

GENERAL REQUIREMENTS AND COMMERCIAL PACKAGING

1. SCOPE

- 1.1 This standard establishes the general packaging requirements of item(s) for shipment to and from Lockheed Martin Space Systems Company (LMSSC) to ensure safe delivery.
- 1.2 Deviations, substitutions, or conflicts to this standard or to the applicable P-Sheet requirements shall be submitted to the cognizant LMSSC Buyer.
- 1.3 All specified documents shall be to "latest revision".
- 1.4 Order of precedence. In the event of conflict between this document and the industry specifications herein, the requirements of this document take precedence. Note that certain LMSSC documents (Program contamination control plans, PHST plans, etc.) may additionally restrict the materials and processes used herein. In those cases, those additional restrictions shall be followed.

2. GENERAL

- 2.1 Packaging furnished shall meet or exceed those requirements specified herein.
- 2.2 Packaging shall satisfy applicable carrier regulation(s): Uniform Freight Classification (rail), LMSSC National Motor Freight Classification and Postal Regulations.
- 2.3 Packaging shall provide item(s) adequate physical, mechanical, chemical and cleanliness protection.
- 2.4 Packaging materials, procedures and workmanship shall be of good industry quality and practice.
- 2.5 Packaging shall be of minimum weight and cube.
- 2.6 Packaging shall permit safe removal and replacement of item(s).
- 2.7 To the maximum extent possible, use recyclable packaging materials.
- 2.8 To prevent contamination of hardware, protective wrappings shall be as clean or cleaner than the cleanliness of the hardware it is being used to protect.
- 2.9 Restricted Materials:
 - 2.9.1 ESD protective packaging, including anti-static treated materials and "pink poly" films and foams, shall not be used for packaging of non-electronic propulsion hardware, including but not limited to the hardware below:
 - Metal tubing of any length (stainless steel, titanium, aluminum, or beryllium)

- Fittings, adapters, bushings, T-rings, manifolds
- Fasteners, washers, and spacers shipped with other propulsion hardware
- Tanks and tank components
- Mounting brackets for any of the above propulsion hardware

Note: Electrical and electronic propulsion hardware and harnesses shall be packaged in ESD protective materials when identified as ESD sensitive hardware.

- 2.9.2 Amine and amide treated anti-static (e.g. pink poly) wrapping and cushioning materials are prohibited by many LMSSC programs and should not be used to package non-ESD sensitive hardware.
- 2.9.3 Loose fill (e.g. synthetic popcorn) shall not be used in packaging electrostatic discharge (ESDS) items or items to be unpackaged in clean rooms or missile silos.
- 2.9.4 Foam-in place packaging shall be restricted when high temperatures resulting from exothermic reaction could negatively affect hardware. Temperature sensitive products, such as circuit card assemblies shall not be put in contact with expanding foam. Expanding foam may be used with temperature sensitive products if molds are used to form the cavity within the expanding foam. Mechanical items, such as brackets may be packed with expanding foam with little or no additional shielding from the foam-generated heat.
- 2.9.5 Only non-corrosive wrapping materials (such as MIL-DTL-17667 Type I) shall be in contact with the metal surfaces of an unpreserved item. Items that incorporate caging or damping features for securing movable parts in place shall be properly engaged or electrically damped prior to packaging. Items with moveable external parts that might become damaged by shock or vibration during shipment shall have these parts secured by blocking, bracing, tiedowns, disassembly, vacuum packaging, or other techniques.
- 2.9.6 Wooden containers shall be painted before cleanroom use. Paint shall be low volatile organic compounds (VOC) and shall be latex, polyurethane, or a two-part adhesive approved by Contamination Control Engineering and PMP Engineering.
- 2.9.7 Fiberboard shipping containers shall be fabricated in accordance with the ASTM D 5118 or ASTM D 5168. Weather resistant grades shall be used if the contract or purchase order requires packaging in accordance with Level B of MIL-STD-2073 or NPR 6000.1.

2.9.8 Contact LMSSC Product Protection Engineering if removable lids require swivel hoist rings. If swivel hoist rings are used, all swivel hoist rings (SHRs) used on container covers shall comply with the following:

- All Carr Lane SHRs shall be prohibited from use;
- All SHRs shall pass magnetic particle inspection per ASTM E 1444 or MAP-901001-3003 prior to use (supplier shall provide certification of acceptance or failure of this inspection requirement);
- All SHRs shall bear evidence of 200% proof tested prior to use
- All SHRs shall include the 3 point contact E-Ring depicted in Figure 1. Full contact retaining rings shall not be used on SHRs.



Standard E Ring



Full Contact Retaining Ring

FIGURE 1. STANDARD E-RING AND FULL CONTACT RETAINING RING

2.10 If shock indicators or shock recorders are required, they shall be installed per P-134.

3. UNIT PACKAGING

- 3.1 Unit closure shall be adequate to prevent loss of, or damage to contents during shipment or storage.
- 3.2 When lot date code identifier is specified, do not intermix items from different lots and/or lot dates within the same unit packaging.

