

**INCH- POUND****MIL-E-16298D****7 March 1989****SUPERSEDING****MIL-E-16298C****28 February 1964****(See 6.9)****MILITARY SPECIFICATION****ELECTRIC MACHINES HAVING ROTATING PARTS,  
ACCESSORIES AND ASSOCIATED SUPPORT ITEMS: PACKAGING OF**

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

**1. SCOPE**

1.1 Scope. This specification covers the packaging (preservation, packing and marking) requirements for motors, generators, motor-generators, dynamotors, rotary converters, rotary inverters, rotary frequency changers, electrical starters, and similar rotating electric equipment accessories and support items (spares, repair parts and tools). It does not cover such requirements for synchros and servo motors. Although primarily intended for unmounted machines, this specification may also be used for electric machines attached to prime movers, driven auxiliaries, or other electric machines.

1.2 Classification. Packaging shall be of the following levels of protection as specified (see 6.2.1).

**(a) Preservation**

Level A (see 3.7.1.1)

Level C (see 3.7.1.2)

Commercial (see 3.7.1.3)

**(b) Packing**

Level A (see 3.7.2.3)

Level B (see 3.7.2.3)

Level C (see 3.7.2.3)

Commercial (see 3.7.2.6)

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.

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## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

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.
- TT-T-291 - Thinner, Paint, Mineral Spirits, Regular and Odorless.
- UU-P-268 - Paper, Kraft, Wrapping.
- 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, Packaging (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-P-40 - Preservation and Packing of Hand Tools; Tools and Tool Accessories for Power Driven, Metal and Woodworking Machinery.
- PPP-P-291 - Paperboard, Wrapping and Cushioning.
- PPP-T-60 - Tape: Packaging, Waterproof.

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## MILITARY

- MIL-C-104 - Crates, Wood; Lumber and Plywood Sheathed, Nailed and Bolted.
- MIL-P-116 - Preservation, Methods of.
- MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible.
- MIL-B-131 - Barrier Materials, Watervaporproof, Greaseproof, Flexible, Heat-Sealable.
- MIL-R-196 - Repair Parts, Accessories, and Kits, Mechanical; Packaging of.
- MIL-B-197 - Bearings, Antifriction; Associated Parts and Subassemblies; Preparation for Delivery of.
- MIL-B-233 - Boxes, Supply Support Items, Stowage and Storage.
- MIL-E-2036 - Enclosures for Electric and Electronic Equipment.
- MIL-B-3106 - Board, Composition, Water-Resistant, Solid (For Filler or Cushioning Pads).
- MIL-D-3464 - Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification.
- MIL-C-3774 - Crates, Wood; Open 12,000- and 16,000-Pound Capacity.
- MIL-C-3955 - Cans, Composite, Spirally Wound.
- MIL-R-5001 - Rubber Cellular Sheet, Molded and Hand Built Shapes; Latex Foam.
- 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 Light-weight Airframe Components and Bulky Item (For Maximum Loads of 3000 Pounds).
- MIL-C-15074 - Corrosion Preventive, Fingerprint Remover.
- MIL-E-17555 - Electronic and Electrical Equipment, Accessories, and Provisioned Items (Repair Parts): Packaging of.
- MIL-P-17667 - Paper, Wrapping, Chemically Neutral (Non-Corrosive).
- MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.
- MIL-P-19644 - Plastic Molding Material (Polystyrene Foam, Expanded Bead).
- MIL-R-20092 - Rubber or Plastic Sheets and Assembled and Molded Shapes, Synthetic, Foam or Sponge, Open Cell.
- MIL-B-22019 - Barrier Materials, Transparent, Flexible, Sealable, Volatile Corrosion Inhibitor Treated.
- MIL-B-22020 - Bags, Transparent, Flexible, Sealable, Volatile Corrosion Inhibitor Treated.
- MIL-B-22191 - Barrier Materials, Transparent, Flexible, Heat Sealable.
- 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-C-52950 - Crates, Wood, Open and Covered.
- 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.

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## STANDARDS

## FEDERAL

- FED-STD-313 - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities.

## MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.  
 MIL-STD-108 - Definitions of and Basic Requirements for Enclosures for Electric and Electronic Equipment.  
 MIL-STD-129 - Marking for Shipment and Storage.  
 MIL-STD-740-1 - Airborne Sound Measurements and Acceptance Criteria of Shipboard Equipment.  
 MIL-STD-740-2 - Structureborne Vibratory Acceleration Measurements and Acceptance Criteria of Shipboard Equipment.  
 MIL-STD-758 - Packaging Procedures for Submarine Repair Parts.  
 MIL-STD-1186 - Cushioning, Anchoring, Bracing, Blocking and Waterproofing; with Appropriate Test Methods.  
 MIL-STD-1367 - Packaging, Handling, Storage, and Transportability Program Requirements (For Systems and Equipments).  
 MS20003 - Indicator, Humidity, Card, Three Spot, Impregnated Areas (Cobaltous Chloride).

(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 SOCIETY FOR TESTING AND MATERIALS (ASTM)

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

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## 3. REQUIREMENTS

3.1 Definitions or explanation of packaging terms. Definitions or explanation of packaging terms applicable to this specification shall be as stated in the applicable referenced specification and in 6.5. For definitions or explanation of packaging terms not specified therein, ASTM D 996 shall apply.

3.2 First article inspection. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.4 and 6.3).

3.3 Materials. Packaging materials shall be as specified herein.

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 is 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 and incur no additional cost to the Government (see 6.2.2).

3.3.3 Asbestos.

3.3.3.1 Packaging materials. Asbestos or material and items containing asbestos shall not be used as a packaging material.

3.3.3.2 Packaged material. Asbestos and separately packaged components containing asbestos that is predominately distributed throughout the item, shall be packaged in sealed, dust and sift-proof packages. Flexible packages shall be heat sealed. All packages shall be marked (see 3.7.3).

3.3.3.3 Dusting material. The dusting materials used in the packaging process (for example, talc and talcum) shall be asbestos free (see 6.2.2).

3.3.4 Void fill materials. The use of excelsior, newspaper, shredded paper (all types) and similar hygroscopic or nonneutral materials and all types of loose fill materials, for applications such as cushioning, fill, stuffing, and dunnage shall be prohibited.

3.3.5 Navy fire-retardant materials.

3.3.5.1 Lumber and plywood. Unless otherwise specified (see 6.2.1), all lumber and plywood including laminated veneer material used in shipping container and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated material conforming to MIL-L-19140 as follows:

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- Level A and B - Type II - weather resistant.  
Category 1 - general use.
- Level C - Type I - non-weather resistant.  
Category 1 - general use.

3.3.5.2 Fiberboard. Fiberboard used in the construction of class-domestic, non-weather resistant fiberboard, and cleated fiberboard boxes shall meet the flame spread index and the specific optic density requirements of PPP-F-320 and amendments thereto.

3.3.5.3 Cushioning and wrapping. Materials selected for cushioning and wrapping shall have properties (characteristics) resistant to fire (see 3.7.1.1.3).

3.4 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 shall be tailored to the applicable system or equipment acquisition in accordance with MIL-STD-1367.

3.4.1 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 shall be provided in accordance with FED-STD-313 (see 6.7). The MSDS shall be included with each shipment of any hazardous material.

3.5 Disassembly and matchmarking.

3.5.1 Disassembly. Machines shall not be disconnected from prime movers, gear trains, chain drives, bedplates, or driven auxiliaries, or in any way disassembled for shipment, except where the excessive size of the machine involved dictates that partial disassembly is necessary for the purpose of processing in accordance with table I. If partial disassembly is necessary, preservation of parts shall be accomplished in accordance with table II for items listed therein, and 3.5.2.

