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## MILITARY SPECIFICATION

### CONTAINERS, SHIPPING AND STORAGE, METAL REUSABLE

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

#### 1. SCOPE

1.1 This specification covers metal shipping containers for Military equipment. The containers are intended to provide water-vapor-proof and physical protection for domestic shipment, overseas shipment, and storage.

1.2 Classification. Shipping Containers shall be of the following styles, as specified (see 6.2).

Style I - Vertical mount - So designed that the item is mounted in the containers with its longitudinal axis perpendicular to the base of the container.

Style II - Horizontal mount - So designed that the item is mounted in the container with its longitudinal axis parallel to the base of the container.

#### 2. APPLICABLE DOCUMENTS

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

#### SPECIFICATIONS

##### Federal

QQ-P-416	Plating, Cadmium (Electro-Deposited)
TT-C-490	Cleaning Methods and Pretreatment of Ferrous Surfaces for Organic Coatings
TT-C-650	Wood Preservative, Creosote-Coal-Tar-Solution
TT-E-527	Enamel, Alkyd, Lustreless
TT-I-558	Ink, Marking Stencil, Opaque, for Nonporous Surfaces (Metals, Glass, etc.)
TT-P-636	Primer Coating, Alkyd, Wood & Ferrous Metal
TT-W-571	Wood Preservative, Treating, Practices

##### Military

MIL-P-514	Plates, Identification, Instruction & Marking, Blank
MIL-D-1000	Drawing, Engineering & Associated Lists
MIL-D-3464	Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification

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MIL-T-5021	Tests, Aircraft & Missile Welding Operators Qualification
MIL-C-5541	Chemical Films & Chemical Film Materials for Aluminum and Aluminum Alloys
MIL-E-5556	Enamel Camouflage, Quick Drying
MIL-S-6855	Synthetic Rubber Sheets, Strips, Molded or Extruded Shapes
MIL-I-6866	Inspection, Penetrant Method of
MIL-I-6868	Inspection Process, Magnetic Particle
MIL-P-8585	Primer Coating, Zinc Chromate, Low-Moisture Sensitivity
MIL-A-8625	Anodic Coatings, for Aluminum & Aluminum Alloys
MIL-C-16173	Corrosion Preventative Compound, Solvent Cutback, Cold-Application
MIL-P-16232	Phosphate Coatings, Heavy, Manganese or Zinc Base (for Ferrous Metals)
MIL-P-19834	Plates, Identification Metal Foil, Adhesive Backed
MIL-I-26860	Indicator, Humidity, Plug, Color Change
MIL-V-27166	Valve, Pressure Equalizing, Gaseous Products

## STANDARDS

Military

MIL-STD-129	Marking for Shipment and Storage
MIL-STD-210	Climatic Extremes for Military Equipment
MIL-STD-453	Inspection, Radiographic
MIL-STD-731	Quality of Wood Members for Containers and Pallets
MS 33586	Metals, Definition of Dissimilar

Federal

FED-STD-101	Preservation, Packaging Materials
	Test Procedures
FED-STD-595	Colors (Requirements for Individual Color Chips)

AIR FORCE, NAVY AERONAUTICAL BULLETINS

No. 343	Specifications & Standards applicable to aircraft Engines & Propellers, Use of
No. 422	Standardized Procurement & Utilization of Aeronautical Engine Containers, Procedures for

(Copies of specifications, standards, drawings and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

\*2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise

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indicated, the issue in effect on the date of invitation for bids or request for proposal shall apply.

### National Bureau of Standards

Handbook H28

Screw-Thread Standards for Federal Services

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D.C. 20330.)

### 3. REQUIREMENTS

\*3.1 First article sample. Before starting production, a sample of the finished container shall be submitted for approval in accordance with 4.3. The approval of the first article sample authorizes the commencement of production, but does not relieve the supplier of responsibility for compliance with all applicable provisions of this specification. The first article sample shall be manufactured in the same facilities to be used for the manufacture of the production container.

3.2 Materials. Materials used in the manufacture of containers shall be suitable for the purpose intended. Magnesium shall not be used.

3.2.1 Dissimilar metals. The use of dissimilar metals, as defined in Drawing MS 33586, shall be avoided in container materials.

