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MILITARY SPECIFICATION

PRESERVATION AND PACKING OF ROCKET AND MISSILE SYSTEMS EQUIPMENT FOR SHIPMENT

This specification is approved for use within the Army Missile Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the general requirements for preservation, packing and loading for shipment of rocket and missile systems ground support equipment and hazardous items for worldwide movement and storage.

2. APPLICABLE DOCUMENTS

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, US Army Missile Command, ATTN: AMSI-RD-SE-TD-ST, Redstone Arsenal, AL 35898-5270 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) at the end of this document or by letter.

AMSC N/A AREA PACK

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

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

NN-P-71	-	Pallets, Material Handling, Wood, Stringer Construction, 2-Way and 4-Way (Partial)
UU-T-81	-	Tags, Shipping and Stock
PPP-B-585	-	Boxes, Wood, Wirebound
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-1055	-	Barrier Material, Waterproof, Flexible
PPP-B-1364	-	Boxes, Shipping, Corrugated Fiberboard, High Strength, Weather-Resistant, Double-Wall
PPP-T-76	-	Tape, Packaging, Paper (for Carton Sealing)
PPP-T-97	-	Tape, Packaging/Industrial, Filament Reinforced

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MIL-C-104	-	Crates, Wood: Lumber and Plywood Sheathed, Nailed and Bolted
MIL-P-116	-	Preservation, Methods of
MIL-B-131	-	Barrier Materials, Water Vapor-Proof, Grease-Proof, Flexible, Heat-Sealable
MIL-B-2427	-	Box, Ammunition Packing: Wood, Nailed
MIL-D-3464	-	Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification
MIL-C-3600	-	Compressors, Rotary, Power-Driven; and Compressors, Reciprocating, Power-Driven: Air and Gas (Except Oxygen andRefrigerant), Packaging of

MIL-D-3716	-	Desiccants, Activated for Dynamic Dehumidification
MIL-C-3774	-	Crates, Wood; Open 12,000- and 16,000-Pound Capacity
MIL-C-4150	-	Cases, Transit and Storage, Waterproof and Water Vapor-Proof
MIL-C-5501	-	Caps and Plugs, Protective, Dust and Moisture Seal
MIL-C-5584	-	Containers, Shipping and Storage, Metal, Reusable
MIL-D-6054	-	Drum, Metal-Shipping and Storage
MIL-Q-9858	-	Quality Program Requirements
MIL-E-10062	-	Engines, Preparation for Shipment and Storage of
MIL-G-10924	-	Grease, Automotive and Artillery
MIL-C-11133	-	Crates, Shipping, Wood, Open, Wirebound
MIL-C-12000	-	Cable, Cord, and Wire, Electric; Packaging of
MIL-B-12841	-	Basic Issue Items for Military Vehicles, Carriages and Equipment; Preparation for Shipment and Storage of
MIL-P-14232	-	Parts, Equipment and Tools for Army Materiel, Packaging of
MIL-P-17667	-	Paper, Wrapping, Chemically Neutral (Non-Corrosive)
MIL-T-22085	-	Tapes, Pressure-Sensitive, Adhesive, Preservation and Sealing
MIL-B-26195	-	Boxes, Wood-Cleated, Skidded, Load-Bearing Base
MIL-I-26860	-	Indicator, Humidity, Plug, Color Change
MIL-B-43666	-	Boxes, Shipping, Consolidation
MIL-I-45208	-	Inspection System Requirements
MIL-B-46506	-	Boxes, Ammunition Packing, Wood, Wirebound
MIL-C-52950	-	Crates, Wood, Open and Covered
MIL-C-53072	-	Chemical Agent Resistant Coating (CARC) System Application Procedures and Quality Control Inspection
MIL-V-62038	-	Vehicles, Wheeled: Preparation for Shipment and Storage of

STANDARDS

FEDERAL

FED-STD-595	-	Colors

MILITARY

MIL-STD-129	-	Marking for Shipment and Storage
MIL-STD-147	-	Palletized Unit Loads
MIL-STD-186	-	Protective Finishing for Army Missile Weapon Systems
MIL-STD-709	-	Ammunition Color Coding
MIL-STD-1186	-	Cushioning, Anchoring, Bracing, Blocking and Waterproofing; With Appropriate Test Methods
MIL-STD-2073-1	-	DOD Materiel Procedures for Development and Application of Packaging Requirements
MS20003	-	Indicator, Humidity, Card, Three Spot,Impregnated Areas (Cobaltous Chloride)

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS) 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

DEPARTMENT OF TRANSPORTATION

Title 49 Code of Federal Regulations (CFR)

(Copies of CFR titles can be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001.)

DRAWINGS

8035091	-	Breather, Free, Assembly
8035148	-	Vent, Free Breathing, Assembly
9973173	-	Retainer Assembly, Desiccant Static Charge

(Copies of drawings required by the contractor are available to Department of Defense activities from the Commanding Officer, U.S. Army Missile Command, ATTN:AMSMI-RD-SE-TD-ST, Redstone Arsenal, AL 35898-5270.)

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3950	-	Standard Specification for Strapping, Plastic (and Seals)
ASTM D 3953	-	Standard Specification for Strapping, Flat Steel and Seals
ASTM D 4675	-	Standard Guide for Selection and Use of Flat Strapping Materials

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

NATIONAL AEROSPACE STANDARD

NAS 854	-	Hazardous Material Packaging and Safety Data Sheet Preparation

(Application for copies should be made to the Aerospace Industries Association of America, Inc., 1250 Eye Street, NW, Washington, DC 20005.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 General requirements.

3.1.1 First article. When specified (see 6.2), the first item of equipment processed in accordance with this specification shall be designated the first article, and shall be subjected to first article inspection (see 6.3) in accordance with 4.3. Any change of materials or design after approval of the first article shall require submission of an additional first article which shall be subjected to first article inspection.

3.1.2 Packaging data sheets. When packaging data sheets are available for specified items of equipment, the requirements of this specification shall apply to the extent referenced therein. Processing instructions which are supplemental or

additional to the requirements of this specification may also be included in packaging data sheets.

3.1.3 Preparation prior to processing. Repairs and tests shall have been completed prior to processing (see 4.6.2). Associated equipment shall be installed and all adjustments shall be made to permit the item to be operated or shipped. Any painted surface (interior or exterior) that has defective or damaged paint film shall be repainted with materials of the same type and quality as the original application. Repainted spots shall blend inconspicuously with surrounding areas.

3.1.4 Reprocessing of equipment with controlled humidity. Shelters and van bodies processed for controlled humidity shall be reprocessed when the humidity indicator shows a relative humidity (RH) of 30 percent or more within 24 hours. Readings shall be recorded and enclosed with the record forms secured to the exterior of processed unit(s) (see 4.6.3).

3.1.5 CARC/CPP program. Chemical agent resistant coatings (CARC) are the approved coatings for all combat equipment, combat support equipment, tactical wheeled vehicles, aircraft, and essential ground support equipment. Three color camouflage pattern painting (CPP) will be used when patterns are available. If camouflage patterns are not available, a base coat of polyurethane paint (color green 383, MIL-C-53072; color 34094, FED-STD-595) shall be applied. The CARC/CPP program shall be governed by the provisions of MIL-STD-186 and shall be conducted in accordance with the provisions of MIL-C-53072.

3.1.6 Tags. Tags required for equipment processing shall conform to UU-T-81, type B, class 2, except that tags used in controlled humidity areas may be type B, class 1 (see 4.6.4).

3.1.7 Sealing tape. Tape required for sealing shall conform to MIL-T-22085 for all applications (see 4.6.5).

3.1.8 Blocking, bracing, anchoring, cushioning and waterproofing. Blocking, bracing, anchoring, cushioning and waterproofing of items or packages in shipping containers shall be in accordance with MIL-STD-1186 and the applicable requirements of this specification (see 4.6.6).

3.1.9 Palletization. When required, palletization shall be in accordance with MIL-STD-147 and pallets shall be softwood conforming to NN-P-71, type IV, size 2. Palletized loads shall be "bonded" in accordance with MIL-STD-147 (see 4.6.7).

3.1.9 Containers. Unit, intermediate and exterior containers shall conform to the standard sizes of MIL-STD-147 (see 4.6.18).

3.2 Preservation. Preservation shall be level A or B, as specified (see 6.2).

3.2.1 Level A.

3.2.1.1 Cleaning and drying. Cleaning and drying procedures shall be in accordance with MIL-P-116. Exterior and interior surfaces shall be free of dirt, dust, grease and any other contaminants. Liquid oxygen lines and related components shall be purged in accordance with instructions in detailed equipment specifications. Petroleum solvents, compounds or other organic materials shall not be applied to line caps, threaded surfaces, couplings or outlets of liquid oxygen equipment (see 4.6.8).

3.2.1.2 Preservative application.

a. Unpainted metal surfaces shall be protected following the preservative application criteria of specification MIL-P-116. Unless otherwise specified, all grease fittings shall be lubricated with grease conforming to MIL-G-10924 (see 3.2.1.4.2 and 4.6.9).

b. Preservation of repair parts shall be in accordance with Appendix B.

c. Preservation of modification kits shall be in accordance with MIL-STD-2073-1.