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TABLE I. Preservation of electrical machinery having rotating parts.

| Machine enclosure <sup>2/</sup>  | Weight <sup>1/</sup>                                       | Cleaning process <sup>3/</sup> | Preservatives <sup>3/</sup> | Method of preservation <sup>3/</sup>  |
|--|--|--------------------------------|-----------------------------|---|
| Oil filled<br>Oil proof<br>Submersible   | All  | C-1                            | ---                         | III   |
| Blower-cooled<br>Blower-ventilated<br>Dripproof<br>Dripproof protected<br>Dust-ignitionproof<br>Explosionproof<br>Explosionproof fan-cooled<br>Floodtight<br>Forced-air cooled<br>Forced-air ventilated<br>Open<br>Protected<br>Spraytight<br>Spraytight fan-cooled<br>Totally enclosed<br>Totally enclosed fan-cooled<br>Water-cooled<br>Water-air-cooled<br>Water-hydrogen-cooled<br>Watertight<br>Watertight fan-cooled | Under 5 pounds<br><br>5 to 70 pounds<br><br>Over 70 pounds | C-1                            | See 3.7.1.1.2               | I Ib<br>I Ic as selected<br>I Id by contractor<br>I Ie<br>I If<br>See 3.7.1.1.6<br><br>I Ia as selected<br>I Ib by contractor<br>I Id<br>See 3.7.1.1.6<br><br>I Ia as selected<br>I Ib by contractor<br>See 3.7.1.1.6 |

<sup>1/</sup> In the case of motor driven generators or other directly connected machines, these weights apply to the assembled unit, not merely the individual motor or other electric machines.

<sup>2/</sup> In accordance with MIL-STD-108 and MIL-E-2036, class 2.

<sup>3/</sup> In accordance with MIL-P-116.

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TABLE II. Preservation of accessories and supply support items for electrical rotating machinery.

| Item  | Cleaning process <sup>4/</sup> | Preservatives <sup>4/</sup>      | Method of preservation <sup>4/</sup> |
|---|--------------------------------|----------------------------------|--------------------------------------|
| Armature:<br>15 inches or less overall diameter     | C-1                            | See<br>3.7.1.1.7.3               | II                                   |
| more than 15 inches overall diameter                | C-3<br>(handwipe)              | See<br>3.7.1.1.7.3               | I<br>See<br>3.7.1.1.7.3              |
| Barrel: cranking motor with coils                   | C-1                            | None                             | II                                   |
| Base, motor   | C-1                            | P-1 or P-19                      | I<br>See<br>3.7.1.1.7.4              |
| Bearings:<br>Antifriction                           |                                | See MIL-B-197                    |                                      |
| Sleeve, self-lubricated (ferrous)                   | None                           | Excess of impregnating lubricant | IC                                   |
| Sleeve, self-lubricated (nonferrous)                | None                           | Excess of impregnating lubricant | I                                    |
| Sleeve, ferrous or combination                      | C-1                            | P-2 or P-18                      | IC<br>See 3.7.1.1.5.2                |
| Sleeve, nonferrous                                  | C-1                            | P-2                              | I                                    |
| Sleeve (tin, lead, silver or babbitt lined)         | C-1                            | P-2                              | IC                                   |
| Brush:<br>Electrical contact (with ferrous springs) | C-1                            | None                             | IC                                   |
| Electrical contact, other than above                | C-1                            | None                             | III                                  |

See footnotes at end of table.

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TABLE II. Preservation of accessories and supply support items for electrical rotating machinery. - Continued

| Item  | Cleaning process <sup>4/</sup> | Preservatives <sup>4/</sup> | Method of preservation <sup>4/</sup> |
|---|--------------------------------|-----------------------------|--------------------------------------|
| Brush rigging   | C-1                            | None                        | IC                                   |
| Clutch, magnetic  | C-1                            | ---                         | IIa, IIb, IIc                        |
| Commutator  | C-1                            | None                        | IC                                   |
| Field winding:<br>Not fungus and water-proof              | C-1                            | None                        | IIa, IIb, IIc, IIId                  |
| Fungus and waterproof                                     | C-1                            | None                        | III                                  |
| Field windings and pole pieces (field assemblies)         | C-1                            | None                        | IIa, IIb, IIc, IIId                  |
| Gaskets: <sup>1/</sup><br>Combination metal and asbestos: |                                |                             | See 3.3.3.2                          |
| Ferrous   | C-1                            | P-2 or P-18                 | IC<br>See 3.7.1.1.5.2                |
| Nonferrous  | C-1                            | None                        | III                                  |
| Cork, fiber, felt, leather or paper                       | C-1                            | None                        | IC                                   |
| Metallic:<br>Ferrous                                      | C-1                            | P-2, P-7, P-18 or P-19      | I or IC<br>See 3.7.1.1.5.2           |
| Nonferrous  | C-1                            | None                        | III                                  |
| Teflon, rubber or neoprene                                | C-1                            | None                        | 2/ 3/ III or IC                      |
| Holder, contact brush                                     | C-1                            | None                        | IC                                   |

See footnotes at end of table.

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TABLE II. Preservation of accessories and supply support items for electrical rotating machinery. - Continued

| Item   | Cleaning process <sup>4/</sup>           | Preservatives <sup>4/</sup> | Method of preservation <sup>4/</sup> |
|--|--|-----------------------------|--------------------------------------|
| Insulation:<br>Cloth                               | C-1                                      | None                        | IC<br>See 3.7.1.1.7.5                |
| Cordage  | C-1                                      | None                        | IC<br>See 3.7.1.1.7.5                |
| Mica   | C-1                                      | None                        | III                                  |
| Sleeving, cloth                                    | C-1                                      | None                        | IC<br>See 3.7.1.1.7.5                |
| Sleeving, rubber                                   | C-1                                      | None                        | 2/ 3/ III or IC                      |
| Tape   | C-1                                      | None                        | IC                                   |
| Insulating tube                                    | C-1                                      | None                        | IC<br>See 3.7.1.1.7.5                |
| Magneto  | C-1                                      | None                        | II                                   |
| Ring collector:<br>Ferrous<br>(without insulation) | C-3 or C-8<br>in<br>combination<br>(C-5) | P-2, P-7, P-18<br>or P-19   | I<br>See 3.7.1.1.5.2                 |
| Ferrous<br>(with insulation)                       | C-1                                      | None                        | IIa, IIb, IIc,<br>II d               |
| Nonferrous   | C-1                                      | None                        | IC                                   |
| Rotor:<br>Squirrel cage<br>(without shafts)        | C-1                                      | None                        | II<br>See 3.7.1.1.7.3                |
| Squirrel cage<br>(with shafts)                     | C-1                                      | P-2 on shafts               | I<br>See 3.7.1.1.7.3                 |
| Wound (15 inches or less<br>overall diameter)      | C-1                                      | See<br>3.7.1.1.7.3          | II                                   |
| Wound (more than 15<br>inches overall diameter)    | C-1                                      | See<br>3.7.1.1.7.3          | I<br>See 3.7.1.1.7.3                 |

See footnotes at end of table.

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TABLE II. Preservation of accessories and supply support items for electrical rotating machinery.- Continued

| Item                           | Cleaning process <sup>4/</sup> | Preservatives <sup>4/</sup> | Method of preservation <sup>4/</sup> |
|--------------------------------|--------------------------------|-----------------------------|--------------------------------------|
| Springs                        | C-1                            | None                        | III                                  |
| Switch, thermostatic           | C-1                            | None                        | IIa, IIb, IIc, IIId                  |
| Thermometer                    | C-1                            | None                        | III                                  |
| Tools:<br>Standard and special | See 3.7.1.1.7.2                |                             |                                      |

1/ Protect against bending, crushing and deformation.

2/ Rubber products, when unit packed in multiples, shall be dusted with talc or talcum (see 3.3.3.3).

3/ Unit packs for rubber items and items containing rubber components shall be opaque to prevent accelerated deterioration due to exposure to ozone or ultraviolet light.

4/ In accordance with MIL-P-116.

3.5.2 Partial disassembly. Equipment disassembly shall be the minimum necessary to make accessible for cleaning, drying, and preservation the 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 by semi-skilled personnel 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.

3.5.3 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. 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.

3.7 Levels of protection (see 6.2.2).

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

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3.7.1.1 Level A. Unless otherwise specified herein, preservation shall be accomplished in accordance with MIL-P-116; table I for assembled equipments, and table II for accessories and supply support items. The contractor may provide any additional protection which he considers necessary. Requirements in tables I and II are assigned by category; methods and submethods of preservation are assigned on the basis of the type of preservation most commonly required for a specific category. Unless otherwise specified herein or in the acquisition document (see 6.2.1), the selection of the submethod under a particular method of preservation is at the contractor's option.

3.7.1.1.1 Cleaning and drying. Cleaning and drying, process and procedure respectively, shall be in accordance with MIL-P-116 with the applicable cleaning process as specified in table I or II. 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 items such as gaskets, rubber or electrical insulation.