3.2.2 Materials and processes control. Specifications and standards for all materials, processes, parts equipment, Government approval of anodizing, electroplating, kiln drying, resistance welding, heat-treating equipment, Government certification of X-ray laboratories, fusion welders, magnetic inspection, and fluorescent penetrant inspection personnel which are not otherwise specifically designated herein, and which are necessary for the execution of the requirements of this specification, shall, except as provided in the following paragraph, be selected in accordance with ANA Bulletin No. 343, as designated by the procuring activity.

\*3.3.2.1 Standard parts. Standard parts (MS or AN) shall be used wherever they are suitable for the purpose, and shall be identified on the drawing by their part numbers. In the event there is no suitable corresponding standard part in effect on date of invitation for bids, commercial parts may be used provided they conform to all requirements of this specification.

### 3.3 Design and construction.

#### 3.3.1 Internal component parts.

3.3.1.1 Mounting provisions. Each container shall include complete interior supports and attachments to receive and secure the items prescribed by the procuring activity and include individual mounting provisions or supports for designated accessories unless otherwise specified. All fasteners used in the primary support structure shall be of the self-locking type or shall be secured by safety wire or cotter pins.

3.3.1.2 Standardization. The internal parts shall be so designed that they will have standard application insofar as physically possible between the various basic items and their succeeding models.

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3.3.1.3 Accessibility. The container shall be so designed as to provide ready accessibility to the interior supports and shall permit the installation and removal of the item by means of overhead lifting devices through a sequence of simple operations.

3.3.1.4 Vibration isolation. The container shall be so designed as to prevent damage to the item resulting from transient vibrations excited by the rough handling tests and also from steady-state vibrations encountered in shipment (see 6.4). Performance in meeting the latter requirement shall be determined by means of the shipping test specified in 4.4.9.

\*3.3.1.5 Manufacturing cure date on rubber shock mounts. Each shock mount shall be marked with its manufacturing cure date. This date will be permanently molded into the top of the mount material so as to be plainly visible when the mount is installed. Shock mounts shall be no older than one year when newly installed in containers.

3.3.2 Free drainage. Provisions shall be incorporated to insure that every possible pocket large and small on the exterior of the container is provided with a means of drainage in the normal storage position of the container. Where necessary, holes shall be drilled of sufficient size that they may be adequately painted without danger of subsequent stoppage. Where drainage holes are impractical the affected area shall be filled with compound of suitable consistency in such manner as to prevent the collecting of water or treated to insure against corrosive action.

### 3.3.3 Container assembly.

3.3.3.1 Permanent joints. All fittings, seams and permanent joints affecting the airtightness of container shall be welded or brazed.

### 3.3.3.2 Container closure.

3.3.3.2.1 Closure fastenings. Closure fastenings shall be such that only common tools will be required to open and close the container.

3.3.3.2.2 Container sealing. All joining surfaces shall be such as to ensure sealing under the performance requirements of this specification. Sealing gaskets shall be of material conforming to MIL-S-6855, class II, grade 60, and all gasket joints shall be vulcanized to form a continuous gasket. When assembled, the sections of the container shall apply no loads to the gasket(s) other than those required for sealing. Separately applied sealing compounds or materials shall not be used.

3.3.3.2.3 Installation time. The time required to open the container, to remove and reinstall the item and to close the container for shipment shall be the minimum practicable.

3.3.3.2.4 Leakage. When tested in accordance with the requirements of section 4 the container shall show no leakage.

### 3.3.4 Handling provisions.

3.3.4.1 Lifting rings, eyes or lugs. Lifting rings, eyes or lugs capable of withstanding the tests prescribed herein without failure or visible permanent distortion shall be provided for lifting the container or major sections thereof with chains, hooks or by a single overhead hook. These rings, eyes or lugs shall be so disposed as

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to permit the container to be lifted with its axis parallel to and also normal to the position most frequently used for storage. Provisions for four-point suspension of the loaded container shall be included for all style II containers that have a loaded gross weight of over 4,000 pounds. It will be permissible to incorporate lifting eyes in the stacking brackets. Rings, eyes or lugs when not in use shall not project beyond the limits of maximum displacement of the container. The minimum inside diameter of rings or eyes shall be large enough to permit the use of a crane hook of sufficient capacity to support the loaded container. Lifting rings or eyes installed for handling major sections during disassembly shall be located to insure a stable lifting configuration.

3.3.4.2 Securing to conveyance. Style I containers shall have four tie-down points located equidistant on the upper rolling ring or flange. Each point shall be formed by an eye bolt or bar welded to form an "eye". This bar or bolt shall be of sufficient size to accommodate 1/2 inch diameter steel cable and of sufficient strength not to distort or fail when used to secure loaded containers under conditions normally encountered during truck or rail shipment. Tie-down points provided shall not extend beyond the outside diameter of the rolling ring or flange.

