shipping requirements for repair parts and tools (see 3.9.1.1).
- (y) When unsheathed or open crates are acceptable (see 3.9.1.1).
- (z) When triple wall corrugated boxes are authorized (see 3.9.1.1).
- (aa) Selection of packing level for shipment of technical manuals in bulk quantities (see 3.9.2.5).
- (bb) Special marking required (see 3.9.3 and 3.10).
- (cc) When bar coding is not required (see 3.9.3).
- (dd) Special unpacking instructions (see 3.10).
- (ee) Test conditions if other than specified (see 4.3).
- (ff) When a complete item or equipment pack shall not be subjected to examination and test (see 4.4.2).
- (gg) Cyclic exposure test, when required (see 4.4.2).
- (hh) Test report if other than specified (see 4.4.3).
- (ii) Level C sampling and inspection procedures if other than specified (see 4.5.2).



## MIL-P-16789D(SH)

6.2.2 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD FAR Supplement, Part 27, Sub-Part 27.410-6 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification are cited in the following paragraphs.

| <u>Paragraph no.</u>   | <u>Data requirement title</u>                 | <u>Applicable DID no.</u> | <u>Option</u>          |
|------------------------|---|---------------------------|------------------------|
| 3.2.1                  | Notification of tests                         | DI-T-23731                | ---                    |
| 3.3.2.1 and<br>3.3.3.3 | Certificate of compliance                     | DI-E-2121                 | ---                    |
| 3.4 and<br>3.9.2.1.1.2 | Drawings, engineering<br>and associated lists | DI-E-7031                 | Level 2 and<br>Level 3 |
| 3.4.1                  | Preservation and packing<br>data              | DI-L-7135                 | ---                    |
| 3.8.1.1.6.8            | Packing list(s)                               | UDI-L-20500               | ---                    |
| 4.4.3                  | Reports, test                                 | DI-T-2072                 | ---                    |

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5010.12-L., AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 First article. When a first article inspection is required, the items should be a first article sample. The first article should consist of one unit. The contracting officer should 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.

## MIL-P-16789D(SH)

6.4 Definitions or explanation of terms.

6.4.1 Levels of protection. The following levels of protection apply equally to preservation and packing:

6.4.1.1 Level A. This packaging provides maximum protection. It is needed to protect material under the most severe worldwide shipment, handling, and storage conditions. Preservation and packing will be designed to protect material against direct exposure to extremes of climate, terrain, and operational and transportation environments, without protection other than that provided by the pack. The conditions to be considered include, but are not limited to:

- (a) Multiple handling during transportation and intransit storage from point of origin to final user.
- (b) Shock, vibration, and static loading during shipment.
- (c) Loading on shipdeck, transfer at sea, helicopter delivery, and offshore or over-the-beach discharge, to final user.
- (d) Environmental exposure during shipment or during intransit operations where port and warehouse facilities are limited or nonexistent.
- (e) Outdoor storage in all climatic conditions for a minimum of 1 year.
- (f) Static loads imposed by stacking.

For packing (exterior containers) it has been determined and agreed upon by the joint DoD packaging administrators that fiberboard and paperboard are not an acceptable material for use under level A packing.

6.4.1.2 Level B. This packaging provides intermediate protection. It is needed to protect material under anticipated favorable environmental conditions of worldwide shipment, handling, and storage. Preservation and packing will be designed to protect material against physical damage and deterioration during favorable conditions of shipment, handling, and storage. The conditions to be considered include, but are not limited to:

- (a) Multiple handling during transportation and intransit storage.
- (b) Shock, vibration, and static loading of shipments worldwide by truck, rail, aircraft, or ocean transport.
- (c) Favorable warehouse environment for a minimum of 18 months.
- (d) Environmental exposure during shipment and intransit transfers, excluding deck loading and offshore cargo discharge.
- (e) Stacking and supporting superimposed loads during shipment and extended storage.

For packing (exterior containers) weather-resistant grades of fiberboard and paperboard are permitted under level B. Domestic type or grade (non-weather resistant) fiberboard and paperboard are not acceptable under level B packing. Level B packing as defined in 6.4.1.2(b) covers shipments world-wide by all types of transportation.