3.7.1.1.2 Preservatives and application.

3.7.1.1.2.1 Application. Excessive use of preservative compounds shall be avoided. Preservative compounds shall not be applied to nonmetallic parts such as gaskets, rubber or electrical insulation. Unless otherwise specified (see 6.2.1), preservation compounds shall not be applied to surfaces of corrosion resistant metal or metal that is treated or painted to resist corrosion. Immediately after cleaning and drying, surfaces of the equipment or item that is subject to corrosion shall be treated with preservative in accordance with table I or II as applicable, MIL-P-116 and as specified herein. During and after preservative application, the equipment or items shall be handled in such a manner as to produce a uniform protective preservative coating or film that will be the least disturbed. The protective coating or film shall remain untouched for a sufficient period of time to allow the coating or film to set before undertaking wrapping, if required, and packing.

3.7.1.1.2.1.1 External metal surfaces. Preservative compound shall be type P-1, P-2, or P-19 in accordance with MIL-P-116. Use of type P-1 and P-19 shall be limited to surfaces where it would not normally have to be removed to place the equipment in operation, or where its removal by scraping or solvent action would not damage the part or equipment. Type P-1 and P-19 preservatives do not require an overwrap of greasproof barrier material.

3.7.1.1.2.1.2 Internal metal surfaces. Internal surfaces which normally are in contact with oil shall be treated with type P-2 preservative. Internal surfaces normally in contact with water shall be coated with type P-21, thin film, water displacing preservative compound.

3.7.1.1.3 Cushioning and wrapping materials. Cushioning or wrapping material shall be provided, as required, to prevent damage to the item as determined in accordance with MIL-P-116, and to prevent puncture or tearing of the barrier materials used in packaging. Excessive use of cushioning within the unit pack shall be avoided since an unnecessary increase in tare weight and cube

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will result. Performance in accordance with the requirements of MIL-P-116 shall be given consideration when determining the actual required quantity of cushioning material (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 in accordance with PPP-B-1055. The barrier shall not affect nor be affected by the items within the pack. Cushioning materials used within the unit pack shall conform to any of, or combination of, the specifications in table III, at the contractor's option, which will provide the required protection.

TABLE III. Cushioning and wrapping materials.

| Specification | Material  | Special requirements                               |
|---------------|---|--|
| UU-P-268      | Paper, kraft, wrapping  | For Navy, use type II, grade C or D <sup>1/</sup>  |
| PPP-P-291     | Paperboard, wrapping and cushioning                                       |  |
| PPP-F-320     | Fiberboard  |  |
| PPP-C-795     | Plastic film - flexible cellular  | For Navy, use class III <sup>1/</sup>              |
| PPP-C-843     | Cellulosic  |  |
| PPP-C-850     | Polystyrene expanded, resilient   | For Navy, use grade SE <sup>1/</sup>               |
| PPP-C-1120    | Bound fiber   | For Navy, use type II or IV, class C <sup>1/</sup> |
| PPP-C-1752    | Polyethylene foam, unicellular  |  |
| PPP-C-1797    | Resilient, low density, unicellular, polypropylene foam                   |  |
| PPP-C-1842    | Cushioning material, plastic, open cell                                   |  |
| MIL-B-3106    | Board, composition, water-resistant, solid                                |  |
| MIL-R-5001    | Rubber, latex foam, sponge  | For Navy, use grade A <sup>1/</sup>                |
| MIL-R-6130    | Rubber, cellular  | For Navy, use grade A <sup>1/</sup>                |
| MIL-P-19644   | Plastic molding material (polystyrene foam, expanded bead)                | For Navy, use type II <sup>1/</sup>                |
| MIL-R-20092   | Rubber sheets and molded shapes, cellular, synthetic, open cell           | For Navy, use class 5 <sup>1/</sup>                |
| MIL-P-26514   | Polyurethane foam   |  |
| MIL-C-26861   | Cushioning, resilient type  |  |
| MIL-F-81334   | Foam, plastic, flexible open cell polyester type, polyurethane            |  |
| MIL-F-87090   | Foam, combustion retardant, for cushioning supply items aboard Navy ships |  |

<sup>1/</sup> Fire-retardant material.

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3.7.1.1.4 Barrier materials. When using barrier materials in accordance with MIL-B-121, the precautions as follows shall apply:

- (a) The greaseproof side of grade A material shall be in contact with the part or surface.
- (b) Grade C material shall not be in contact with metal surfaces or be used as an intimate wrap.

3.7.1.1.5 Method of preservation. In addition to the requirements in accordance with MIL-P-116, and supplemental information in 6.6, the following requirements shall apply.

3.7.1.1.5.1 Transparent unit protection. When transparent unit protection is selected by the contractor, or required by the contract or order (see 6.2.1), selection of materials 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.

3.7.1.1.5.2 Volatile corrosion inhibitor (VCI). When VCI, P-18, is selected (see table II), the preservation procedure shall be in accordance with MIL-I-8574. Unless otherwise specified (see 6.2.1), application of a 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."

3.7.1.1.5.3 Method of preservation. In addition to the requirements in accordance with MIL-P-116, and supplemental information in 6.6, the following requirements shall apply.

3.7.1.1.5.3.1 Method I. Preserved items shall be wrapped with a greaseproof material in accordance with MIL-P-116, or as an alternative, enclosed in a container lined, coated, or impregnated with a greaseproof barrier material. The greaseproof barrier material wrap shall be secured with tape. Items coated with preservative in accordance with P-1 or P-19 and subsequently dried will not require a greaseproof wrap, unless it is used to facilitate item identification or to prevent physical abrasion of the preservative film.

3.7.1.1.5.3.2 Method IC. Material in accordance with MIL-B-131 may be used as an alternative for flexible wraps or barriers.

3.7.1.1.5.3.2.1 Submethod IC-4. Alternatively, items may be individually cushioned and packed in a spirally wound fiber can in accordance with the construction requirements for type I, grade B of MIL-C-3955, except that the closure end may be sealed by the application of 1-1/2-inch tape in accordance with class 1, type III or IV of PPP-T-60 over the joint between the cover tube and half its width above and half below the juncture line of the slip-on-cover. A minimum length of tape 1-1/3 times the can circumference shall be used. The leakage test in accordance with MIL-P-116 shall apply.

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3.7.1.1.5.3.3 Method II. Method II shall be used where time at the installation or using point is critical and the removal of the contact preservative would prevent timely use of the equipment. Any preservative used for additional protection of the equipment shall be such as to permit the operation of the equipment without removal of the preservative. A reuseable flexible container in accordance with type I or II of MIL-C-58104 may be used in lieu of the MIL-B-131 barrier material. Desiccant shall be in accordance with type II or III of MIL-D-3464. Unless otherwise specified (see 6.2.1), a humidity indicator shall be required in the method II package. Method II shall not be utilized as a method of unit protection for parts which would be damaged by dehydration resulting from desiccation. Cushioning, blocking and bracing of products and protrusions shall be as specified in 3.7.1.1.3 and 3.7.2.1.4. When flexible bags are used, except for the container in accordance with MIL-C-58104, the bag shall be of sufficient size to permit at least two subsequent sealings. The preferred method is to reheat seal.

3.7.1.1.5.3.3.1 Submethod IIa. The level of packing (see 3.7.2) provides for the shipping container selection. For a single product weighing 200 pounds or more, containers shall be modified (see 3.7.2.1.3). To facilitate equipment mounting, where an item has mounting holes, bolt holes shall be drilled to accommodate bolting the unit to the container base and skids. Where the bolt location cannot accommodate bolting to the skids, the unit shall be bolted to the base and a sleeper on the underside of the base in accordance with the figure for the methods of bolting down of MIL-C-104. Following insertion of the bolts, a cushioning pad of fiberboard or other material, of a size sufficient to extend beneath all points of contact between the barrier and the container base, shall be placed over the bolts protruding through the close-fitting holes pre-bored in the pad. Close-fitting gaskets, minimum 1/8-inch thickness, shall then be placed over the bolts followed by the barrier material and a second set of gaskets. Gaskets shall be asbestos free (see 3.3.3). Cement shall be liberally applied between the gaskets and barrier material. Additional cushioning (see 3.7.1.1.3) shall be applied to fragile areas, sharp projections, corners, edges, and other features that might damage the barrier material. After the item is placed in its position, the nuts shall be tightened sufficiently to make an airtight seal around the bolts. To insure nuts will not loosen in transit, they shall be positively secured by upsetting or nicking the threads of the bolt beyond the nut; applying asphaltum, paint or lacquer on the threads; by use of lock nuts; or by the use of cotter pins with nuts. When the equipment cannot be bolted to the container base, it shall be secured by tensioned and cushioned steel straps, tie-down rods, or lumber hold-downs in accordance with the figure for hold-downs and tie-downs for skid bases of MIL-C-104. For fiberboard packs up to and including 200 pounds, a humidity indicator in accordance with MS20003 shall be used and no inspection port is required. For crates, or wood, plywood, and triple-wall fiberboard boxes (see 3.7.2.4.1) (over 200 pounds and modified with a base and skids), an externally mounted humidity indicator element or device shall be provided with an inspection port for viewing of the humidity indicator mounted on the barrier material.