3.3.4.3 Towing hooks, rings or eyes. Towing hook(s), ring(s), or eye(s) shall be attached to the container base structure. They shall have a minimum opening of three inches and the edges shall be rounded. Hook(s), ring(s) or eye(s) when in use shall not project beyond the limits of maximum displacement of the container.

\*3.3.4.4 Skids. Two (2) hardwood skids with minimum nominal width of four inches shall be provided on the bottom of the container. The vertical clearance between the bottom plane of the skids and the bottom of the container shall be a minimum of four inches unless otherwise specified (see 6.2). Skids on Style II containers having a total displacement of 50 ft.<sup>3</sup> or less shall be spaced so that the distance between their outer edges coincides with the major width of the container. Skids shall be of wood (Group IV) conforming to the quality specified in MIL-STD-731. The wood shall be sound and free from all defects that would materially affect strength or interfere with fastenings. The wood may be rough. The maximum moisture content at the time of assembly shall be 26 percent. The lower one inch of the ends of the skids shall be beveled 30°. The attachment of the skids to the container shall be designed to a total strength of the assembly (of all skids) in longitudinal shear equal to ten (10) times the gross weight of the container. After fabrication, drilling of holes and scarfing ends, etc. have been completed, the skids shall be treated in accordance with TT-W-571, to a retention of 10#/cubic foot or refusal.

\*3.3.4.5 Stacking. Container shall be suitable for stacking one upon another in such a manner as not to interfere with forklift access. Each container shall be capable of supporting two (2) similar containers (with contents) in a superimposed position, or a number of containers (with contents) stacked to a height of 16 feet which ever is greater. Containers with flat-roofed structure shall also be capable of withstanding a distributed load of 175 pounds per square foot. Style II containers shall be provided with stacking brackets and skid stops.

\*3.3.4.6 Lifting. The container shall be so constructed that it may be lifted by forklift trucks from the side and end without employing additional blocking and without permanent deformation

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to the container. When the gross weight of the loaded container is 5,000 pounds or less, the maximum length of forks shall be taken as 36 inches; over 5,000 pounds, 40 inches unless otherwise specified. When the container skids run parallel to the long axis of the container, 2 openings, 3 inches high by 12 inches wide minimum, spaced approximately 28 inches center to center or one 3 inch by 40 inch opening minimum, shall be provided in the skids. The opening or openings shall be symmetrically disposed about the center of balance of the loaded container.

\*3.3.4.7 Rolling rings. Cylindrical containers shall be provided with rings or flanges designed to permit rolling the container without damaging the sealing joint or causing distortion to the container.

3.3.5 Services and maintenance facilities. The following provisions shall be incorporated in each container.

3.3.5.1 Desiccant holder. The container shall be equipped with interior receptacles for desiccants. Each receptacle shall include a refillable enclosure which shall retain bagged desiccant conforming to MIL-D-3464 while permitting the passage of air. The enclosure shall be accessible through openings in the surface of the container provided with airtight covers and also from the inside. The total capacity of the receptacles shall be 0.50 cubic feet for each 100 cubic feet of container volume. The depth of the desiccant to be contained in the holder shall not exceed 3 inches from any one major exposed surface.

3.3.5.2 Relative humidity indicator. Unless otherwise specified the container shall incorporate the facility for installation of a relative humidity indicator plug conforming to MIL-I-26860, type I. When specified by the procuring activity (see 6.2) a humidity indicator plug shall be furnished with each container.

3.3.5.3 Visual inspection ports. Each container shall be provided with two visual inspection ports which shall consist of MIL-I-26860, humidity indicators with the cobaltous chloride indicating element removed. Inspection ports will be located a minimum of 4 inches apart.

3.3.5.4 Relief valves. Unless otherwise specified, each container shall be provided with an automatic relief valve system (see 6.2). In addition, a manually operated relief valve as specified in 3.3.5.4.1 shall be provided unless a manual feature is built into the automatic valve system. The valve(s) shall not be removable without the use of tools. A metallic decal providing operating instructions shall be applied adjacent to the valve(s).