3.2.1.3 Disassembled parts. When disassembly is permitted, methods of preservation for disassembled parts shall be in accordance with MIL-P-116. Parts shall be provided adequate protection against atmospheric and physical damage. When practical, the packaged parts shall be placed in a protected location on or in the item from which they were removed and secured in a manner to prevent movement and damage during shipment. Containers shall be selected from those listed in 3.3.1.7 (see 4.6.10).

3.2.1.4 Shelters and van bodies.

3.2.1.4.1 Interior. Equipment shall be secured with strapping or locking devices, where provided. Tape conforming to PPP-T-97 shall be used to immobilize locking devices and shall be interlaced between locking devices as practical. Tape conforming to PPP-T-76 shall be applied to glass surfaces (dials, indicators, etc.). Disconnected cable connectors and hose ends not provided with covers or plugs shall be covered with tight fitting plastic caps or plugs conforming to MIL-C-5501. All openings, except pressure relief valves and the vent to which the breather hose is attached, shall be sealed with tape conforming to MIL-T-22085. Openings which are impractical to seal with tape shall be covered with barrier material conforming to MIL-B-131 and the edges sealed with tape conforming to MIL-T-22085. As required, additional immobilization shall be accomplished by blocking, bracing, strapping or taping. Abrasive or corrosive action shall be prevented by the use of cushioning pads or barrier material. Guidance on the selection and use of flat strapping materials, both

flat carbon steel and plastic (nonmetallic) is contained in ASTM D 4675. Strapping (steel and nonmetallic) shell conform to the appropriate type/coated-finish and type/grade of ASTM D 3953 and ASTM D 3950 respectively. Tape used for securing equipment shall conform to PPP-T-97. Shelters and van bodies requiring method II preservation shall be preserved with a breather activated dehumidification system conforming to drawing 8035091 and installed in accordance with Appendix A (see 3.4.2). In addition, a static load of desiccant conforming to MIL-D-3464 shall be distributed within the equipment (see 3.2.2). The static load shall be computed by using 1.2 units of desiccant for each cubic foot of air within the equipment. The desiccant for the static load shall be placed in retainers conforming to drawing 9973173 and suspended within the equipment approximately 12 inches above the floor. Placement of the static load shall be accomplished simultaneously with activation of the breather systems. A humidity indicator conforming to MIL-I-26860 or MS 20003 shall be installed in each shelter or van (see 3.2.1.5). The indicator shall be clearly visible form the exterior of the equipment (see 4.6.3).

3.2.1.4.2 Exterior. Equipment such as spring-mounted air conditioners shall have the mounting bolts loosened and wooden blocks inserted between the shelter or van frame members and the equipment frame to relieve spring tension. The mounting bolts shall be tightened, and doors and covers shall be closed. All openings and seams except pressure relief valves and the vent to which the breather hose is attached shall be sealed with tape conforming to MIL-T-22085. Openings which are impractical to seal with tape shall be covered with barrier material conforming to MIL-B-131, and the edges sealed with tape conforming to MIL-T-22085. Equipment such as cable reel assemblies, ladders and antennas shall be secured with their designated locking devices. Apply preservatives in accordance with 3.2.1.2. Secure all cable connectors and covers (see 4.6.11).

3.2.1.5 Wheeled vehicles. Trailers, trailer chassis and trailer dollies shall be processed in accordance with MIL-V-62038. Carried equipment shall be secured with locking devices provided and with strapping and blocking as required. Process van bodies and shelters in accordance with 3.2.1.4. Other carried equipment requiring Method II preservation shall be preserved in accordance with MIL-P-116. Desiccant shall conform to MIL-D-3464 and shall be secured to prevent movement. Desiccant shall not be placed in direct contact with equipment. Openings not equipped with gasketed covers shall be sealed with tape conforming to MIL-T-22085. Humidity indicators conforming to MS20003 or MIL-I-26860 shall be installed in all desiccated compartments. Secure quick release pins, chains, and the like, as required, to prevent damage and abrasive action. Apply preservatives in accordance with 3.2.1.2. Secure all cable connections and electrical outlet covers. Fire extinguishers mounted on vehicle exteriors shall be removed, wrapped in barrier material conforming to MIL-P-17667 and place in containers conforming to PPP-B-601 or PPP-B-621, overseas types. The containerized fire extinguishers shall be secured inside the vehicle or strapped to the vehicle with strapping conforming to ASTM D 3953 (see 3.2.1.6 and 4.6.13).

3.2.1.6 Tracked vehicles. Process tracked vehicles in accordance with the applicable vehicle processing specification (see 4.6.13).

3.2.1.7 Equipment requiring controlled ventilation. Equipment requiring controlled ventilation (excluding equipment covered in 3.2.1.4 through 3.2.1.6 shall have all exterior openings, except floor or drain openings, sealed with tape conforming to MIL-T-22085, or shall be shrouded with material conforming to ASTM D 3950. Shrouding shall be watertight on the top, ends and sides and shall be secured with strapping conforming to ASTM D 3953, finish A. Barrier rupture or abrasive damage shall be prevented by securing cushioning pads over sharp edges, corners or protrusions, and between banding and shrouding material. Cushioning pads shall be water resistant and compatible with surfaces to which applied (see 4.6.12).

3.2.1.8 Basic issue items. Basic issue items for military vehicles, carriages, and equipment shall be packaged and packed in accordance with MIL-B-12841 and secured to the floor inside the vehicle.

3.2.1.9 Engines. Engines that are operated in connection with loading or moving vehicles shall be reprocessed. Unmounted gasoline and diesel engines shall be cleaned, preserved and packaged in accordance with MIL-E-10062.

3.2.1.10 Air compressors. Air compressors shall be cleaned, preserved and packaged in accordance with MIL-C-3600.

3.2.1.11 Electric cable. Electric cables shall be packaged in accordance with MIL-C-12000.

3.2.1.12 Other equipment.

a. Preservation of equipment not covered in paragraph 3.2.1.1 through 3.2.1.11 shall be in accordance with applicable specifications and drawings, or, if specifications and drawings do not apply, in accordance with applicable requirements of MIL-P-116 and this specification (see 3.3.1.5).

b. Preservation of repair parts and/or spare parts shall be in accordance with Appendix B.

c. Preservation of modification kits shall be in accordance with MIL-STD-2073-1.

3.2.1.13 Hazardous items. Preservation of hazardous items shall be in accordance with packaging drawings or packaging data sheets, as applicable, and the hazardous materials regulations of the Department of Transportation (see 4.6.15).

3.2.2 Level B. Items specified in 3.2.1.9 through 3.2.1.12 processing shall be in accordance with Level B requirements of applicable referenced specifications. The desiccated breather assembly and static charge specified in 3.2.1.4.1 for shelters and van bodies is not required when total shipment time does not exceed 30 days (see 3.3.2.5).

3.3 Packing. Packing shall be level A or B as specified (see 6.2).

3.3.1 Level A. (see 4.6.16).

3.3.1.1 Shelters. Shelters shall be packed in crates conforming to MIL-C-3774 for marine transportation. For air transportation, shelters shall be mounted on skid bases conforming to MIL-C-3774.

3.3.1.2 Engine. Unmounted engines shall be packed in suitable containers selected from 3.3.1.7 or, if applicable, in special containers designed for specific engines.

3.3.1.3 Air compressors. Unmounted compressors shall be packed in suitable containers selected from 3.3.1.7.

3.3.1.4 Electric cables. Electric cables shall be packed in accordance with MIL-C-12000, except that fiberboard and paper overlaid veneer containers shall not be used.

3.3.1.5 Other equipment. Equipment preserved and packaged in accordance with 3.2.1.12 shall be packed in accordance with applicable specifications or drawings, packed in suitable containers selected from 3.3.1.7, and mounted on skids, etc., as applicable.

3.3.1.6 Hazardous items. Packing of hazardous items shall be in accordance with packing drawings or packaging data sheets, as applicable, and the hazardous materials regulations of the Department of Transportation.

3.3.1.7 Containers. Except as otherwise specified herein, exterior shipping containers shall conform to the following specifications:

PPP-B-585	-	Boxes, Wood, Wirebound
PPP-B-601	-	Boxes, Wood, Cleated-Plywood
PPP-B-621	-	Boxes, Wood, Nailed and Lock-Corner
MIL-C-104	-	Crates, Wood: Lumber and Plywood Sheathed, Nailed and Bolted
MIL-B-2427	-	Box, Ammunition Packing: Wood, Nailed
MIL-C-3774	-	Crates, Wood; Open 12,000- and 16,000-Pound Capacity

MIL-C-4150	-	Cases, Transit and Storage, Waterproof and Water Vapor-Proof
MIL-C-5584	-	Containers, Shipping and Storage, Metal,Reusable
MIL-D-6054	-	Drum, Metal-Shipping and Storage
MIL-C-11133	-	Crates, Shipping, Wood, Open, Wirebound
MIL-B-26195	-	Boxes, Wood-Cleated, Skidded, Load-Bearing Base
MIL-B-43666	-	Boxes, Shipping, Consolidation
MIL-B-46506	-	Boxes, Ammunition Packing, Wood, Wirebound
MIL-C-52950	-	Crates, Wood, Open and Covered

Closure and strapping shall be in accordance with the appendix to each applicable specification. Any container exceeding 200 pounds gross weight shall be provided with skids. Strapping shall conform to QQ-S-781, finish A (see 3.2.1.2, 3.2.1.3, 3.3.1.3, and 3.3.1.5).