3.7.1.1.5.3.3.2 Submethod IIb. The cushioned item shall be placed within a close fitting fiberboard box in accordance with PPP-B-636, domestic class. Box closure shall be in accordance with the appendix to the box specification. Every box corner shall be blunted prior to box insertion within the flexible barrier bag. A humidity indicator in accordance with MS20003 shall be affixed to the

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outside of the container. The container shall then be placed within a sealed, close fitting, watervaporproof barrier bag made of material in accordance with MIL-B-131 or type I of MIL-B-22191 which shall be enclosed in an outer unit container specified in 3.7.1.1.7.6, except that when the outer container is to serve as the shipping container, the container shall conform to the packing containers herein as required for the level of packing specified (see 3.7.2). When wood or plywood boxes are used as the outer or exterior shipping container, they shall be lined with minimum grade 200 fiberboard to prevent damage to the barrier bag. Fiberboard liners may be omitted when other types of cushioning media are employed that will provide protection to the barrier bag. When the item has a rigid enclosure, such as in the case of an instrument box or transit case, and which provides protection equal to that of the fiberboard box, the rigid enclosure may be used as the interior container and the enclosure shall be cushioned to prevent damage to the barrier bag.

3.7.1.1.5.3.3.2.1 Department of the Army only. Prior to placing within the shipping container, the method IIB package specified herein shall be further placed in a close fitting fiberboard box in accordance with PPP-B-636, type CF, class weather-resistant. The requirement for fiberboard liners within the shipping containers shall not apply.

3.7.1.1.6 Assembled machines. Each electric machine shall be preserved and individually packaged, based on the degree of machine enclosure and weight of the machine, in accordance with table I of this specification and MIL-P-116, except that the following alternate methods may be used where applicable.

- (a) Spraytight, spraytight fan-cooled, watertight and watertight fan-cooled machines. Enclosures which have gasketed doors and cover openings and meet the requirements in accordance with MIL-STD-108 for spraytight, spraytight fan-cooled, watertight and watertight fan-cooled enclosures may be unit protected and individually packaged using the machine enclosure in place of the watervaporproof barrier required for the submethod of preservation (see table I). This shall be accomplished by placing the desiccant and humidity indicator inside the enclosure in accordance with MIL-P-116 and tightly securing all gasketed doors or covers with the fastenings provided and then sealing all openings with pressure-sensitive tape in accordance with type III, class 1, of PPP-T-60. In the case of spraytight fan-cooled and watertight fan-cooled machines in accordance with MIL-STD-108, the openings through which cooling air flows over or through the frame structure but not over the electric windings within the machine shall not be taped. The item shall be marked as specified for a method II package (see 3.7.3.1.3) with the following addition:

"CAUTION - REMOVE TAPE, ALSO DESICCANT AND HUMIDITY INDICATOR WITHIN ENCLOSURE PRIOR TO OPERATION."

Contact preservation shall be applied as specified herein.

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- (b) Electric machines attached to mechanical equipment with combined weight in excess of 70 pounds. When specified (see 6.2.1), this method may be used for electric machines attached to mechanical equipment with a combined weight of 70 pounds or less. Openings to electric windings in the machine enclosure shall be sealed with type III, class 1, pressure sensitive tape in accordance with PPP-T-60. When tape is applied in accordance with these alternate procedures, a tag shall be affixed with the precautionary statement:

"REMOVE PACKAGING TAPE PRIOR TO OPERATION OF THE MACHINE."

In the case of explosion-proof fan-cooled, and totally enclosed fan-cooled machines, the openings through which cooling air flows over or through the frame structure but not over the electric windings within the machine shall not be taped in accordance with MIL-STD-108. Contact preservation shall be applied as specified herein.

3.7.1.1.6.1 Shafts and couplings. Shafts outside the machine and rigid couplings shall have unpainted surfaces coated with type P-1 or P-19 preservative. Flexible couplings shall be coated with preservative grease type P-11 and overwrapped with grade A barrier material in accordance with MIL-B-121 secured in place with pressure sensitive tape in accordance with PPP-T-60.

3.7.1.1.6.2 Bearings. Ball or roller bearings shall be lubricated as required for service. Lubricating systems, sleeve bearings (except prelubricated bearings) and housings shall be flushed with type P-2 preservative and thoroughly drained. Care shall be taken to ensure that all surfaces of sleeve bearings and journals receive a preservative coating. A double thickness of paper in accordance with grade A of MIL-B-121 shall be placed with the greaseproof sides of the paper in contact with the preserved metal surfaces between the upper half linings of split sleeve bearings and journals to prevent vertical movement of the armature or rotor after the bearing caps have been seated and bolted in place. The paper shall be projected beyond the assembly to permit easy detection. Each journal so prepared shall be plainly marked with a waterproof tag stating:

"BEFORE OPERATING MACHINE, REMOVE PAPER SHIMS BETWEEN THE JOURNAL AND UPPER HALF HOUSING."

3.7.1.1.6.3 Brushes, commutators and coils.

3.7.1.1.6.3.1 Brushes. Except as specified in 3.7.1.1.6.4.1, brushes shall be removed, matchmarked to their brush holders, wrapped in a neutral noncorrosive paper in accordance with MIL-P-17667, cushioned and unit packed in a container (see 3.7.1.1.7.6) and secured within the machine's shipping container. The unit pack and machine shall be marked with a waterproof tag to indicate brush removal with replacement for the matchmarkings.

3.7.1.1.6.3.2 Commutators and coils. Contact preservative shall not be applied to the commutator or coils. Corrodible surfaces directly adjacent to electrical insulation may be preserved by the use of insulating varnish applied during manufacture of the machine.

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3.7.1.1.6.4 Collector rings.

3.7.1.1.6.4.1 Non-corrodible rings with brushes installed. Brushes shall be raised and the exposed surfaces provided a wrap, cover, or a piece of neutral, noncorrosive paper (see 3.7.1.1.6.3.1) inserted between each brush and collector ring. A waterproof warning tag stating that the noncorrosive paper material shall be removed prior to machine operation shall be attached.

3.7.1.1.6.4.2 Corrodible rings. Brushes shall be removed (see 3.7.1.1.6.3.1). The rings shall be cleaned with solvent followed by fingerprint remover and preserved with P-2 preservative and wrapped with greaseproof paper in accordance with MIL-B-121, grade A. A waterproof tag shall be attached stating the rings are preserved and shall be cleaned process C-3 in accordance with MIL-P-116 prior to machine operation.

3.7.1.1.6.5 Heat exchangers (water-cooled, water-air cooled or water-hydrogen-cooled machines). Internal ferrous metal surfaces which normally operate in contact with water shall be brushed, flushed, or sprayed with type P-21 preservative. Excess preservative shall be drained to prevent coagulation of preservative in low places. Openings, such as inlet and outlet circulating water connections, shall be covered with plugs or blank flanges using grade A paper in accordance with MIL-B-121 between the cover and metal surfaces. Grade A paper is not required when closure of openings is accomplished by the use of plastic, snug fitting or threaded type plugs.

3.7.1.1.6.6 Prime movers. Prime movers shall be unit protected to the same level as required in the acquisitioning document for the basic electric machine but in accordance with the packaging or preparation for delivery requirements of the applicable prime mover specification.

3.7.1.1.6.7 Accessories. In order to facilitate packaging, accessories such as brushes (see 3.7.1.1.6.3), thermometers and thermostatic switches may be removed (see 3.5) and unit protected in accordance with table II. Accessories shall be included with the complete machine inside the machine's shipping container.