3.3.5.4.1 Manual relief valve. The valve shall be brass, aluminum or stainless steel captivated type screw having a flat machined surface along the side of the screw which will provide the necessary relief outlet. A rubber washer (conforming to MIL-S-6855) shall be placed under the head of the screw to form the seal when valve is in the closed position. The valve shall have provisions for a wire and lead tamperproof seal that may be affixed in such a manner that the valve cannot be opened without destroying the seal. Pipe threads shall be in accordance with Military Handbook H28, Part No. 2.

\*3.3.5.4.2 Automatic relief valve. The automatic relief valve(s) shall conform to MIL-V-27166, type III, class I, unless otherwise specified (see 6.2) except that the Acceptance Quality Level shall be 1.0 in lieu of the 1.5 specified in MIL-V-27166. The valve system



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shall be rated at 1.0 to 1.5 pounds per square inch (psi) pressure differential for vacuum relief and 2.5 to 3.0 psi for pressure relief. The flow rate of the relief valve(s) shall be adequate to protect the container against damage when subjected to differential pressures incurred during a rate of ascent or descent of 2,000 feet per minute in the standard hot atmosphere and altitude range from 0 to 50,000 feet prescribed in MIL-STD-210.

3.3.5.5 Record receptacle. Unless otherwise specified a receptacle shall be provided of such size and shape as to permit easy insertion and removal of a 1 inch by 9 inch by 11 inch record book without rolling or bending. The attitude of the installed receptacle shall be such that water will not collect in it when the cover is removed. The receptacle shall be closed from the outside with a watertight cover. Provisions shall be made for tamperproof sealing of the record receptacle with lead seals and safety wire threaded through drilled bolts, nuts and wing nuts.

\*3.3.5.6 Location of service facilities. The visual inspection ports, relief valve, record receptacle and humidity indicator shall be grouped on one face or quadrant of style I containers to coincide with the entrance to the forklift openings in order that they will be easily accessible for inspection under row storage. The relief valves, humidity indicator and visual inspection ports shall be provided with physical protection by shielding, or being recessed. Shielding shall not protrude beyond the maximum displacement of the container. On style II containers they shall be located in one end of the container. All receptacles shall be in the base. Consistent with these requirements the humidity indicator shall be placed as far as practicable from the desiccant receptacle.

3.3.5.7 Receptacle closures. All receptacle closures shall be permanently attached to the container by means that will not interfere with accessibility to the receptacles. The closures shall be capable of being removed and inserted by hand or by common hand tools.

3.3.5.8 Drain plug. A 3/4 inch pipe plug shall be installed in the lowest point of the container shell at the end containing the other service receptacles. The plug shall be installed in a bushing from the outside. Location shall be protected against damage from forklifts.

3.4 Interchangeability. Interchangeability of containers and parts shall be governed by the provisions of ANA Bulletin No. 422. The containers shall be so designed as to be capable of competitive procurement as specified in the bulletin.

3.4.1 Major sections of the container which may be otherwise assembled in more than one relative position shall be furnished with assembly guide(s) and suitable markings which will permit assembly in one relative position only.

3.5 The size of the container shall be the minimum consistent with the size of the contents and the performance requirements of this specification. The internal arrangement shall be such as will provide clearance for the movement of the items as permitted by the cushioning medium. Dimensions of all containers shall be such as to permit efficient shipment by common carrier as well as handling and storage aboard naval vessels.

3.6 Weight. The container shall be of the minimum practical weight consistent with the performance requirements of this specification.

3.7 Finish.

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3.7.1 Cleaning and surface treatment. Aluminum alloy parts not otherwise treated shall either be anodized in accordance with MIL-A-8625, surface treated in accordance with MIL-C-5541, or shall be given other surface treatments as may be specifically authorized by the procuring activity. Ferrous metal surfaces shall be treated in accordance with TT-C-490, except that threaded and other working surfaces shall be treated in compliance with MIL-C-16232 and QQ-P-416.

\*3.6.2 Painting. All metal surfaces shall be painted with one coat of primer conforming to MIL-P-8585 and two coats of enamel conforming to TT-E-527. Wooden surfaces, excepting skids, shall be painted with enamel conforming to TT-E-527.

\*3.7.3 Exterior color. Unless otherwise specified, the exterior color of containers shall be Olive Drab Number X24087 of FED-STD-595. (see 6.2)

### 3.8 Performance.

3.8.1 The ability of the container to withstand handling. When tested in accordance with the requirements of section 4, the container and all essential accessories shall reveal no significant structural weaknesses. No deformation shall have occurred that will not permit ready disassembly, reassembly and reuse of the container following complete disassembly. The interior mounts shall reveal no significant structural weaknesses. All wrinkles or dislocations in the container shell or integral parts (except skids) in excess of 3/8 inch beyond their normal plane or location shall be considered significant structural weakness.