3.3.2 Level B (see 4.6.15).

3.3.2.1 Shelters. For air shipments, shelters shall be mounted on skids conforming to MIL-C-3774.

3.3.2.2 Engines. Unmounted engines shall be packed in suitable containers selected from 3.3.2.7 or, if applicable, in special containers designed for specific engines.

3.3.2.3 Air compressors. Unmounted compressors shall be packed in suitable containers selected from 3.3.2.7.

3.3.2.4 Electric cables. Electric cables shall be packed in accordance with MIL-C-12000.

3.3.2.5 Other equipment. Equipment preserved and packaged in accordance with 3.2.2 shall be packed in accordance with applicable specifications or drawings, packed in suitable containers selected from 3.3.2.7, and mounted on skids, etc., as applicable.

3.3.2.6 Hazardous items. Packing of hazardous items shall be in accordance with packing drawings or packaging data sheets, as applicable, and the hazardous materials regulations of the Department of Transportation.

3.3.2.7 Performance oriented packing (POP) for hazardous materials. Packaging and marking for hazardous material shipments shall be in accordance with Title 49 of the Code of Federal Regulations (CFR). In addition, each unit pack shall

contain one of the units of issue and shall be marked in accordance with MIL-STD-129. Where specific packaging requirements are developed by the contractor a copy of the contractor's test report and signed certification that the packaged configuration meets both the CFR and international requirements must be provided to the contracting officer prior to acceptance or shipment, if applicable, of all or any portion of the product. This certification shall be incorporated on the DD Form 250, Material Inspection and Receiving Report, or other related acceptance document if the DD Form 250 is not used. Where specific Army developed Performance Oriented Packaging requirements are included, the contractor may offer alternative packaging provided the symbol used to certify compliance with performance oriented packaging requirements is properly registered with the U.S. Department of Transportation.

3.3.2.8 Containers. Except as otherwise specified herein, exterior shipping containers shall conform to the same specifications listed in 3.3.1.7, plus the following other specifications:

PPP-B-636	-	Boxes, Shipping, Fiberboard
PPP-B-640	-	Boxes, Fiberboard, Corrugated, Triple-Wall
PPP-B-1364	-	Boxes, Shipping, Corrugated Fiberboard, High Strength, Weather-Resistant, Double-Wall

Closure and strapping shall be in accordance with the appendix to each applicable specification. Any container exceeding 200 pounds gross weight shall be provided with skids or pallet base, as applicable.

3.4 Marking. Marking shall be in accordance with MIL-STD-129 and as specified herein (see 4.6.17 and 6.2).

3.4.1 Method II markings (vehicle carried equipment). Method II labels shall be applied to the exterior of all desiccated compartments. When a humidity indicator is placed inside a compartment, a tag conforming to UU-T-81, Type B, class 2 which reads "HUMIDITY INDICATOR ATTACHED TO INSIDE OF DOOR (OR COVER)" shall be secured adjacent to the Method II label.

3.4.2 Method II markings (shelters and van bodies). A Method II label shall be applied to the exterior of the main entry door of a desiccated shelter or van body (see 3.2.1.4.1). When a humidity indicator is attached to the inside of the door, adjacent to the Method II label, stencil, or label: "HUMIDITY INDICATOR ATTACHED TO INSIDE OF DOOR." Attach a tab or label to the exterior of the main entry door which reads: "THIS EQUIPMENT PRESERVED WITH A 3-INCH BREATHER PORT THROUGH A DESICCANT BED. FOR STORAGE OR RESHIPMENT, THE HUMIDITY INDICATOR SHALL BE INSPECTED AND DESICCANT REPLACED IF NECESSARY."

3.4.3 Hazardous item markings. Markings for hazardous items shall be in accordance with packing drawings, packaging data sheet and MIL-STD-129, as applicable, and the hazardous material regulations of the Department of Transportation.

3.4.4 Missile and rocket ammunition containers. Marking shall be in accordance with applicable marking drawings. Containers for which drawings are not applicable shall be marked with appropriate requirements of paragraphs 3.4.4.1, 3.4.4.2, and MIL-STD-129.

3.4.4.1 General. Identification and data markings shall be black or white, color number 37038 or 37875, respectively, or FED-STD-595, whichever provides the maximum contrast to the container color. Color codes shall be in accordance with MIL-STD-709 and shall be applied a squares, not to exceed 4 inches in size, at diametrically opposite corners (ends, sides, and on top -- 6 places, total). Markings shall not be placed under or on strapping or other obstructions which could cause difficulty in reading. Each marking shall be in capital letters of equal height, 0.75 inch minimum, and 2.75 inches maximum, for containers over 3x2x2 feet, and 0.25 inch minimum to 0.75 inch maximum for smaller containers.

3.4.4.2 Required markings. Minimum markings required are:

a. National Stock Number (NSN).

b. Department of Defense Identification Code (DODIC).

c. Official nomenclature and mode designator.

d. Quantity and unit of issue.

e. Gross weight (to nearest pound).

f. Cube (to nearest 0.10 cubic foot).

g. Month and year of loading and pack.

h. Department of Transportation (DOT) shipping name.

i. Serial number.

j. Lot number.

k. Color code.

When applicable, the DODIC will be applied with the NSN and on each end of containers. As required, storage temperature limits (forward/aft end for missiles and rockets), dimensions, Department of Transportation labels and contract data marking will be applied. Figures 1, 2 and 3 indicate relative positions of the various markings (see 3.4.4).

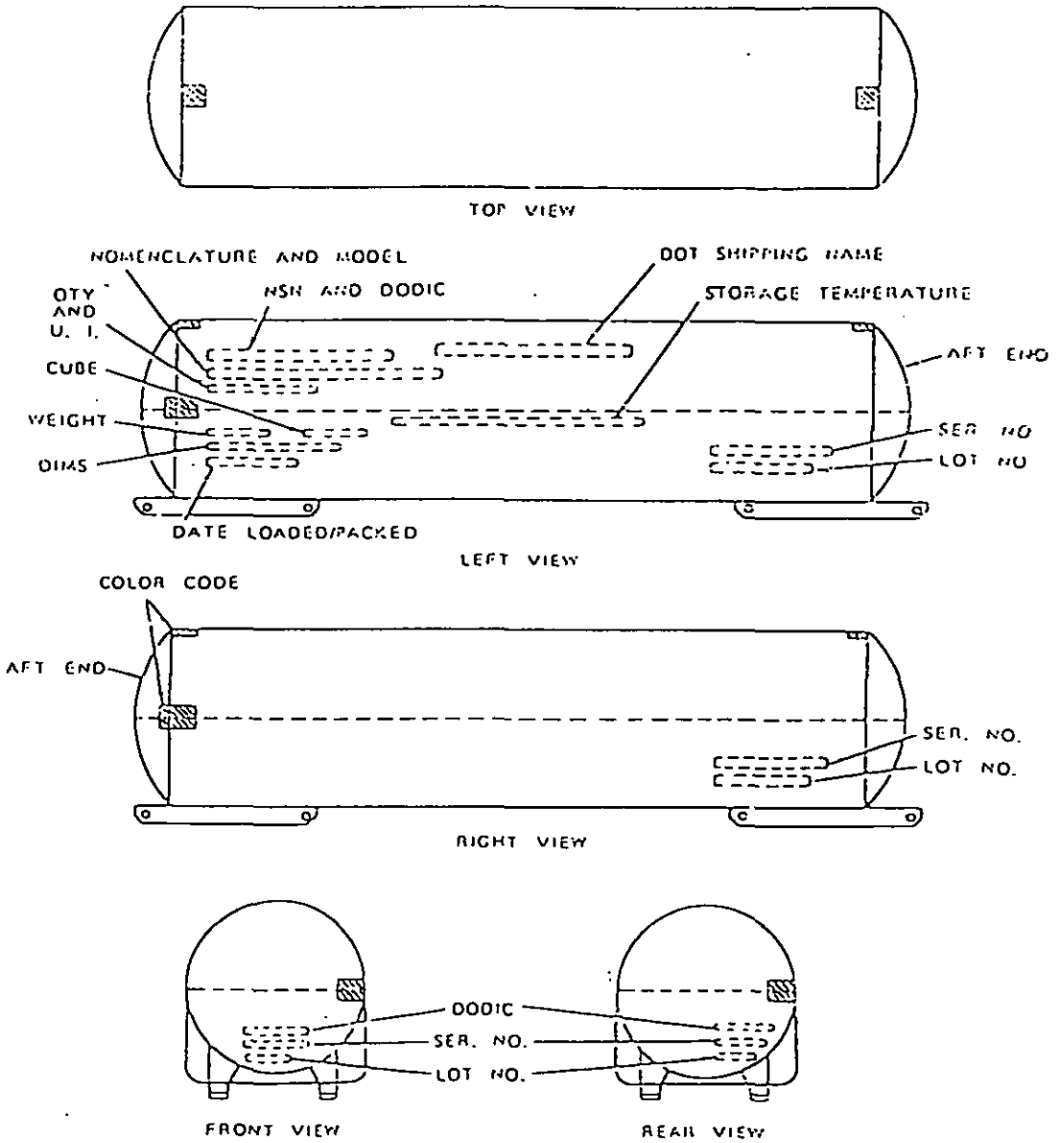


FIGURE 1. Marking of cylindrical containers.