3.7.1.1.7 Support items.

3.7.1.1.7.1 Spares and repair parts. Spares and repair parts (accompanying equipment, for stock, or as on board items) shall be processed as specified in table II and as specified herein. Items not specified in table II 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), parts shall be packed in repair parts boxes (see 3.7.1.1.7.7).

3.7.1.1.7.1.1 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.

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3.7.1.1.7.2 Tools.

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

3.7.1.1.7.2.2 Special tools. Special tools and equipment, such as gauges (alignment, bayonet, clearance and the like), micrometer (depth), lifting gear (jacks, eyebolts, slings and the like), fittings (knuckle joints, bevel gears and the like), pulling tools, flange pumping gun and the like, shall be processed as follows:

- (a) Tools made of ferrous metal and having non-critical surfaces shall be cleaned and dried, as required, in accordance with 3.7.1.1.1, coated with type P-2 preservative and packaged 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-B-22191.
- (b) Tools made of ferrous metal and having critical surfaces shall be cleaned as specified in 3.7.1.1.1, dried as required, coated with type P-9 preservative and packaged by method IC. Selection of the submethod of preservation shall be at the contractor's option. Transparent, flexible, greaseproof film in accordance with type II of MIL-B-22191 may be used in lieu of barrier material in accordance with MIL-B-121.
- (c) Tools fabricated completely of non-ferrous materials not susceptible to corrosion or ferrous materials that are plated or otherwise treated to resist corrosion shall be packaged by method III of MIL-P-116.

As an alternative to the preservative and greaseproof wrap specified in (a) and (b), above, preservative P-18 in accordance with 3.7.1.1.5.2 may be used at the contractor's option.

3.7.1.1.7.2.3 Sets or kits. When sets or kits of tools are furnished, preservation of individual tools shall be in accordance with PPP-P-40, except as follows:

- (a) Sets or kits of tools furnished in a plastic or leather case shall be unit preserved in accordance with IC-2 of MIL-P-116.
- (b) Sets or kits of tools furnished in finished wooden cases such as a varnished, wood micrometer case and intended for use as a tool box or chest shall have each tool preserved as specified in table II. The unit pack shall be preserved in accordance with IC-2 of MIL-P-116, with the wood case as the inner container. Projections such as hinges and catches on the inner container shall be cushioned with material specified in 3.3.5.3. The outer container of the unit pack shall be in accordance with PPP-B-636, class weather-resistant with closure in accordance with method V.
- (c) Tools in a kit or set, which may be damaged by preservatives from other tools, shall be wrapped or bagged.

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3.7.1.1.7.3 Armatures and rotors. Preservative compounds shall not be applied to windings, commutators or peripheries of armatures or rotors from which centrifugal force may cause the preservative to be thrown when the machine is operating. Shafts shall be coated with preservative, type P-2, and wrapped with grade A barrier material in accordance with MIL-B-121, and secured in place with tape in accordance with PPP-T-60. Commutators (see 3.7.1.1.6.3) shall be wrapped with grade A greaseproof barrier-material in accordance with MIL-B-121 and held in place with tape in accordance with PPP-T-60. Corrodible surfaces except shafts, and collector rings, may be preserved by the use of insulating varnish applied during the manufacturing process. In addition to the foregoing requirements, armatures and rotors preserved by method I in accordance with table II shall be wrapped with grade A barrier material in accordance with MIL-B-121 and secured with tape in accordance with PPP-T-60.

3.7.1.1.7.4 Bases (motor or equipment). When all surfaces of the bases are completely coated with primer or paint sufficient to provide corrosion protection, no additional contact preservatives will be required and the base shall be unit protected in accordance with method III of MIL-P-116.

3.7.1.1.7.5 Insulating materials. Insulating material consisting entirely of mica, glass, quartz, and similar inorganic materials or of mica, asbestos (see 3.3.3), fiberglass, and similar inorganic materials in built-up form with binding substances composed of silicone compounds or materials with equivalent properties shall be unit protected by method III of MIL-P-116. Other insulating materials shall be packaged by method IC.

3.7.1.1.7.6 Interior containers.

3.7.1.1.7.6.1 Unit containers. Unless otherwise specified (see 6.2.1), unit containers, except those in accordance with 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, 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 |

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 of MIL-P-116, 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 3.7.2).

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3.7.1.1.7.6.2 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, 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 of the appendix to the fiberboard box specification. 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.

3.7.1.1.7.6.3 Department of the Army only. Intermediate containers shall not exceed a maximum of 40 pounds net weight and a maximum of 1.5 cubic feet, with at least each of two dimensions not exceeding 16 inches.

3.7.1.1.7.7 Repair parts storage boxes. When the item exceeds the size of the bin or drawer-type stowage, or when bin or drawer-type stowage is not provided, and when specified (see 3.7.1.1.7.1 and 6.2.1), parts accompanying the equipment shall be furnished in parts boxes in accordance with MIL-B-233, type M or W as specified (see 6.2.1). When the size of repair parts storage boxes is less than the minimum size specified in accordance with MIL-B-233, material accompanying the equipment shall be furnished in boxes in accordance with PPP-B-636, class weather-resistant, special requirements. Closure of the fiberboard boxes shall be in accordance with method V of the appendix to the box specification. 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.

3.7.1.1.7.7.1 Index list. Index lists of parts shall be inserted in each container containing parts. The list shall be inserted in the index list support located on the interior side of the repair parts box cover, or shall be placed within the box for quick accessibility. The lists give a complete itemized list of the container contents including stock numbers, nomenclatures and quantities. The list shall be enclosed in a waterproof bag or shall be so treated as to be resistant to water, oil and fading.

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3.7.1.1.7.8 Submarine support items. Except for support items packaged in fire-retardant packaging materials, support items for submarine usage shall be transparent packaged in accordance with MIL-STD-758.

3.7.1.2 Level C. Cleaning, drying, preservative application, and the methods of preservation shall be in accordance with MIL-P-116 and requirements specified herein, except that interior containers (see 3.7.1.1.7.6) may be of the non-weather resistant type or class. The level C methods of preservation shall be based on the substitution list as follows:

| <u>Level A</u> | <u>Level C</u> |
|----------------|----------------|
| II             | IA             |
| IC 1/          | III or I 1/    |
| I              | I              |
| III            | III            |

1/ Paper products shall receive a preservation method no lower than IC.

3.7.1.3 Commercial. Commercial preservation shall be in accordance with ASTM D 3951.

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

3.7.2.1 General requirements for levels A, B, and C.

3.7.2.1.1 Containers. Containers selected shall be of 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 meet the requirements of the individual container and are approved by the contracting activity. Shipping container contents shall fit in such a manner that the packed unit forms a compact, nonshifting load. Special tools, when furnished, shall be packed with the machine for which they are intended; however, such shall not be placed within the sealed barrier such as required for submethod IIa preservation. Unless otherwise specified herein, crates shall be used for the shipment of individual equipments exceeding the weight limitations of wood and plywood boxes. With the approval of the activity concerned (see 6.2.1), unsheathed or open type crates may be substituted for sheathed crates. Open type crates when approved, and equipment bolted to the base of a box shall be water-proofed (shrouded) in accordance with 3.7.2.1.4.

3.7.2.1.2 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, or items unit protected in a floating barrier bag (submethod IIa) require from 2 to 4 inches of clearance. Additional clearance may be required for shock mounted equipments. This clearance allows for distortion and vibration which the container may be subjected to or encounter during handling and transit.

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3.7.2.1.3 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.

3.7.2.1.4 Cushioning, anchoring, bracing, blocking and waterproofing. Cushioning (see 3.3.4 and 3.7.1.1.3), anchoring, bracing, blocking as required, and waterproofing shall be in accordance with MIL-STD-1186, MIL-P-116, the applicable container specification or appendix thereto, and as specified herein. When equipment is packed in boxes for shipment, the equipment shall be secured to the container base and modification (see 3.7.2.1.3) in accordance with the appendix to MIL-C-104, the bolting method. Waterproofing (caseliner) will not be required when shipping containers are packed with products or interior packs meeting the following:

- (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, with critical surfaces on the interior of the item, if any, and where the critical interior surfaces are adequately preserved with all openings sealed.
- (c) Method 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 requirements in accordance with PPP-B-636 fiberboard boxes.
- (e) Intermediate packs (or unit packs when no intermediate packs are required) for which the container shall be in accordance with weather-resistant class of PPP-B-636, and are closed and sealed as specified herein.