3.8.2 Ability of container to protect contents. When tested in accordance with the requirements of section 4, the contents of the container shall show no damage that would affect their utility. There shall be no evidence of a substantial amount of shifting of the contents within the container that would create conditions likely to cause such damage during shipment.

\*3.9 Markings. Markings shall be of waterproof ink, paint or decal. Ink shall conform to TT-I-558. Paint shall conform to MIL-E-5556. Color of markings shall be white conforming to color No. 27875 or 37875 of FED-STD-595. The following markings shall be applied to all containers at the locations and in the sizes indicated:

a. Adjacent to the lifting rings, eyes or lugs in 2 inch letters:

LIFT HERE

Arrows 5 inches long shall point to the rings, eyes or lugs.

b. On opposite sides of the upper section of the container, corresponding to lift-truck openings on the skids, in 4 inch letters:

DO NOT DROP

CAUTION: RELEASE PRESSURE BEFORE OPENING CONTAINER

c. Adjacent to the record receptacle in 1 inch letters:

RECORD RECEPTACLE

d. Adjacent to the humidity indicator in 1 inch letters:

HUMIDITY INDICATOR



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e. Adjacent to the relief valve in 1 inch letters:

RELIEF VALVE

DO NOT DISTURB

CAUTION: RELEASE PRESSURE BEFORE OPENING CONTAINER

f. At the loaded center of balance on both sides of style I containers stored or handled with the axis paralleled to the ground, and style II containers, a vertical line 6 inches long and 1 inch wide with the marking adjacent in 1 inch letters:

CENTER OF BALANCE

g. When the container is designed for the shipment of more than one item, the following marking shall be applied in 1 inch letters adjacent to the record receptacle:

CONTAINS ATTACHMENTS FOR MOUNTING  
(Nomenclature and Part Number)

h. In four places on the shell adjacent to and above the closure flange in 1 inch letters:

CAUTION: RELEASE PRESSURE BEFORE OPENING CONTAINER

i. On the interior of the container lower shell in a prominent place apply the following marking in 1 inch letters:

LIFT LOADED CONTAINER BOTTOM BY  
LIFTING RINGS, EYES, OR LUGS ONLY

3.10 Identification of product. A name plate conforming to MIL-P-19834, type 2, permanently and legible marked with the following information, including all information required to be inserted in the blanks indicated, shall be permanently attached to each major section of the container:

CONTAINER: SHIPPING & STORAGE (nomenclature) METAL REUSEABLE  
Model No., If not classified (insert Model No. or Nos. for each design)  
Specification MIL-C-5584C  
Stock No.  
Manufacturer's Part No.  
Serial No. (Assigned as directed by the procuring activity)  
Contract or Order No.  
Manufacturer's Name or trade-mark  
U.S.

\*3.10.1 Data plate. Unless otherwise specified, space for recording rework and technical compliance data shall be furnished by a data plate that conforms to MIL-P-514, type III (see 6.2). It shall be permanently attached to one major section of the container and located to the right of the name plate.

\*3.11 Installation instruction. Each container shall be accompanied by two sets of instructions printed on durable paper. One set of instructions shall be contained in an envelope marked "INSTALLATION INSTRUCTIONS" and placed in the record receptacle. The second set of instructions shall be bonded to the inner wall of the bottom half of the container. The instructions shall be positioned for easy viewing, and provided waterproof protection. Instructions shall include a step-by-step procedure for installing and removing the item for which the container is designed. The instructions shall be approved by the procuring activity prior to printing.

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3.12 Government-loaned property. When the contract or purchase order so provides, the Government will loan one item of the type for which the container is designed to the contractor upon his request for use in final first article testing.

3.13 Workmanship. The container shall be of clean design, well made and free from any defects which may affect durability, strength and serviceability.

3.13.1 Welding. Welds shall be reasonable smooth and free of craters. They shall exhibit characteristics of fusion, penetration and soundness of weld deposit representative of good welding practice. They shall be free of irregularities which indicate lack of skill or experience on the part of the operator. All welding fluxes, scale, weld spatter, acids, or basic solutions shall be completely removed prior to application of any finish coats.

3.13.2 Welding operators. All fusion welding shall be performed by operators who are currently certified as Class A operators in accordance with MIL-T-5021 except that certification joint No. 4 or No. 4 alternate shall not be required as a prerequisite of certification for welding of shipping containers.