## MIL-P-16789D(SH)

6.4.1.3 Level C. This packaging provides minimum protection. It is needed to protect material under known favorable conditions. The following criteria determine the requirements for this degree of protection:

- (a) Use or consumption of the item at the first destination.
- (b) Shock, vibration, and static loading during the limited transportation cycle.
- (c) Favorable warehouse environment for a maximum of 18 months.
- (d) Effects of environmental exposure during shipment and intransit delays.
- (e) Stacking and supporting superimposed loads during shipment and temporary storage.

6.4.1.4 Commercial. Although not specifically defined by any Government regulation or instruction, commercial packaging (preservation and packing) is understood to be those practices by manufacturers and contractors to protect and identify material and items packaged for retail and wholesale distribution purposes. ASTM D 3951 provides guidance in the application of commercial packaging. It has been determined by joint DoD instructions that commercial, also in some areas addressed as industrial packaging, should only be used or specified when such packaging is known to satisfy the DoD needs. Such use should be determined before a contract for supplies is awarded or within the life cycle of the contract when substantial savings to the Government may result. Commercial (industrial) packaging should not be specified where multiple shipments and handlings are anticipated or desired.

#### 6.4.2 Packaging and supply terms.

6.4.2.1 Assembly. A number of parts or subassemblies or any combination thereof joined together to perform a specific function and capable of disassembly for example: pump - rotating element, fan assembly.

6.4.2.2 Critical items. Items meeting one or more of the following criteria:

- (a) Chemically critical. Items of such a nature that any degree of deterioration (in the form of rust, stain, scale, mold, fungi, or bacteria) when acted upon by oxygen, moisture, sunlight, living organisms, temperature, time, and other contaminants, will result in premature failure or malfunction of the item or equipment in which installed or to which the item is related.
- (b) Physically critical. Items having a surface finish of 63 micro-inches or less and items requiring a high degree of cleanliness, free of contamination, special protection against shock, vibration, abrasion, or distortion.

6.4.2.3 Exterior pack. A container, bundle, or assembly which is sufficient by reason of design and construction to protect material during shipment and storage. This can be the unit pack or a container with any combination of unit or intermediate packs.

6.4.2.4 Intermediate pack. A wrap, box, or bundle which contains two or more unit packs of identical items.

## MIL-P-16789D(SH)

6.4.2.5 Marking. Application of numbers, letters, labels, tags, symbols, or colors for handling or identification during shipment and storage.

6.4.2.6 Noncritical items. Items not meeting the criteria set forth for critical items.

6.4.2.7 On board repair parts (OBRP). Assemblies, sub-assemblies, and parts carried on board a ship for maintenance and repair of shipboard equipment and components.

6.4.2.8 Packaging. The process and procedures used to protect material from deterioration or damage. It includes cleaning, drying, preserving, packing, marking, and unitization.

6.4.2.9 Packing. Assembling of items into a unit, intermediate, or exterior pack with necessary blocking, bracing, cushioning, weatherproofing, reinforcement and marking.

6.4.2.10 Preservation. Application of protective measures, including cleaning, drying, preservative materials, barrier materials, cushioning, and containers when necessary.

6.4.2.11 Repair parts. Those support items that are coded to be not repairable (for example, consumable items) (see MIL-STD-1561).

6.4.2.12 Spares. Those support items that are coded to be repairable (for example, repairable items) (see MIL-STD-1561).

6.4.2.13 Support items. Items subordinate to, or associated with, an end item (for example, spares, repair parts, tools, test equipment, support equipment and sundry materials) and required to operate, service, repair, or overhaul an end item (see MIL-STD-1561).

6.4.2.14 Unit pack. The first tie, wrap, or container applied to a single item or quantity thereof, or to a group of items of single stock number, preserved or unpreserved, which constitutes a complete or identifiable package.

6.5 Asbestos. It is the intent of the Government to eliminate the use of asbestos except in those cases that a suitable alternative material cannot be used to obtain the desired results. In those cases in which components or materials being packaged contain asbestos predominately in their make-up, such items are to be separately packaged and marked (see 3.3.3.1).