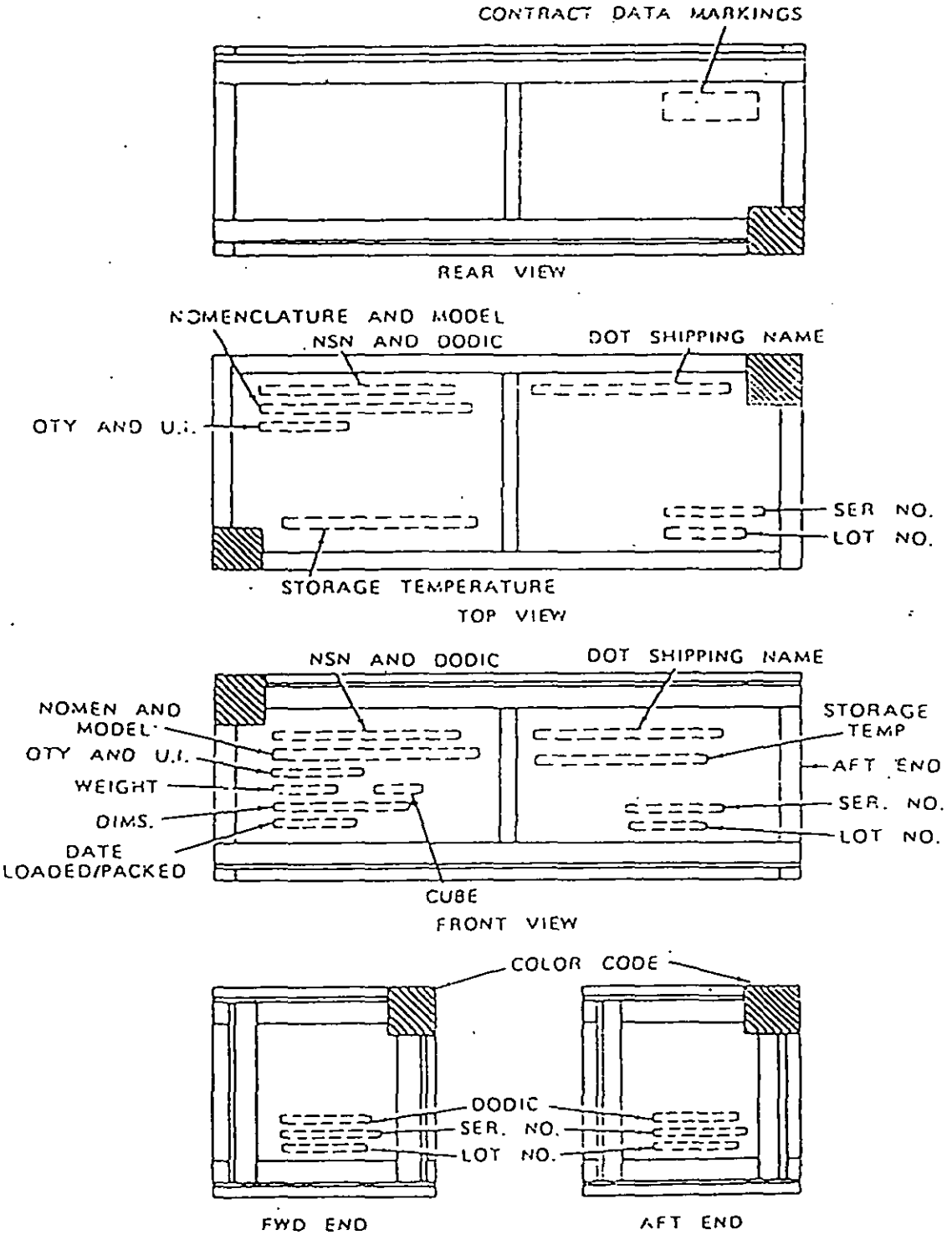
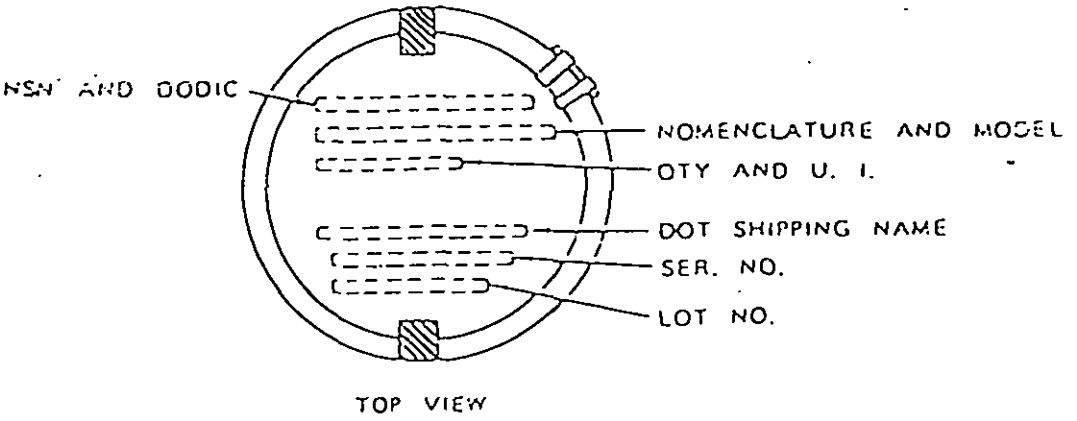


FIGURE 2. Marking of rectangular containers.



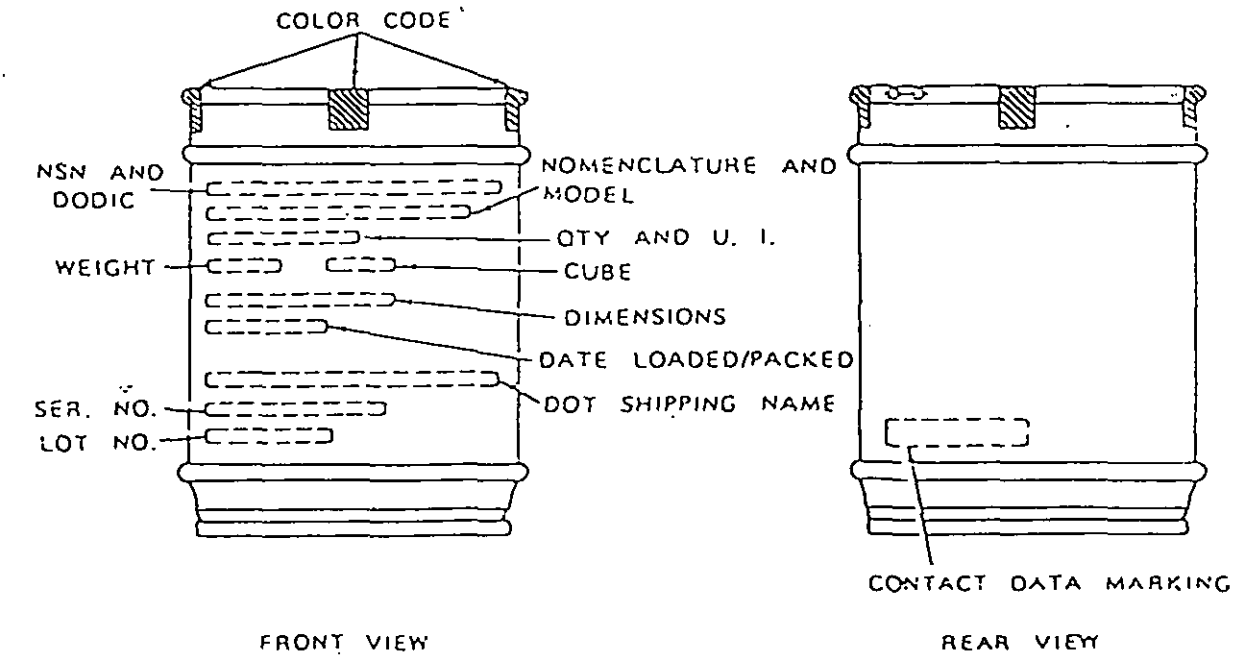


FIGURE 3. Marking of drums.

3.5 Loading.

3.5.1 Rail shipment. Loading of equipment for rail shipment shall be in accordance with the applicable Army Materiel Command carloading drawing. When carloading drawings are not available, the applicable loading rules of the Association of American Railroads and NAS 854 shall be used (see 4.6.19).

3.5.2 Highway shipment. Loading of equipment for highway shipment shall be in accordance with the applicable Army Materiel Command truck loading drawing. When truck loading drawings are not available, the applicable American Trucking Association publications shall be used. Shipment by driveway or tow-away shall be in accordance with NAS 854 and applicable military regulations (see 4.6.19).

3.5.3 Aircraft shipment. Shipments shall comply with the requirements of the load officer or his authorized agent (see 4.6.19).

3.5.4 Marine shipment. Shipments shall comply with the requirements of the transportation officer or his authorized agent. Guidance for vessel loading is provided in the applicable Army Materiel Command loading drawings (see 4.6.19).

3.6 Workmanship. Workmanship shall be such as to provide maximum practical protection, by means of the specified processing, against corrosion and deterioration during shipment and storage. Tape shall be neat and uniformly applied. Visual observation shall indicate that the application of special materials and methods are practical and will not result in deficiencies.