3.13.3 Primary support structure. When inspected by the methods set forth in section 4, all castings and machinings used in the primary support structure shall be free of cracks or flaws.

3.13.4 Bolted joints. All bolted support structure shall have flat mating surfaces that are free of burrs, weld spatter, etc.

#### 4. QUALITY ASSURANCE PROVISIONS

\*4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

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

- a. First Article Inspection (see 4.5)
- b. Quality Conformance Inspection. Acceptance inspections are those tests performed on individual lots for acceptance (see 4.6).

#### \*4.3 First article inspection.

\*4.3.1 First article test samples. One container of each design for which approval is desired shall be subjected to the preliminary first article tests specified in 4.5.1. After successful completion of the preliminary first article tests, the container shall be subject to the final first article tests specified in 4.5.2.

#### \*4.3.2 First article test reports.

\*4.3.2.1 Preliminary reports. Prior to first article tests, the contractor shall submit a report in triplicate to the procuring activity showing measured or computed values for deflection of the item mounting points, the center of gravity, and the extremities of the item; computed or measured values of the natural frequency of vibration of the item mass in its cushioning medium, computed or measured values

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for the acceleration imposed upon the item mounting points, the item center of gravity and the extremities. One copy of the master assembly drawing or drawings and parts list shall accompany each copy of the report.

\*4.3.2.2 Preliminary first article reports. The contractor shall, upon completion of the tests, submit a certified test report in triplicate to the procuring activity for approval showing results of the tests. Three copies of assembly prints and parts list shall accompany the report. Approval of the report shall release the container for final first article tests.

\*4.3.2.3 Final first article test reports. The contractor shall submit a test report in triplicate outlining the procedures and results of the test. Three complete sets of assembly prints including one reproducible set and three sets of photographs of container and installed item and description of test methods shall accompany the final test reports.

#### 4.4 Test conditions.

\*4.4.1 For the preliminary first article tests. The container shall be loaded with an appropriate dummy load prior to testing. The dummy load shall conform in size, weight and weight distribution to the actual item for which the container is designed. Interim approval for production of the container may be granted by the procuring activity upon successful completion of the preliminary tests conducted with an appropriate dummy load.

\*4.4.2 For the final first article tests. The container shall be loaded with an actual item and designated accessories for which it is designed and fully assembled in a prepared-for-shipment condition. Final approval for production of the container shall be withheld until the final first article tests utilizing the actual item have been satisfactorily completed.

4.4.2.1 The item used for final first article tests shall be serviceable. Unless otherwise specified, it shall be inspected by or under the supervision of the procuring activity before and after tests.

#### \*4.5 First article inspection.

\*4.5.1 Preliminary first article inspection. The preliminary first article inspection shall consist of all tests described under 4.7 test methods with the exceptions of the shipping tests in 4.7.9.

\*4.5.2 Final first article inspection. The final first article inspection shall consist of all tests described under 4.7 test methods.

\*4.6 Acceptance inspection. Acceptance inspection shall consist of individual tests.

\*4.6.1 Individual tests. Each container submitted for acceptance shall be subjected to the tests as described under 4.7.1 and 4.7.2.

\*4.6.2 Rejection and retest. Failure of any container to conform to any of the requirements of this specification shall be cause for rejection of the container. Containers which have been rejected may be re-worked or replaced to correct the defects and resubmitted for acceptance. Before resubmitting, full particulars concerning previous rejection and the action taken to correct the defects found in the original shall be furnished to the inspector.

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#### 4.7 Test methods.

\*4.7.1 Examination of product. The container shall be carefully examined to determine conformance with the materials, design, finish and workmanship requirements of this specification and with any applicable drawings. Castings and machinings used in the primary support structure shall be inspected for cracks and flaws and when so specified by the procuring activity shall be visually inspected by magnetic particle, dye penetrant, X-ray or other methods listed in MIL-STD-453, MIL-I-6866, MIL-I-6868 or approved equivalents.

4.7.2 Leakage. The container shall be examined for leakage when assembled, loaded and sealed in the same manner as it will be prepared for shipment, except that the relief valve will be blocked off and all entries to the interior sealed with appropriate closures. The container shall be filled with air to a minimum pressure of 10 psi and tested by the immersion test. For acceptance testing the leakage test shall be performed on the empty container prior to painting.