3.7.2.1.5 Shipping container closure, reinforcing, and weight. Except as specified herein, container closure, reinforcement or strapping, and container weight limitation shall be as specified in the applicable container specification and appendix thereto.

3.7.2.1.6 Test terminal board. When specified (see 6.2.1), shipping containers for assembled equipment or parts, such as armatures and wound rotors weighing more than 70 pounds and unit protected by other than method II shall be provided with a test terminal board to permit measurement of insulation resistance without opening the container. The test terminal board shall be as shown on figure 1, connected electrically by a hookup wire to the equipment connection box or to parts requiring measurements. In the case of equipment with commutator or collector rings and packed in accordance with 3.7.1.1.6 (a) or (b), temporary wiring may be installed between the commutator or collector rings and a brushholder terminal, in order that connection to the test terminal board may be made through the equipment connection box without affecting the sealing of equipment openings required by these preservation methods. Contact with commutators or collector rings shall be made by means of a braided copper band, or equivalent wrapped around the commutator or rings. Parts which are grounded, whether permanently or for inspection purposes, shall be connected to a common

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ground terminal on the test terminal board. The point of contact for rotating parts such as direct current (dc) armatures and wound rotors, shall be the shaft. The point of contact for the ground connection to stationary parts such as stators shall be the frame of the machine. The wiring added for the purpose of insulation resistance measurements shall be marked:

"CAUTION - REMOVE TEMPORARY WIRING PRIOR TO OPERATION OF EQUIPMENT."

The temporary wiring and test terminal board shall be suitable for measurement of insulation resistance by a 500 volt direct current (Vdc) insulation resistance test instrument.

3.7.2.1.7 Critical close tolerance equipment. In addition to any preservation and packing requirements specified by the product specification of packaging requirements code, equipments which are certified to MIL-STD-740-1 or MIL-STD-740-2 shall be protected against damage resulting from environmental conditions, multiple handling and the hazards of transportation (rough handling, shock, vibration, and so forth). Shipping containers or method of packing utilizing shock or vibration mitigation systems shall only use mounts which have captive features incorporated in their design. Unit packs and shipping containers shall be marked as specified (see 3.7.3.1.1). This requirement is also applicable to commercial packing (see 3.7.2.6).

3.7.2.2 Air shipment. Packing for air shipment when applicable, to attain minimum tare and cube consistent with the protection required to withstand the hazards encountered in air transport shall be in accordance with MIL-A-25175.

3.7.2.3 Equipment. Equipment preserved as specified (see 3.7.1), shall be individually packed for the level specified in a container conforming to table IV, with selection of the container at the contractor's option.

TABLE IV. Container selection.

| Specification | Container                            | Packing application 5/ |                   |                       | Use criteria                  |            |             |           |
|---------------|--------------------------------------|------------------------|-------------------|-----------------------|-------------------------------|------------|-------------|-----------|
|               |                                      | Level A                | Level B           | Level C               | Gross weight maximum (pounds) |            |             |           |
|               |                                      | (Style, type or class) |                   |                       | Under 100                     | 100 to 200 | 200 to 1000 | Over 1000 |
| PPP-B-636     | Box fiberboard                       | Not applicable         | Weather resistant | Domestic              | 1/                            | 1/         | No          | No        |
| PPP-B-640     | Fiberboard, corrugated, triple wall  | Not applicable         | Weather resistant | Non-weather resistant | Yes                           | Yes        | 2/          | No        |
| PPP-B-576     | Wood, cleated veneer, paper overlaid | Not applicable         | Class 2           | Class 1               | 3/                            | Yes        | 1/          | No        |
| PPP-B-585     | Box, wood, wirebound                 | Class 3                | Class 2           | Class 1               | 3/                            | Yes        | 1/          | No        |
| PPP-B-591     | Wood, cleated, fiberboard            | Not applicable         | Class 2           | Class 1               | 3/                            | 1/         | 1/          | No        |
| PPP-B-601     | Wood, cleated, plywood               | Overseas type          | Overseas type     | Domestic type         | 3/                            | Yes        | 1/          | No        |
| PPP-B-621     | Wood, nailed and lock-corner         | Class 2 overseas       | Class 2 overseas  | Class 1 domestic      | 3/                            | Yes        | 1/          | No        |
| MIL-C-9897    | Slotted angle, steel or aluminum     | Grade 1                | Grade 2           | Grade 2               | 4/                            | 4/         | Yes         | Yes 1/    |

See footnotes at end of table.

TABLE IV. Container selection. - Continued

| Specification | Container  | Packing application <u>5/</u> |         |         | Use criteria                  |               |                |               |
|---------------|--|-------------------------------|---------|---------|-------------------------------|---------------|----------------|---------------|
|               |  | Level A                       | Level B | Level C | Gross weight maximum (pounds) |               |                |               |
|               |  | (Style, type or class)        |         |         | Under<br>100                  | 100 to<br>200 | 200 to<br>1000 | Over<br>1000  |
| MIL-C-3774    | Wood, open,<br>12,000- and<br>16,000-pound<br>capacity           |                               |         |         | <u>4/</u>                     | <u>4/</u>     | <u>4/</u>      | Yes <u>1/</u> |
| MIL-C-104     | Wood, lumber<br>and plywood<br>sheathed,<br>nailed and<br>bolted |                               |         |         | <u>4/</u>                     | <u>4/</u>     | <u>4/</u>      | Yes <u>1/</u> |
| MIL-C-52950   | Crate, wood,<br>open and<br>covered                              |                               |         |         | <u>4/</u>                     | <u>4/</u>     | Yes            | Yes <u>1/</u> |

- 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 3.7.2.1.3.
- 3/ For weights under 100 pounds, container may be used; however, lighter weight, minimum cube and less expensive fiberboard containers shall be given consideration for level B and level C shipments.
- 4/ Not recommended for this weight category.
- 5/ For Navy, the fire-retardant requirements of 3.3.5 shall apply.

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3.7.2.4 Support and submarine items. Material, preserved as specified (see 3.7.1), shall be packed for the level specified in containers in accordance with table IV herein, with selection of the container at the contractor's option. The gross weight of the boxes shall not exceed 200 pounds unless the weight of a single item exceeds 200 pounds. Boxes exceeding 200 pounds shall be modified as specified in 3.7.2.1.3.

3.7.2.4.1 Fiberboard boxes. Fiberboard boxes in accordance with class domestic of PPP-B-636 shall be closed in accordance with method I; class weather-resistant shall be closed in accordance with method V and reinforced with nonmetallic banding in accordance with the appendix to the box specification. Interior (unit or intermediate) fiberboard boxes (see 3.7.1.1.7.6) in accordance with PPP-B-636, weather-resistant class, closed and reinforced as specified herein and used as shipping containers need not be overpacked. Triple-wall, fiberboard boxes may be used for individual items weighing more than 200 pounds provided the box is modified with reinforcing strength members for stacking and modified as specified in 3.7.2.1.3. When the triple-wall, fiberboard box exceeds the size and weight limitations of the carrier's classification, a copy of the special permit as required in accordance with PPP-B-640 shall be furnished to the contracting activity.

3.7.2.5 Repair parts boxes. Repair parts boxes (see 3.7.1.1.7.7) shall be overpacked in containers as specified in table IV for the level of packing specified. Alternatively, repair parts boxes may be overpacked in unsheathed or open crates (see table IV) at the contractor's option.

3.7.2.6 Commercial. Commercial packing of support and submarine items shall be in accordance with ASTM D 3951.

3.7.2.6.1 Skids. For shipping containers exceeding 200 pounds gross weight, or when the length and width is 48 by 24 inches or more and the weight exceeds 100 pounds, a minimum of two, 3 by 4 inch nominal wood skids, laid flat shall be provided and secured in a manner which shall support the material and facilitate the use of material handling equipment during transportation, storage, and stowage.

3.7.2.7 Technical manuals. Technical manuals which accompany shipments shall be unit packed in a transparent, waterproof plastic bag, 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 level A, B, or C, as specified (see 6.2.1).

3.7.2.8 Drawings and microfilm. Drawings and microfilm shall be packaged or prepared for shipment in accordance with the applicable specification.