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 inspections requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective

material, either indicated or actual, nor does it commit the Government to accept defective material.

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

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

4.3 First article inspection. First article inspection shall be performed on the first item of equipment processed in accordance with this specification when a first article sample is required (see 3.1.1 and 6.2).

4.4 Quality control program or inspection system requirements. When contracts include provisions for the establishment by the contractor of a quality control program in accordance with MIL-Q-9858 or an inspection system in accordance with MIL-I-45208, and the approved program or system includes sampling and inspection requirements to insure that processed equipment meets the requirements of this specification, that program or system shall be used in lieu of the sampling and inspection provisions of this specification.

4.5 Quality conformance inspection. Quality conformance inspection shall include the inspections specified in table I.

TABLE I. Quality conformance inspection.

Inspection	Requirement paragraph	Examination paragraph
Preparation prior to processing	3.1.3	4.6.2
Dehumidified equipment	3.1.4, 3.2.1.4 3.2.1.5	4.6.3
Tags	3.1.5	4.6.4
Sealing Tape	3.1.6	4.6.5
Blocking, bracing, anchoring, cushioning and waterproofing	3.1.7	4.6.6
Palletized items or packages	3.1.8	4.6.7
Containers	3.1.9	4.6.18
Cleanliness	3.2.1.1	4.6.8
Preservation	3.2.1.2	4.6.9
Disassembly	3.2.1.3	4.6.10
Shelters and van bodies	3.2.1.4, 3.2.2	4.6.11
Controlled ventilation equipment	3.2.1.7	4.6.12
Vehicles	3.2.1.5, 3.2.1.6	4.6.13
Miscellaneous equipment	3.2.1.8, 3.2.1.9 3.2.1.10, 3.2.1.11, 3.2.1.12, 3.2.2	4.6.14
Hazardous items	3.2.1.13	4.6.15
Packing	3.3.1, 3.3.2	4.6.16
Marking	3.4	4.6.17
Loading for shipment	3.5.1, 3.5.2, 3.5.3, 3.5.4	4.6.19

4.6 Quality conformance inspection.

4.6.1 Materials. Except for materials which have been government inspected, at the source, all materials used in processing shall be subjected to the inspections and tests specified for acceptance in the detailed specification; or certified inspection and test reports shall be furnished which show that the materials, as supplied, conform to the requirements of the detail specification.

4.6.2 Preparation prior to processing. All equipment shall be visually examined to determine conformance to 3.1.3. Any evidence of incomplete repairs and tests, improperly installed and adjusted associated equipment, or defective or damaged paint shall be cause for rejection.

4.6.3 Dehumidified equipment. All dehumidified equipment shall be visually inspected to determine conformance to 3.1.4, 3.2.1.4 and 3.2.1.5. Improperly installed free-breather systems, desiccant charges, humidity indicators and inadequate sealing shall be cause for rejection. A humidity indicator reading of 30 percent or more within 24 hours will be cause for reprocessing of shelter or van.

4.6.4 Tags. Tags used in processing shall be examined for conformance to 3.1.5. Use of any type other than specified shall be cause for rejection.

4.6.5 Sealing tape. Tape used for sealing shall be examined for conformance to 3.1.6. Use of any tape other than specified shall be cause for rejections.

4.6.6 Blocking, bracing, anchoring, cushioning and waterproofing. Application of blocking, bracing, anchoring, cushioning and waterproofing shall be examined for conformance to 3.1.7. Inadequate application shall be cause for rejection.

4.6.7 Palletized items or packages. Palletized items or packages shall be inspected for conformance to 3.1.8. Improperly palletized materiel shall be cause for rejection.

4.6.8 Cleanliness. Surfaces shall be examined to determine conformance to 3.2.1.1. The presence of contamination shall be cause for rejection.

4.6.9 Preservation. The continuity and appearance of preservatives after application shall be determined visually for conformance to 3.2.1.2. Coatings which are not uniform and homogeneous shall be cause for rejection.

4.6.10 Disassembled items. Packaging of disassembled items shall be inspected for conformance to 3.2.1.3. Improper packaging and securing shall be cause for rejection.

4.6.11 Shelters and van bodies. Materials and their application in processing carried equipment shall be inspected for conformance to 3.2.1.4 or 3.2.2 as applicable. Use of materials other than specified, inadequate dehumidification, improper draining and preservation, or inadequate immobilization shall be cause for rejection.

4.6.12 Controlled ventilated equipment. Equipment processed for controlled ventilation shall be examined for conformance to 3.2.1.7. Use of materials other than specified or inadequate protection from rupture or abrasive damage to barrier shall be cause for rejection.

4.6.13 Vehicles. Processing of trailers, trailer chassis, trailer dollies, tracked vehicles and associated carried equipment shall be inspected for conformance to

3.2.1.5 or 3.2.1.6 as applicable. Use of materials other than specified, improper preservation or inadequate blocking, bracing, and securing shall be cause for rejection.

4.6.14 Miscellaneous equipment. Preservation and packaging of basic issue items, engines, air compressors, electric cables, and other equipment shall be inspected for conformance to the applicable requirements of 3.2.1.8 through 3.2.1.12 and 3.2.2. Use of materials other than specified, improper preservation or inadequate packaging shall be cause for rejection.

4.6.15 Hazardous items. Preservation and packing of hazardous items shall be inspected for conformance to 3.2.1.6. Use of materials other than specified, improper preservation or inadequate packaging shall be cause for rejection.

4.6.16 Packing. Packed items or packages shall be inspected for conformance to 3.3.1 and 3.3.2. Use of materials other than specified, improper closure or strapping, or absence of skids from containers weighing more than 200 pounds shall be cause for rejection.

4.6.17 Marking. Package and pack markings shall be examined for conformance to 3.4. Inadequate or improper marking shall be cause for rejection.

4.6.18 Containers. Containers used for preservation and packing shall be inspected for conformance to 3.1.9, 3.3.1.7, or 3.3.2.7, as applicable. Use of containers other than specified shall be cause for rejection.

4.6.19 Loading for shipment. Equipment loaded for shipment shall be inspected for conformance to 3.5.1, 3.5.2, 3.5.3 or 3.5.4 as applicable. Improper or inadequate loading, tiedowns, blocking or bracing shall be cause for rejection.

5.0 PACKAGING

(This section is not applicable to this specification.)

6. NOTES

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

6.1 Intended use. This specification is intended to be used in support of packaging data sheets to the extent specified therein, or when specified in the absence of the packaging data sheets, it will provide basic requirements for preservation, packing, and loading of missile weapon system equipment.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number and date of the specification.
b. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1 and 2.2).
c. Whether a first article inspection is required (see 3.1.1).
d. Levels of preservation and packing required (see 3.2 and 3.3).
e. Special marking required (see 3.4).
f. Method of shipment required (see 3.5).

6.3 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, or a sample selected from the first production items, and the number items to be tested as specified in 4.3. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 DA forms. DA forms required in connection with equipment processing will be furnished by the government upon application to the procuring activity.

6.5 Subject term (keyword) listing.

Boxes, shipping
CARC/CPP
Crates, shipping
Missile systems
Package
Packing, performance oriented
Preservation of equipment
Shipping and loading

6.7 Metric equivalents. Metric equivalents, in accordance with FED-STD-376, are acceptable for use in this document.

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

APPENDIX A

INSTALLATION OF STATIC-FREE BREATHER DEHUMIDIFIER SYSTEM

10. SCOPE

10.1 This appendix covers the fabrication, assembly and installation of the static-free breather dehumidification system. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance only.

20. APPLICABLE DOCUMENTS

20.1 Government documents.

20.1.1 Specifications, standards and handbooks. The following document forms a part of this Appendix to the extent specified:

MILITARY SPECIFICATION

MIL-D-3716	Desiccants, Activated for DynamicDehumidification

20.1.2 Other Government documents, drawings, and publications. The following documents form a part of this Appendix to the extent specified:

DRAWINGS

8035091	Breather, Free Assembly
8035148	Vent, Free Breather, Assembly

30. REQUIREMENTS

30.1 Components.

30.1.1 Breather vent. When a vent conforming to drawing 8035148 has not been installed in the wall of the shelter or van for attaching the free breather assembly, a suitable temporary vent assembly shall be devised.

30.1.2 Free breather assemblies. Static free breather assemblies shall conform to drawing 8035091 (see 40.1).

30.1.3 Desiccant. The desiccant shall be new and conform to the requirements of MIL-D-3716, type I, grade H. The quantity of desiccant used for initial shipments shall be a minimum, of 0.9 units per cubic foot of air contained in the shelter, unless it

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is known that a single set of conditions listed in table II will apply for the period of time that the equipment is expected to remain desiccated (see 30.2.2).

Table II. Desiccant Requirements for Free Breather System

Climatic region	Units of desiccant per cubic foot[1]	
	Summer	Winter[2]
Tropic	.9	.9
Continental and Maritime	.9	.6
Arctic and Highlands	.6	.4
Ice Cap	.4	.4

1. The volume of air to be desiccated shall be considered as that which is free to flow in and out through the free breather as a result of expansion and contraction. This volume shall be computed as $V = V_1 - (V_2 + V_3 + V_4 + ...)$ where V_1 is the internal cube (length X width X height) of the shelter, V_2 is the volume of air displaced by equipment, V_3 is the volume of air displaced by tightly closed chests, boxes and cabinets, V_4 is the volume of air displaced by benches and desks. The volume will vary; however, in general, electronic and mechanical equipment displace 25 percent of their cube (V_2), closed cabinets and chests having relatively tight closures displace 90 percent of their cube (V_3), and benches and desks displace from 5 to 10 percent of their cube (V_4).