4.7.2.1 Preferred method. The container shall be immersed slowly in water until the closure flange is approximately 4 inches above the waterline followed by examination for leakage. The container shall then be immersed until the closure flange is 4 inches below the surface of the water followed by examination for leakage. During the examination, the water shall be quiet and free of air bubbles. Following immersion, any closures or welds which were not under water shall be tested for leaks by the application of a soap solution.

4.7.2.2 Variant in preferred method. When approved by the procuring activity the container may be tested for leaks by the application of a soap solution.

4.7.3 Drop tests. Each container shall be subjected to the following drop tests:

4.7.3.1 Rotational drop test. The loaded container shall be supported at one end of its base on a sill approximately 5 inches in height and placed at right angles to the skids. The other end of the container shall be raised and allowed to drop freely from heights of 6, 12, 18, 24, 30 and 36 inches successively to a concrete or similarly hard surface. Duplicate drops shall be conducted from the 36 inch height. This test shall be applied to each end of the container. The loaded container shall then be supported at one corner of its base on a block approximately 5 inches high and with a block 10 to 12 inches high under the other corner of the same end of the container. The opposite end of the container shall be raised and allowed to fall freely from heights of 6, 12, 18, 24, 30 and 36 inches (as measured from the lower of the two corners) to a concrete or similarly hard surface. Duplicate drops shall be conducted from the 36 inch height. The test shall be applied to one corner of each end of the container. During the course of testing, the container must be repositioned on the blocks at any time the blocks are more than 6 inches from the end.

4.7.3.2 Edgewise drop test. If the size of the container and the location of the center of gravity are such that the rotational drop test cannot be conducted the following test shall be performed. The loaded container shall be raised and allowed to fall freely from a height of 12 inches (as measured from the lowest point of the container) to a concrete or similarly hard surface. The container shall first strike at the greatest angle commensurate with insuring that the container will then rotate in such manner as to come to rest on its base. For purposes of this test the "base" shall be any major surface on which the container would normally be shipped or stored.

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The test shall be repeated on each of the four corners or quarters (of cylindrical containers) of the base so defined.

\*4.7.3.3 Flatwise drop test. The container shall be raised and allowed to fall freely from a height of 18 inches to concrete or similarly hard surface landing flat on its base.

4.7.4 Tipover test. The container erect on its base on a hard level floor shall be slowly tipped (in any direction) until it falls freely and solely by its own weight to the floor. This test shall not be performed on style II containers.

4.7.5 Rollover test. The container erect on its base on a hard level floor shall be tipped slowly until it falls freely and by its own weight to the floor on its side. This process shall be repeated with fall from the side to the top, from the top to the other side and from the other side to the base thus completing one revolution. This test shall not be applied to style I container.

4.7.6 Impact. An impact test shall be applied to each end of the container. This test shall also be applied to the sides of containers less than 132 inches in length. Wood bumpers attached for testing may be used to protect the sealing flange or shell from impacts. The test shall consist of placing the container in motion in such manner that it will strike a hard flat surface normal to the direction of the load at a velocity of 7 ft./sec. on impact.

4.7.6.1 Incline-impact test. Incline-impact test, when applicable, shall be conducted in accordance with Method 211 of Federal Test Method Standard Number 101.

4.7.6.2 Pendulum-impact test. Pendulum-impact test, when applicable, shall be conducted in accordance with Method 212 of Federal Test Method Standard Number 101.

4.7.7 Static loading.

\*4.7.7.1 Concentrated load resistance. A load as specified below shall be applied to the top surface of the container simulating the effect of containers being stacked on the top. The greater of the following two loads shall be applied. A load equal to two times the weight of the containers when loaded for shipment or storage, or a load equal to that which would be produced by a number of like loaded containers stacked to a height of 16 feet.

4.7.7.2 Distributed load resistance. A load sufficient to insure a bearing pressure of 175 pounds per square foot shall be evenly applied to the top surface of the container. This test shall not be applied to areas with curved or domed-shaped cross section.

4.7.8 Handling characteristics test.

4.7.8.1 Hoisting test. The loaded container shall be lifted free of the ground (or other supports) by means of each of the suspension provisions specified in 3.3.4.1. This test shall be applied separately to each individual lifting ring or eye.

4.7.8.2 Assembly and disassembly. The item shall be placed in the container and the container shall be made ready for shipment. It shall then be removed from the container. Records shall be maintained of the tools required for this work and the number of man-hours consumed.