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3.7.3 Marking. In addition to any special marking required (see 6.2.1 and herein), marking including bar coding, of interior and exterior packs for levels A, B and C shall be in accordance with MIL-STD-129, for commercial in accordance with ASTM D 3951.

3.7.3.1 Special marking.

3.7.3.1.1 Critical close tolerance equipment. Unit packs and shipping containers and unpacked shipments shall be marked with the following:

CRITICAL, CLOSE TOLERANCE OPERATING EQUIPMENT  
HANDLE WITH CARE  
DO NOT DROP OR SUBJECT TO SHOCKS OR JARS

Markings shall be stenciled, red color, and applied on two sides and both ends of the container or shipment. Letters shall be minimum 1-1/2 inches high, except for small containers with insufficient space, in which case letters shall be of such size as to be legible. In addition, arrows and the word, "UP", center of balance, sling or lifting point markings as indicated in MIL-STD-129 shall apply.

3.7.3.1.2 Submarine items. Package, interior and exterior, markings shall be in accordance with MIL-STD-758.

3.7.3.1.3 Method II. Method II packs shall be marked in accordance with MIL-STD-129. Method IIa packs 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 3.7.4.1), 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.

3.7.3.1.4 Technical manuals. Shipment of equipment that includes technical manuals (see 3.7.2.7) shall have the location of the information annotated on the packing list. In addition, the shipping container housing the manuals shall be marked:

"MANUALS ENCLOSED"

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3.7.3.1.5 Container structural and handling markings. When and as applicable to the packed container, the following markings in accordance with MIL-STD-129 and the applicable container specification or appendix thereto shall apply: structural markings; handling marking such as center of balance, sling and lift points, load bearing and forklift areas, and arrows.

3.7.4 Instructions.

3.7.4.1 Unpacking instructions. In addition to any special marking required (see 3.7.3), unpacking instructions shall be provided for complex equipment or systems 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."

3.7.4.1.1 Placement of unpacking instructions. A set of unpacking 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.

3.7.4.2 Depreservation instructions. A set of instructions covering the depreservation of the equipment shall be furnished. Instructions shall show all information necessary for depreservation prior to equipment use such as, but not limited to: the addition of lubricants prior to operation, flushing of water lines, desiccant removal, commutator ring wrapping removal, 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.

3.8 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.

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## 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.

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

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

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

4.3 Inspection 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 inspection. The contractor shall conduct inspection on one complete package, packed for shipment, to ascertain that the 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 item by the same contractor and satisfactory evidence can be furnished to the Government that the 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 (see 6.2.2).

4.4.1 Rough handling test. When specified (see 6.2.1), the first article pack shall be subjected to a rough handling test in accordance with MIL-P-116, except when a dummy or simulated load is specified. When a dummy or simulated load is substituted for the actual equipment or item in performing the rough handling tests (see 6.2.1), instrumentation of the pack is required for assurance that the acceleration of the packaged item during the tests is less than the

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fragility rating of the item. Upon completion of the rough handling test when required, except when a dummy or simulated load is used, the item or equipment shall be inspected as applicable, in accordance with the initial acceptance limits of the applicable item or equipment specification to determine freedom from operational malfunctions.

#### 4.5 Quality conformance inspection.

4.5.1 Levels A, B and C. Sampling, inspection and testing for preservation shall be in accordance with MIL-P-116. Inspection of packing and marking requirements not covered by any referenced specification shall be performed on sample packs in accordance with MIL-STD-105, inspection level S-1.

4.5.2 Commercial. Unless otherwise specified (see 6.2.1), the quality conformance inspection shall be in accordance with the contractor's procedure.

### 5. PACKAGING

5.1 This section is not applicable to this specification. Packaging requirements are specified in section 3 herein.

### 6. NOTES

6.1 Intended use. The packaging requirements specified herein are intended to assure proper and safe storage, stowage and transportation of material processed for shipment to Government activities or material processed for shipment at a Military activity or agency. In addition, the packing requirements specified herein are intended for use as a reference in section 5 of commodity specifications, and for direct reference in acquisition documents.

#### 6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Level of preservation and level of packing required (see 1.2).
- (c) When a first article inspection is required (see 3.2).
- (d) Fire-retardant treatment if other than specified (see 3.3.5.1).
- (e) When a PHST plan is required (see 3.4).
- (f) Level of preservation required (see 3.7.1).
- (g) Preservation submethod required, if other than contractor's option (see 3.7.1.1).
- (h) Application of preservation compounds to corrosion resistant or treated metal, if required (see 3.7.1.1.2.1).
- (i) When transparent unit protection is required (see 3.7.1.1.5.1).
- (j) When a contact preservative compound is required (see 3.7.1.1.5.2).
- (k) When a humidity indicator is not required (see 3.7.1.1.5.3.3).
- (l) When packaging method for electric machines attached to mechanical equipment with a combined weight in excess of 70 pounds may be used for electric machines attached to mechanical equipment with a combined weight of 70 pounds or less (see 3.7.1.1.6(b)).

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- (m) When repair parts boxes, and type are required (see 3.7.1.1.7.1 and 3.7.1.1.7.7).
- (n) Quantity per unit pack if other than specified (see 3.7.1.1.7.1.1).
- (o) Unit container if other than specified (see 3.7.1.1.7.6.1).
- (p) Intermediate container if other than specified (see 3.7.1.1.7.6.2).
- (q) Unit pack quantity required per intermediate container (see 3.7.1.1.7.6.2).
- (r) Gross weight of fiberboard boxes if other than specified (see 3.7.1.1.7.6.2).
- (s) Level of packing required (see 3.7.2).
- (t) When unsheathed or open type crates are acceptable (see 3.7.2.1.1).
- (u) When test terminal board is required (see 3.7.2.1.6).
- (v) Levels of packaging for technical manuals (see 3.7.2.7).
- (w) Special marking required (see 3.7.3).
- (x) Inspection conditions if other than specified (see 4.3).
- (y) When a first article rough handling test is required (see 4.4.1).
- (z) When a dummy or simulated load may be used (see 4.4.1).
- (aa) Quality conformance inspection if other than specified (see 4.5.2).

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 27.475-1 (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> |
|----------------------|--|---------------------------|---------------|
| 3.3.2 and<br>3.3.3.3 | Certificate of compliance                  | DI-E-2121                 | ---           |
| 3.7                  | Drawings, engineering and associated lists | DI-E-7031                 | ---           |
| 3.7                  | Special packaging instructions (SPI)       | DI-PACK-80121             | ---           |
| 3.7                  | Preservation and packing data              | DI-PACK-80120             | ---           |
| 4.4                  | First article inspection report            | DI-T-4902                 | ---           |

(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.)

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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 requirements 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.

6.4 Asbestos. It is the intent of the Government to eliminate the use of asbestos except in those cases that an 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 will be separately packaged and marked (see 3.3.3).

6.5 Definitions or explanation of terms.

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

- (a) Level A. Level A packaging provides maximum protection. It is needed to protect material under the most severe worldwide shipment, handling, and storage conditions. Preservation and packing should 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:
- (1) Multiple handling during transportation and in-transit storage from point of origin to final user.
  - (2) Shock, vibration, and static loading during shipment.
  - (3) Loading on shipdeck, transfer at sea, helicopter delivery, and offshore or over-the-beach discharge, to final user.
  - (4) Environmental exposure during shipment or during in-transit operations where port and warehouse facilities are limited or nonexistent.
  - (5) Outdoor storage in all climatic conditions for a minimum of 1 year.
  - (6) Static loads imposed by stacking.

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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.

(b) Level B (static loads imposed by stacking). Level B packaging provides intermediate protection. It is needed to protect material under anticipated favorable environmental conditions of worldwide shipment, handling, and storage. Preservation and packing should 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:

- (1) Multiple handling during transportation and in-transit storage.
- (2) Shock, vibration, and static loading of shipments worldwide by truck, rail, aircraft, or ocean transport.
- (3) Favorable warehouse environment for a minimum of 18 months.
- (4) Environmental exposure during shipment and in-transit transfers, excluding deck loading and offshore cargo discharge.
- (5) 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 6.5.1(b) covers shipments worldwide by all types of transportation.

(c) Level C. Level C 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.

- (1) Use or consumption of the item at the first destination.
- (2) Shock, vibration, and static loading during the limited transportation cycle.
- (3) Favorable warehouse environment for a maximum of 18 months.
- (4) Effects of environmental exposure during shipment and in-transit delays.
- (5) Stacking and supporting superimposed loads during shipment and temporary storage.