2. Northern hemisphere, 1 October through 31 March.

30.2 Installation.

30.2.1 Free breathing vent. When a temporary vent (see 30.1.1) is required and an opening does not exist in which it may be installed, an appropriate opening shall be provided by removal of an emergency access hatch, a shelter control window or some other easily removed panel. The adapter plate in which the vent is mounted shall be installed in the opening in such a manner that a complete seal will be achieved and air can enter only through the vent tube.

30.2.2 Free breather assembly. The free breather assembly shall be located in the shelter as centrally as possible. The drum shall be secured to the shelter by attachment to either the floor or vertical structure, or both, in such manner that it will

not be displaced or damaged during transportation and handling. The flexible tubing shall be secured to the internal drum in a manner to preclude kinking or flattening.

30.2.2.1 Desiccant bag. The nylon bag shall retain 18 mesh and larger particles of desiccant and when filled and lowered into the drum shall rest on the trivet and shall contact the side of the drum to prevent the air from by-passing the desiccant.

30.2.2.2 Assembly requirements. A single free breather dehumidification system shall be installed for each 800 ± 50 cubic feet of air contained in the shelter. The volume of air to be desiccated shall be computed in accordance with Table II. When more than one system is employed, the location of the system shall be arranged to service equal volumes of air contained in the shelter.

30.2.3 Equipment qualifications. When all direct openings have been sealed and all the doors and vents are closed, the shelter, with the static free breather dehumidification system installed, shall show no evidence of free air passages except as provided by the breather system.

30.3 Preparation for activation.

30.3.1 Moisture drawdown. All shelters shall have the moisture content of the internal air reduced to the equivalent of two grains of moisture per cubic foot prior to activation of the static free breather dehumidification system (see table III). The drawing down of the moisture content of the air may be accomplished by either dynamic dehumidification or by using a static charge of desiccant.

TABLE III. Water Vapor Computation for Obtaining Two Grains

Temperature Degrees F	100 Percent Relative Humidity Grains per cubic Foot Air	Relative Humidity to Attain 2 Grains Moisture Cubic Foot of Air in Percent
30	1.9	100
35	2.3	87
40	2.9	69
45	3.4	59
50	4.1	49
55	4.9	41
60	5.8	34
65	6.9	29
70	8.1	25
75	9.5	21

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80	11.1	18
85	12.9	15
90	15.0	13
95	17.3	11
100	20.0	10

30.3.2 Preparation of desiccant charges. The quantity required shall be placed in desiccant bags (see 30.2.2.1. and 30.1.3) and retained in hermetically sealed containers until the drawdown has been competed (see 30.3.1).

30.4 Activation. Activation of the static free breather dehumidification system shall be accomplished as soon as the moisture content of the internal air has reached the level specified in 30.3.1. Bagged desiccant prepared as specified in 30.3.2 shall be placed in the drum of the free breather assembly as rapidly as possible (see 40.3). The cover shall be clamped to the drum body and the entry sealed. After the entry door has been sealed, the free breathing vent shall be placed in the open position.

40. NOTES

40.1 Intended use. The static free breather dehumidification system was designed to provide a simple means for preserving equipment contained in large rigid containers such as shelters and vans. The expansion and contraction of the air contained in large shelters result in unusual problems in maintaining hermetic seals of air tightness. The free breather system overcomes many of these problems by reducing the degree of air pressure tightness required so that any shelter or container which is or can be sealed against free entry of air is a satisfactory item for use of the system. A free breather system consists of two basic parts, a designed venting system and a bed of desiccant, through which all air is exchanged. The length to diameter ratio of the flexible tubing used to attach the free breather assembly to the external vent shall never be less than 10 to 1 and in this instance the tubing shall be not less than 30 inches in length. A major factor in the success or failure of the system is the air flow through the desiccant and not around it. When approved by the procuring activity, processing activities having AN type drums which can be economically salvaged and modified for the purpose may substitute such drums for the fiber drum required by drawing 8035091.

40.2 Tiedown. The tiedown of the drum of the free breather assembly may be accomplished in several way. One method is to use a 0.25 inch plywood disc 0.50 inch smaller in diameter than the drum opening. The disc is placed on the bottom of the drum and fastened to wood or metal blocking by means of bolts or screws. If tiedown is accomplished by securing the drum to a side wall or panel, a hardwood or

metal shim should be used inside the drum to prevent the bolts or screws from tearing through the drum wall. The drum may be tied down with strapping where other methods of securing cannot be readily applied.

40.3 Activation. Activation of the system can be done very rapidly if the cover of the free breather assembly has been removed during the drawdown period and access to the assemblies from the entrance has been planned. Caution should be taken upon insertion of the desiccant charge to completely block the air passage with the desiccant. Rocking the bag into position will cause the desiccant to flow to the side wall of the drum closing the passage.

APPENDIX B

PROCEDURAL REQUIREMENTS FOR THE PRESERVATION AND PACKING OF REPAIR PARTS AND SPARE PARTS

10. SCOPE

10.1 This appendix provides procedural requirements for the preservation and packing of repair parts and spare parts prior to shipment. This Appendix is a mandatory part of the specification. The information contained herein is intended for compliance only.

20. APPLICABLE DOCUMENTS

20.1 Government documents.

20.1.1 Specifications, standards, and handbooks. The following documents form a part of this Appendix to the extent specified.

FEDERAL SPECIFICATIONS

A-A-42	-	Talcum Powder
L-P-378	-	Plastic, Sheet and Strip, Thin Gauge, Polyolefin
P-D-680	-	Dry Cleaning Solvent
NN-P-71	-	Pallets, Material Handling, Wood, StringerConstruction, 2-Way and 4-Way (Partial)
TT-T-291	-	Thinner, Paint, Mineral Spirits, Regular and Odorless
VV-L-800	-	Lubricating Oil, General Purpose,Preservative (Water-Displacing, LowTemperature)
PPP-B-1055	-	Barrier Material, Waterproof, Flexible
PPP-C-1797	-	Cushioning Material, Resilient, Low Density, Uncellular, 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
PPP-T-60	-	Tape: Packaging, Waterproof
PPP-T-76	-	Tape, Packaging, Paper (for Carton Sealing)

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PPP-T-97	-	Tape, Packaging/Industrial, Filament Reinforced

MILITARY SPECIFICATIONS

MIL-P-116	-	Preservation, Methods of
MIL-B-117	-	Bags, Sleeves and Tubing - Interior Packaging
MIL-B-121	-	Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-P-130	-	Paper, Wrapping, Laminated and Creped
MIL-P-3420	-	Packaging Materials, Volatile Corrosion Inhibitor, Treated, Opaque
MIL-C-5501	-	Caps and Plugs, Protective, Dust and Moisture Seal
MIL-O-16898	-	Optical Elements, Packaging of
MIL-P-17667	-	Paper, Wrapping, Chemically Neutral (Non-Corrosive)
MIL-B-81705	-	Barrier Materials, Flexible, Electrostatic-Free, Heat Sealable
MIL-P-81997	-	Pouches, Cushioned, Flexible, Electrostatic-Free, Reclosable, Transparent

FEDERAL STANDARDS

FED-STD-101	-	Test Procedure for Packaging Materials

MILITARY STANDARDS

MIL-STD-129	-	Marking for Shipment and Storage
MIL-STD-147	-	Palletized Unit Loads
MIL-STD-1660	-	Design Criteria for Ammunition Unit Loads
MIL-STD-2073-1	-	DoD Materiel Procedures for Development and Application of Packaging Requirements

20.1.2 Other Government documents, drawings, and publications. The following other documents form a part of this Appendix to the extent specified.

DEPARTMENT OF TRANSPORTATION

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Title 49 - Code of Federal Regulations (CFR)

DEPARTMENT OF THE AIR FORCE

AFR 71-4 - Preparation of Hazardous Material for Military Air Shipment

20.1.3 Non-Government publications. The following documents form a part of this Appendix to the extent specified:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3950 - Standard Specification for Strapping, Plastic (and Seals)

ASTM D 3953 - Standard Specification for Strapping, Flat Steel and Seals

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

30. REQUIREMENTS

30.1 Cleaning. Items to be preserved and packed shall be cleaned before processing in accordance with the detailed requirements specified herein.

30.1.1 Impregnated items. Items impregnated with oil or graphite shall be cleaned by wiping with a cloth moistened with solvent conforming to P-D-680, or thinner conforming to TT-T-291. The quantity of fluid applied to the cloth shall be limited to avoid dissolving impregnated lubricants.

30.1.2 Complex items. Items requiring interior cleaning shall be completely drained of all trapped cleaning fluid.

30.1.3 Nonmetallic items. Unless otherwise specified, the items such as rubber, leather, and cork shall be cleaned in accordance with the procedures described in Process C-1 of MIL-P-116.

30.1.4 Material used with liquid oxygen. Items required to be in direct contact with liquid oxygen shall be pre-packed in heat sealed bags conforming to MIL-B-117 immediately after cleaning.