6.6 Detailed information. Supplemental information on packaging may be found in the following manuals:

DSAM 4145.2, Vol. I, TM38-230-1, NAVSUP PUB 502, AFP 71-75, MCO P4030.31B, Preservation and Packaging of Material (Volume I) (National Stock Number 0530-LP-050-2077)

DSAM 4145.2, Vol. II, TM-38-230-2, NAVSUP PUB 503, Vol. II, AFR 71-16, MCO P4030.21C, Preservation Packaging and Packing of Military Supplies and Equipment (Volume II) (National Stock Number 0530-LP-050-3211).

## MIL-P-16789D(SH)

DSAM 4145.7, TM38-236, NAVSUP PUB 504, AFP 15-01-3, AFP 71-8, MCO P4030, 30B, Preparation of Freight for Air Shipment (National Stock Number 0530-LP-050-4001).

DSAM 4145.3, TM38-250, NAVSUP PUB 505, AFR 71-4, MCO P4030.19D, Preparation of Hazardous Materials for Military Air Shipment (National Stock Number 0530-LP-050-5007).

Military standardization handbook, MIL-HDBK-304, Packaging Cushioning Design.

(Copies of the listed documents may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

6.7 Material safety data sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in appendix B of FED-STD-313.

6.8 Subject term (key word) listing.

|                |              |
|----------------|--------------|
| Boxes          | Packaging    |
| Caseliners     | Packing      |
| Containers     | Preservation |
| Cushioning     | Prime movers |
| Depreservation | Pumps        |
| Dummy load     | Unpacking    |
| Marking        | Wrapping     |

6.9 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  
(Project PACK-N043)

**INSTRUCTIONS:** In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

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

(Fold along this line)

(Fold along this line)

DEPARTMENT OF THE NAVY

COMMANDER  
NAVAL SEA SYSTEMS COMMAND (SEA 5523)  
DEPARTMENT OF THE NAVY  
WASHINGTON, DC 20362-5101

OFFICIAL BUSINESS  
PENALTY FOR PRIVATE USE \$300

**BUSINESS REPLY MAIL**

FIRST CLASS PERMIT NO. 12503 WASHINGTON D. C.

POSTAGE WILL BE PAID BY THE DEPARTMENT OF THE NAVY

COMMANDER  
NAVAL SEA SYSTEMS COMMAND (SEA 5523)  
DEPARTMENT OF THE NAVY  
WASHINGTON, DC 20362-5101

NO POSTAGE  
NECESSARY  
IF MAILED  
IN THE  
UNITED STATES



**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL***(See Instructions - Reverse Side)*

|   |  |   |  |
|---|--|---|--|
| 1. DOCUMENT NUMBER<br>MIL-P-16789D(SH)                        |  | 2. DOCUMENT TITLE<br>PUMPS (INCLUDING PRIME MOVERS AND SUPPORT ITEMS); PACKAGING OF |  |
| 3a. NAME OF SUBMITTING ORGANIZATION                           |  | 4. TYPE OF ORGANIZATION (Mark one)  |  |
| b. ADDRESS (Street, City, State, ZIP Code)                    |  | <input type="checkbox"/> VENDOR   |  |
|   |  | <input type="checkbox"/> USER   |  |
|   |  | <input type="checkbox"/> MANUFACTURER   |  |
|   |  | <input type="checkbox"/> OTHER (Specify): _____                                     |  |
| 5. PROBLEM AREAS  |  |   |  |
| a. Paragraph Number and Wording:                              |  |   |  |
|   |  |   |  |
|   |  |   |  |
|   |  |   |  |
|   |  |   |  |
|   |  |   |  |
| 6. REMARKS  |  |   |  |
|   |  |   |  |
| 7a. NAME OF SUBMITTER (Last, First, MI) - Optional            |  | b. WORK TELEPHONE NUMBER (Include Area Code) - Optional                             |  |
| c. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional |  | 8. DATE OF SUBMISSION (YYMMDD)  |  |
|   |  |   |  |