(d) 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 suppliers 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

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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.

#### 6.5.2 Packaging and supply terms.

6.5.2.1 Assembly. An assembly is any 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).

6.5.2.2 Critical items. Critical items are those meeting one or more of the following criteria:

- (a) Chemically critical. Chemically critical items are items of such a nature that any degree of deterioration (in the form of corrosion, 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. Physically critical items are items having a surface finish of 63 microinches or less and items requiring a high degree of cleanliness, free of contamination, special protection against shock, vibration, abrasion, or distortion.

6.5.2.3 Exterior pack. An exterior pack is a container, bundle, or assembly which is sufficient by reason of material, 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.

6.5.2.4 Intermediate pack. An intermediate pack is a wrap, box, or bundle which contains two or more unit packs of identical items.

6.5.2.5 Marking. Marking consists of application of numbers, letters, labels, tags, symbols, or colors for handling or identification during shipment and storage.

6.5.2.6 Military packaging. Military packaging consists of the materials and methods or procedures prescribed in Federal and Military specifications, standards, drawings or other authorized documents, which are designed to provide the degree of packaging protection determined necessary to prevent damage and deterioration during worldwide distribution of material.

6.5.2.7 Noncritical items. Noncritical items are all items not meeting the criteria set forth for critical items.

6.5.2.8 On board repair parts. On board repair parts are assemblies, sub-assemblies, and parts carried on board a ship for maintenance and repair of shipboard equipment and components.

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

6.5.2.10 Packing. Packing is the assembling of items into a unit, intermediate, or exterior pack with necessary blocking, bracing, cushioning, weather-proofing, reinforcement and marking.

6.5.2.11 Preservation. Preservation is the application of protective measures, including cleaning, drying, preservative materials, barrier materials, cushioning, and containers when necessary.

6.5.2.12 Repair parts. Repair parts are those support items that are coded to be not repairable (that is, consumable items) (see MIL-STD-1561).

6.5.2.13 Spares. Spares are those support items that are coded to be repairable (that is, repairable items) (see MIL-STD-1561).

6.5.2.14 Support items. Support items are those items subordinate to, or associated with, an end item (that is, 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).

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

6.6 Detailed information. Detailed information is supplemental information on packaging which may be found in the following manuals:

DSAM 4145.2, Vol. I, TM38-230-1, NAVSUP PUB 502, AFP 71-15, MCO P4030.31B, Preservation and Packaging (Volume I) (National Stock Number 0530-LP-050-2073)

DSAM 4145.2, Vol. II, TM38-230-2, NAVSUP PUB 503, Vol. II, AFR 71-16, MCO P4030.21C, Packing (Volume II) (National Stock Number 0530-LP-050-3211)

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, AFT 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, Package Cushioning Design

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

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6.7 Material safety data sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets (MSDS) 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. In order to obtain the MSDS, federal acquisition regulation (FAR) clause 52.223-3 must be in the contract.

6.8 Subject term (key word) listing.

Assembled machines, packaging  
Electrical rotating machinery, preservation of  
Enclosures, machine  
Machines, electric, packaging  
Volatile corrosion inhibitor (VCI)

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.

Custodians:

Army - AV  
Navy - SH  
Air Force - 69

Preparing activity:

Navy - SH  
(Project PACK-0815)

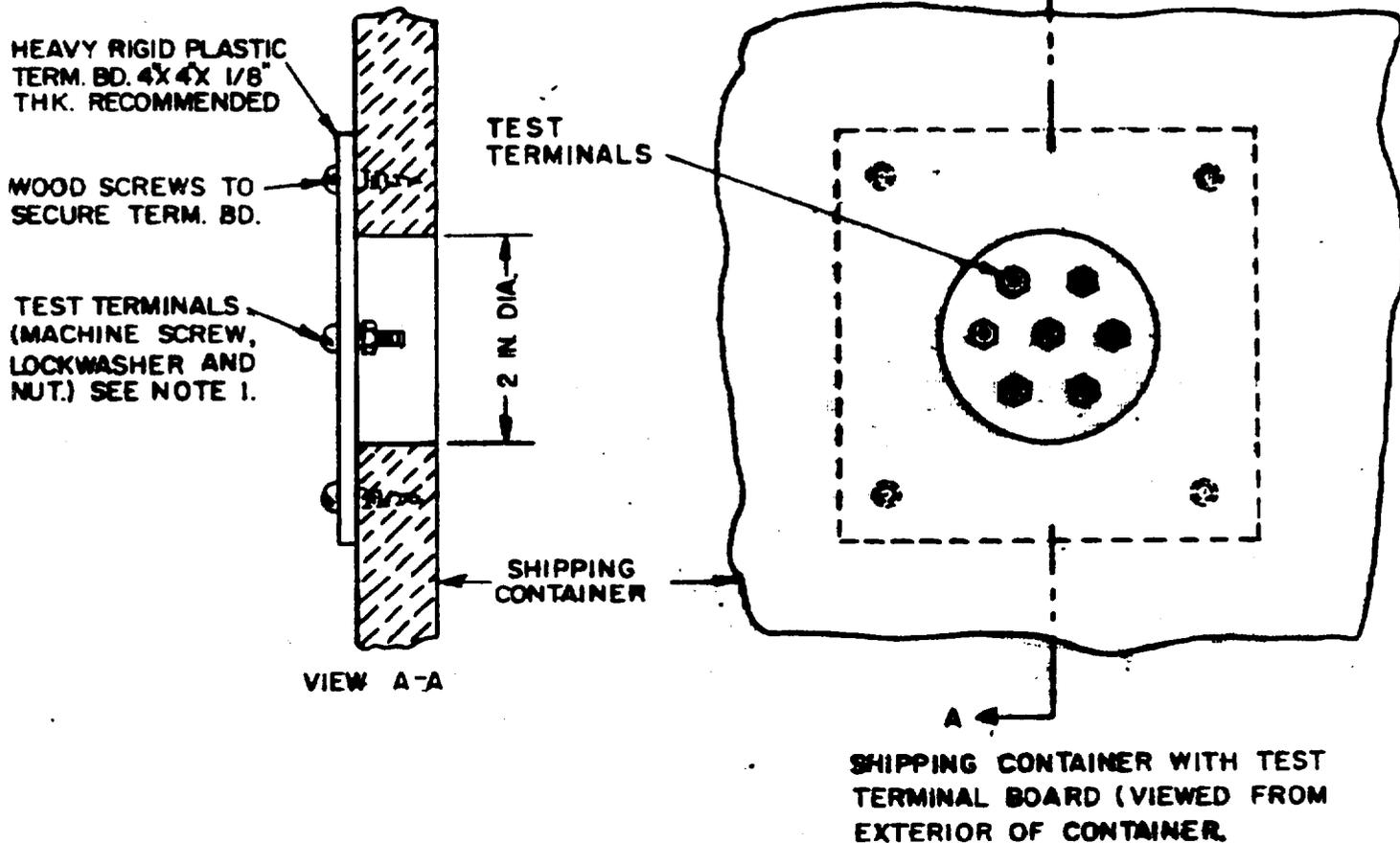
Review activities:

Army - EA, SM  
Navy - YD

User activities:

Army - AT, ME  
Navy - EC

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## NOTES:

1. NUMBER OF TERMINALS AS NECESSARY BUT NOT TO EXCEED SEVEN, SPACING APPROXIMATELY EQUIDISTANT.
2. MACHINE SCREWS USED FOR TERMINALS SHALL EXTEND 1/4 TO 1/2 INCH BEYOND NUT TO PERMIT ATTACHMENT OF TEST CLIPS.
3. TERMINAL MARKING.  
 FOR D.C. MACHINES:  
 A- ARMATURE  
 S- SERIES FIELD  
 F- FIELD  
 FOR A.C. MACHINES:  
 T- STATOR  
 R- ROTOR (NOT APPLICABLE TO SQUIRREL-CAGE TYPE)  
 FOR ALL MACHINES:  
 GRD- GROUND  
 WHERE ONE TERMINAL CONNECTS TO MORE THAN ONE PART IT SHALL BEAR MULTIPLE MARKINGS, FOR EXAMPLE SF, A, S, F.

SH 7477

FIGURE 1. Test terminal board.



**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.

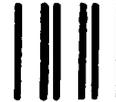
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