30.1.5 Optical elements and assemblies. Cleaning and drying of optical elements and assemblies shall be in accordance with MIL-O-16898.

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30.2 Drying. Items shall be dried after cleaning by using the most applicable procedure in MIL-P-116. (When procedures D-1 or D-4 are used as cleaning processes, drying is not required.)

30.3 Preservative application. Immediately after cleaning and drying, a continuos coating of required contact preservative shall be applied to unpainted metal surfaces by one of more of the processes specified in MIL-P-116. Coatings shall be in accordance with applicable preservative specifications referenced in detailed requirements. Occasionally, however, the following preservation methods may be used in lieu of any referenced preservative specifications, but only on specific items and under certain conditions as described herein.

30.3.1 Partially pained or combinations of metallic/nonmetallic parts. Apply required preservative only to the unpainted, unplated ferrous metal surfaces unless otherwise specified.

30.3.2 Nonferrous and plated items. Preservatives shall not be required on exterior parts that are completely nonferrous, or plated with gold, silver, cadmium, zinc or tin. Further, preservative shall not be required on items constructed of 18-8 stainless steel. (Preservatives are required on items plated with phosphate.) All plating materials shall be of non-flash variety to qualify for the no-preservative exception.

30.3.3 Sealing openings in items. Only metal caps and plugs conforming to MIL-C-5501 shall be used to seal threaded ports and/or orifices in fluid and/or gaseous systems (i.e., hydraulic, fuel, oil, pneumatic, etc.). However, oxygen systems, components of oxygen systems, and escape system hot gas ballistic lines and devices shall use rigid plastic caps and plugs conforming to MIL-C-5501 to seal threaded ports and orifices. All non-threaded ports and orifices shall be sealed with plastic caps and plugs. Other openings shall be sealed with Grade A barrier material conforming to MIL-B-121 and secured with tape conforming to PPP-T-60. Alternatively, other openings may be sealed with 6-mil polyethylene conforming to L-P-378 and secured with vinyl pressure sensitive tape.

30.3.4 Coating impregnated items. Unless otherwise specified, oil impregnated items shall be coated with a compatible preservative oil conforming to VV-L-800. Preservative coatings shall not be applied to graphite impregnated items.

30.3.5 Internally preserved items. Items that require the application of preservatives to internal areas shall be sloshed in, sprayed with or dipped into preservative oil prescribed in the detailed requirements. Preservative oil shall be applied in such a manner to ensure complete coverage of both interior and exterior surfaces, and shall be thoroughly drained to prevent any oil entrapment that could

cause subsequent damage tot he package. If the item cannot be sealed by design features (lids, hatches, etc.), openings and orifices shall be sealed with caps or plugs, conforming to MIL-C-5501, or with Class 1 tape conforming to PPP-T-60, Types III or IV.

30.3.6 Rubber and synthetic rubber items. When rubber or synthetic rubber items are unit packed in quantities of more than one, the individual pieces shall be dusted with talcum powder conforming to A-A-42A (or equivalent commercial grade), or shall be separated by plastic film separators.

30.3.7 Items with grease fittings. Unless otherwise specified, items such as universal joints and flexible cables that are equipped with grease fittings or tapped holes for such fittings shall be pressure-filled with the grease specified for use in normal operations.

30.3.8 Supplemental oil application. When the engineering drawing or other technical instruction requires a supplementary oil finish be applied to metals with phosphate and black oxide coatings, the supplemental oil shall be applied after cleaning unless otherwise specified.

30.4 Preparation of flexible/coilable items. Flexible, coilable items constructed in a loop, such as fan belts or door seals, and having a diameter of 14 inches or greater, shall be coiled upon themselves for packing. Care must be taken to prevent distortion or other damage to the item, and if such damage or strain may occur, the items shall not be coiled. Items conducive to folding or rolling shall be folded or rolled to the minimum cube that will prevent deformation or "set" to the item during long term storage.

30.5 Caging or damping sensitive items. Items such as gyroscopes, motion sensors, or other delicate instruments that incorporate caging or damping devices in their design to secure movable parts in position, shall be properly caged or electrically damped prior to packaging.

30.6 Packaging gaskets or seals. When gaskets or seals are used in connection with selected preservation procedures, and a possibility exists that they could be mistakenly used in ultimate item installation, the seals and gaskets must be identified in a manner that will prevent their accidental use in item installation.

30.7 Equipment mounts. Equipment having vibration/shock mounts shall not be shipped on the mounts unless they are immobilized by blocking or unless the mounts are an integral part of the equipment. In either case, a suitable cushioning system shall be provided.

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30.8 Electronic devices subject to damage by environmental field forces. Sensitive electronic devices (including modules, circuit card assemblies, and printed wiring boards containing one or more of these sensitive components) shall be packaged in accordance with applicable submethods of Method IA, MIL-P-116. Only non-corrosive electro-static-protective wrapping or cushioning shall be used. Wrapping material shall conform to MIL-B-81705 (Type II). Cushioning material shall conform to PPP-C-1842 (Type III), PPP-C-1797 (Type II), or MIL-P-81997 (Type II).

Each device, wrapped or cushioned as required, shall be inserted in heat-sealed bags conforming to MIL-B-117 (Type I, Class F, Style 1) for electromagnetic, electrostatic and water vapor-proof protection. Alternatively, these devices shall be inserted into heat-sealed bags conforming to MIL-B-117 (Type I, Class A, Style 2) or MIL-P-81997, for electrostatic and water vapor-proof protection only. Larger bags shall be fabricated in conformance with MIL-B-81705 (Type I) for electromagnetic, electrostatic and water vapor-proof protection, or MIL-B-81705 (Type II) for electrostatic and water vapor-proof protection only.

The sensitive electronic device symbol and associated cautionary label shall be attached in conformance with MIL-STD-129 on all unit, intermediate, and exterior containers enclosing these devices. To ensure handling protection, sensitive electronic devices packages shall be opened only at field force protective work stations.

30.9 Radioactive materials. The requirements of CFR Title 49 shall be complied with. Markings shall be in accordance with MIL-STD-129.

30.10 Unit pack requirements.

30.10.1 Level A unit pack requirements.

30.10.1.1 Intimate wrapping. When more than a single item is specified for unit pack wrapping, individual items weighing more than 0.25 pounds, and all fragile items, shall be individually wrapped. If individual items weigh less than 0.25 pound, or are not considered fragile, all the specified items shall be included in only one wrap. Arrangement of multiple items within the wrap shall be such as to provide minimum cube.

30.10.1.1.1 Intimate wrap size. When size is not specified, length and width shall be determined in accordance with MIL-STD-2073-1, Appendix C, Table V, except that the minimum acceptable size shall be 3 x 3 inches.

30.10.1.1.2 Intimate neutral wraps. When greaseproofness (no contact preservative) is not a requirement and barrier material conforming to MIL-B-121 (Type II, Grade A, Class 2) is specified in the contract or packaging document as an

intimate wrap, neutral papers conforming to MIL-P-17667 and/or MIL-P-130 may be used as a substitute barrier material.

30.10.1.2 Cushioning, blocking, and bracing. When cushioning, blocking, and/or bracing are required but not specified, application shall be in accordance with MIL-P-116. When a cushioning wrap is required and size is not specified, intimate wrap size shall be determined in accordance with MIL-STD-2073-1, Appendix C, Table V.

30.10.1.3 Stiffeners. When stiffeners are required, the items(s) shall be placed between two pieces, or inserted inside one folded piece, or taped/tied to a single piece of stiffener material measuring a minimum of 0.5 inch larger in length and width than the item(s). Stiffener material shall conform to PPP-F-320. After positioning the item(s) between the stiffeners, secure the stiffeners with tape conforming to PPP-T-76 or PPP-T-60, ensuring that the tape does not touch the item(s). Items subject to deformation, such as preformed material or synthetic rubber seals and gaskets, may use mailing tubes as cores, vacuum-formed material, or otherwise built-up materials to prevent deformation or set.

30.10.1.3.1 Load deflector stiffeners. When an item requires protection from compression forces or being otherwise deformed (such as O-rings), and a specific stiffener type is not specified, load deflector stiffeners shall be used. (O-rings with an outside diameter of 2 inches or less shall not require stiffeners.)

30.10.1.4 Desiccant application. Unless otherwise specified, desiccant application shall be in accordance with MIL-STD-2073-1, Appendix C, Table V.

30.10.1.5 Unit pack containers. Unit pack containers shall conform to specified requirements or as described in MIL-STD-2073-1.

30.10.1.5.1 Container size. When container size is not specified, calculate the appropriate size in accordance with MIL-STD-2073-1, Appendix C, Table V.

30.10.1.5.2 Conforming heat sealed bags. When unit-packed items use heat sealable bags as the exterior unit container, the bag shall conform to the configuration of the parts, or the container, as applicable. This requirement shall not apply when stiffeners are used in conjunction with heat sealable bags, or if the item has been coiled prior to the application of the stiffeners.

30.10.2 Level B unit pack requirements.

30.10.2.1 Preservation requirements. Preservation shall be in accordance with 30.10.2.2 through 30.10.2.7.

30.10.2.2 Bare ferrous items (unpainted or unplated). Bare ferrous items shall be provided with a single wrap of VCI-treated barrier material conforming to MIL-P-3420 (Type I, Class 2, Style B). Barrier material shall be placed around the entire quantity contained in the unit pack.