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4.7.8.3 Lifting test. The loaded container shall be lifted clear of the ground by a forklift truck with forks 30 inches center-to-center and transported for a distance of not less than 100 feet. The container shall then be deposited, the fingers of the truck placed between the skids of one end of the container (unless the design of the container prevents it) and lifted free of the ground and again transported a distance of 100 feet. If the location of the center of gravity does not permit the free lift of the container from one end using fork extensions, the one end shall be raised to a height of 6 inches by the forklift and the container drawn along a concrete or similarly smooth surface for a distance of not less than 100 feet. If the loaded container weighs 5,000 pounds or less the forks shall be approximately 36 inches long; over 5,000 pounds, 40 inches. Observations concerning the stability of the container on the forks and any tendency of the forks to distort or puncture the container shall be recorded.

4.7.8.4 Towing test. The loaded container shall be towed using the towing hook(s), ring(s) or eye(s) for a minimum of 50 feet over a concrete or similar surface. This test shall be applied to each end of the container.

4.7.9 Shipping test. This test is only required for aircraft engine containers. The shipping test shall consist of shipment of a serviceable engine shipped in the container for which final approval is desired for a distance of not less than 2,500 miles by rail freight loaded in a car equipped with Association of American Railroad standard trucks. After the test, the engine shall be operated and inspected in accordance with the applicable instructions as directed by the procuring activity. The operation and inspections shall be performed by or under the supervision of the procuring activity.

## 5. PREPARATION FOR DELIVERY

5.1 Application. The requirements of section 5 apply only to direct purchases by or direct shipment to the Government.

\*5.2 Preparation. Each container shall be completely assembled for shipment. Mounting plates or brackets shall be mounted in place. Any other accessories shall be securely fixed at any convenient place on the interior of the container. All exposed operating surfaces of closure devices and exposed threaded surfaces shall be treated with an application of material conforming to the requirements of MIL-C-16173 Grade I.

5.3 Marking of shipment. The container shall be marked for shipment in accordance with MIL-STD-129.

## 6. NOTES

6.1 Intended use. The containers covered by this specification are for domestic and overseas use as shipping and storage containers for Military equipment requiring moisture and water vaporproof protection. These containers are especially designed for such items as helicopter transmissions, engines, gear boxes, propeller hubs, missile components, electronic gear, etc.

\*6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Nomenclature, model number of equipment to be accommodated.
- c. Applicable detailed drawings.
- d. Style of container required (see 1.2).
- e. Number of containers to be furnished.



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- f. Record receptacle if different than specified in 3.3.5.5.
- g. Whether accessory mounting provisions are to be included (see 3.3.1.1).
- h. Where first article testing is to be performed.
- i. When Government loaned property is to be furnished (see 3.12).
- j. Exterior Colors - State exterior color require if different than specified in 3.7.3.
- k. When castings and machinings used in primary support structure are to be other than visually inspected (see 4.7.1).
- l. Whether data plate is required (see 3.10.1).
- m. Whether a relative humidity plug should be furnished with the container (see 3.3.5.2).
- n. Whether an automatic relief valve system should be furnished with the container (see 3.3.5.4).
- o. Type of relief valve if different than specified (see 3.3.5.4.1).
- p. Location of skids, specify if different than in 3.3.4.4.

6.3 Drawing requirements. The attention of contractors is invited to the fact that Government contractors for shipping and storage containers whether procured directly by the Government or through another contractor require that all drawings submitted must be in accordance with the requirements of MIL-C-1000.

6.4 Vibration design. The provisions for vibration isolation of the item from shipping conditions should adequately protect major item components from damage that will seriously affect item operation. In order to accomplish this, the designer should provide maximum isolation in the vertical and horizontal transverse directions relative to the main axis (coincident with the main shaft) of the engine for style II containers, and in vertical axis (coincident with main shaft) for style I containers. The frequency range to be particularly guarded against is 2.5 to 7.5 cps with 1 inch double amplitude between 2.5 and 5 cps and amplitudes corresponding to 1 g acceleration between 5 and 7.5 cps. Every effort should be made to avoid sharp resonant frequencies (amplification factors in excess of 10) in these ranges. Consideration should also be given to minimizing, if practicable amplification of vibrations between 7.5 and 55 cps and amplitudes corresponding to 1 g. It is generally safe to assume for design purposes that frequencies over 55 cps will be dampened out by skid and container structure although frequencies as high as 1,000 cps with 10 g or more acceleration have been reported in the literature.

\*6.5 The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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