30.10.2.3 Ferrous and nonferrous item combinations. All items of composite construction, including those which are partially painted or plated, shall be coated with lubricating oil, conforming to VV-L-800, on the bare ferrous surfaces only. When a preservative is applied, the unit quantity shall be wrapped in barrier material conforming to MIL-B-121 (Type II, Grade A, Class 2).

30.10.2.4 Fully painted, plated and nonferrous items. All fully painted, plated and nonferrous items, including stainless steel, shall be packed with no preservative applied.

30.10.2.5 Items requiring protection from direct contract with water. When the nature of an item is such that using a contact preservative is not applicable, the quantity of items to be contained in the unit pack shall be wrapped in material conforming to PPP-B-1055 or MIL-B-121. The material shall be arranged on or around the items so that free water (rain or melting snow) cannot directly enter the interior of the unit pack.

30.10.2.6 Cushioning. Items shall be cushioned within the unit pack to prevent any damage which could result from movement of the items within the package.

30.10.2.7 Unit containers. Unit containers shall be as specified by the detail requirements shown in MIL-STD-2073-1.

30.11 Intermediate pack requirements.

30.11.1 Levels A and B pack requirements.

30.11.1.1 Intermediate container. The intermediate container shall be as specified in either the detail requirements or in MIL-STD-2073-1. Intermediate containers shall be used under the following conditions:

a) when they are considered economical because of total ordered quantity, production schedule, or when they facilitate handling, storage, or shipment;
b) when the quantity to be shipped to a single destination permits the use of two or more intermediate containers in an exterior container;
c) when he exterior surface of the unit pack is a bag or wrapping material of any kind; and

d) when the unit pack volume is less than 64 cubic inches and the exterior container is rigid.

30.11.1.2 Quantities in intermediate containers. Except as otherwise specified herein, or specified by the contract or packaging document, unit packs requiring intermediate containers shall be packed in quantities as follows:

a) a maximum of 100 unit packs to the intermediate container;
b) a maximum net load of 40 pounds; or
c) a maximum size of 1.5 cubic feet with at least two dimensions not exceeding 16 inches.

MIL-STD-2073-1, dictates the quantities of unit packs that shall be placed in the intermediate container based on the above criteria.

30.11.1.3 Intermediate container limitations. Prescribed quantities of unit packs may be varied under the following conditions:

a) when the quantity to be shipped to a single destination is less than the established intermediate quantity, the total quantity shall be placed in a shipping container of a minimum size to contain the pack;
b) when the contract or purchase order specifies a total quantity that is more than the established intermediate quantity, established quantities shall be packed in the required number of intermediate containers, and the remaining quantity shall be placed in the smallest container that will accommodate the unit pack; and
c) when the contract or purchase order specifies a quantity that is more than twice the established maximum permissible intermediate quantity, the container size shall be selected in accordance with MIL-STD-147. The size selected shall be such that voids are held to an absolute minimum.

30.11.1.4 Closure. Container closure shall be in accordance with the applicable container specification.

30.12 Exterior packing requirements.

30.12.1 General considerations. Exterior containers being shipped to a single destination shall (as far as practical):

a) contain items having the same National Stock Number (NSN);
b) contain identical quantities of unit/intermediate packs;
c) contain items covered by the same contract or purchase order;
d) contain items having cure, manufacture or expiration dates; and
e) have a minimum size of three cubic feet, with the following exceptions:

1) when the maximum gross weight precludes the use of the minimum size container, size of the container shall be governed by the quantity of the items which most nearly approximates the maximum gross weight;
2) when the total quantity to be shipped to a single destination displaces less than three cubic feet, the exterior container will be the size necessary for shipment; and
3) if more than one contract line item is involved, those items whose cube is less than three cubic feet and whose weight is less than 200 pounds will be consolidated to the fullest extent practical.

30.5.2 Containers with skids. All shipping containers, except drums and fiberboard containers, with gross weights exceeding 200 pounds, and containers with length and width dimensions of 48 x 24 inches or larger and weighing more than 100 pounds will be provided with skids to facilitate handling. The skids shall be constructed, as a minimum, of 3 x 4 inch lumber laid flat, or as specified in the applicable container specification. Pallets shall be used for fiberboard containers meeting the above dimensions for shipment and /or storage.

30.5.3 Shipping containers. Exterior shipping containers shall be of the minimum size necessary to contain the packs. Unless otherwise specified, exterior containers shall be in accordance with applicable specifications selected from MIL-STD-2073-1, Appendix C, Table VII. Container sizes should conform, to the maximum extent possible, to those listed in MIL-STD-147.

30.5.4 Closure. Closure of the exterior container shall be in accordance with the applicable container specification, or as specified in the contract or purchase order.

30.5.5 Reinforcement strapping of exterior containers. Reinforcement strapping of exterior containers shall be in accordance with the applicable container specification, except that metal strappings for wooden boxes shall conform to QQ-S-781 (Type I, Finish A), and fiberboard container reinforcing shall be in accordance with PPP-T-97 or ASTM D 3950. Strapping is not required under the following conditions:

a) Continental United States (CONUS) shipments (does not include overseas shipments through ocean or air terminals);
b) Shipments through a consolidation depot or from consignor to consignee in MILVANS or SEAVANS; and
c) Containers composing a pallet load.

30.5.6 Shipments by parcel post. Parcel post shipments shall meet all requirements specified by postal service regulations.

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30.5.7 Consolidated pack. Consolidated packs shall be exterior containers used to consolidate shipments of two or more assorted packed items to a single destination, when the total cube of each item displaces less than three cubic feet. A cover shall be fastened to the container to prevent pilferage or loss of the enclosed packages. The total quantity of the same line items (unit or intermediate packs) shall be positioned during packing to permit ready identification upon opening, or shall be consolidated by means such as bagging, tying, bundling or wrapping and cartonizing, and then identified before being placed in a consolidation container. Consolidated packs weighing over 200 pounds or larger than 20 cubic feet shall be provided with skids to facilitate handling. Containers conforming to MIL-STD-2073-1, Appendix C, Table VII, shall be used. Consolidation containers normally will not exceed 36 inches in depth.

30.5.8 Unitization/consolidation.

30.5.8.1 Pallets. Pallets shall be used to the greatest extent possible where the volume of homogeneous commodities are destined for CONUS or overseas shipment. Unless otherwise specified, material shall be palletized when containers do not require skids; when quantities per destination exceed either a total of 250 pounds (excluding the pallet) or a volume of 20 cubic feet; and when the container size permits the use of one of the pallet patterns described in MIL-STD-147. Load shall be Type I. Pallets shall conform to NN-P-71 (Type IV, Group I or II wood). The load shall be "bonded" to the pallet by strapping conforming to ASTM D 3953, by shrink film conforming to L-P-378 (Type IV), or by stretch wrapping. Unitization of ammunition loads shall be in accordance with MIL-STD-1660 and specific service directives and drawings.

30.5.8.2 Criteria for unitization and consolidation. The following factors shall be used in determining the feasibility of and requirements for unitization and consolidation.

30.5.8.2.1 Palletized loads. Palletization of exterior containers is continued to the following criteria:

a) the load shall consist of four or more unskidded containers being shipped to the same destination:
b) the load shall cover a minimum of 80 percent of the pallet base: and
c) the loaded pallet height shall be in accordance with MIL-STD-147.

30.5.9 Stackability and superimposed loads. Shipping containers for all levels shall be capable of being stacked and supporting superimposed loads during shipment and storage without damaging containers or contents. Testing for compliance to these requirements shall be in accordance with FED-STD-101, Methods 5016 and 5017.

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30.6 Preparation of general cargo for air shipment. Material shipped by air should be packaged so that the cube and gross weight are minimal. Any decision to repack should balance transportation cost savings against the cost of repackaging and/or possible delay in shipment.

30.7 Shipment of hazardous materials.

30.7.1 Shipment of hazardous materials by military air. Shipments of hazardous materials by military aircraft, or shipments delivered to an airport for shipment by military aircraft (including Logair and Quicktrans) shall be prepared for shipment in accordance with provisions of Air Force Regulation 71-4.

30.7.2 Shipment of hazardous materials by other than military air. Hazardous material shipment by a mode of transportation other than by military aircraft shall be prepared in accordance with CFR title 49 (parts 100 through 178). Hazardous material shipments by Parcel Post must comply with Postal Service regulations.

30.8 Marking.

30.8.1 General marking information. Unless otherwise specified, marking shall be in accordance with MIL-STD-129.

30.8.2 Shelf life codes. Unless otherwise specified, shelf life codes shall be marked on unit, intermediate, and exterior containers in accordance with MIL-STD-129.

30.9 Packaging design validation. Unless otherwise specified in the contract or purchase order, the contractor shall be required to perform packaging validation tests on selective and special group items in accordance with MIL-STD-2073-1, unless one of the following conditions exists:

a) the contractor can produce previous successful test records for the same or similar items;
b) the contractor can produce previous engineering data which has been approved by a cognizant DOD activity and which indicates that the proposed packaging design will successfully meet or exceed contractual requirements; and
c) the contractor can produce historical shipping data confirming that adequate protection is provided using the same or upgraded packaging.

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CONCLUDING MATERIAL

Custodian:
Army - MI

Reviewer:
Army - SM

Preparing Activity:
Army - MI

(Project No. PACK-A353)