- 3.3 Any accessory part(s) required per item shall be enclosed in a separate package and secured within the unit package so as to prevent damage to other items.
- 3.4 An item consisting of two or more separate matched parts (sets) shall be packaged within the same unit package.
- 3.5 Repairable items, high-value and high-priority items, fragile items and irregularly shaped items shall have a quantity per unit pack (QUP) of one. The QUP for items furnished in pairs, sets, kits, etc., shall be one pair, one set, or one kit, as applicable.
- 3.6 Item(s) with sharp points or protrusions shall be adequately padded to prevent damage to containers or to personnel inadvertently contacting them.
- 3.7 Protect all exposed or projection pins, contacts, fittings, etc., with proper size type and style of protective caps, plugs, and closures.
- 3.8 Exposed metal item(s) requiring volatile corrosion inhibitors shall be protected with tarnish inhibitor material. The treated surface area of the tarnish inhibitor material must be facing the item. Items having any surface incompatible with the tarnish inhibitor shall be completely wrapped with a neutral material prior to application.
- 3.9 Unit packaging that also meets the requirements of Section 6.0 may be used as a shipping container.

4. UNIT PACKAGING OF ELECTROSTATIC DISCHARGE SENSITIVE ITEMS (WHEN APPLICABLE)

- 4.1 Protect ESD sensitive hardware per P-116.
- 4.2 Trident II (D5) Fleet Ballistic Missile (FBM) Program requires ESD protective caps in accordance with WS 259984 for all FBM electrical and RF connectors.

5. SHIPPING CONTAINER PACKAGING

- 5.1 The number of unit or intermediate packages per shipping container is restricted to the dimensions and gross weight limitations of the container specifications. Fill any voids with suitable dunnage, blocking or bracing as appropriate.
- 5.2 Enclose or attach a copy of the packing slip to the shipping container. (If shipment consists of multiple pieces, place packing slip in piece number one of the shipment and mark "Packing Slip Enclosed").

- 5.2.1 Support Fasteners, Closure Devices, and Handles: All support fasteners and closure devices, such as self-locking nuts, safety wiring, or other suitable devices, shall have mechanical provisions to prevent loosening. Handles shall be provided to lift empty container covers that weigh between 70 and 150 pounds. Handles shall be clearly marked to avoid misuse, i.e., "COVER LIFT ONLY." If four handles are used for a two-person lift, the handles shall be located conveniently about the center of balance of the cover. Straps and rope shall not be used for handles. Handles shall be selected using a safety factor of 3. Handles shall not be used as tie-down attachments unless they are designed for tie-down loads.
- 5.2.2 Wooden Boxes and Crates shall be designed and fabricated to comply with any of the following industry specifications: ASTM D6039, Crates, Wood, Open and Covered; ASTM D6880, Wood Boxes; ASTM D6251, Wood-Cleated Panelboard Shipping Boxes, and ASTM D6256, Wood-Cleated Shipping Boxes with Skidded Load Bearing Bases. ASTM D6251 containers are preferred for items weighing up to 1000 pounds. ASTM D6256 containers are preferred for items weighing 1000 to 2500 pounds. In addition, the following constraints apply:
- Reusable wooden boxes and crates shall be capable of being opened and reclosed without degrading the degree of protection provided or impairing the reusability of the container. Covers shall be fastened to the headers or skids of the container base.
 - Wooden boxes and crates with a gross (loaded) weight of over 200 pounds shall be provided with skids and rubbing strips. Rubbing strips shall provide a minimum forklift entry of 12 inches wide by 3 inches tall.
 - Additional skids are required when the distance between the skids, measured between the inside edges, is more than 48 inches.
 - If a product is to be bolted or strapped to the base, it shall be fastened to a load bearing member of the container base.
 - Wood cleats shall be attached to plywood panels with divergent or convergent staples or nails sized to provide a 1/8-inch clinch after passing through the wood and plywood.
 - Wood or plywood blocking and bracing members shall bear against only those parts of the packed item capable of withstanding the applied dynamic forces or shall bear against blocking pads or pressure strips that adequately distribute these forces.
 - Wood or plywood blocking and bracing shall be designed to permit easy removal without damage to the item.

5.2.2.1 Solid wood packaging material (e.g., pallets, crates, boxes, blocking, and bracing) imported into the United States shall be heat treated or fumigated with methyl bromide and marked with the International Plant Protection Convention (IPPC) logo and appropriate country code designating the location of treatment. Exported solid wood packaging material shall be in compliance with the ISPM Publication No. 15.

6. MARKING

- 6.1 Unless otherwise specified in contract or P.O., use the following criteria.
- 6.2 All markings shall be uniform, legible, durable and properly placed on package.
- 6.3 Unless otherwise specified or required, application may be by any method (e.g., labels, stencil, tagging, etc.).
- 6.4 When required markings are visible through the package, markings need not be repeated.
- 6.5 Apply additional markings as specified.
- 6.6 Unit package markings shall include part number per contracting document, supplier identity (name may be abbreviated), and quantity and unit (e.g., 1 each, 2 sets, 3 lbs., etc.).
- 6.7 Intermediate package markings shall include part number per contracting document, supplier identity (name may be abbreviated), and total unit quantity contained in intermediate package.
- 6.8 Packages that do not contain ESD sensitive hardware shall not bear ESD caution marking.
- 6.9 Marking should be limited to that required by the PO or part specification. Special and precautionary handling labels shall meet ASTM D5445, Pictorial Marking for Handling of Goods. Precautionary marking shall include (as applicable):
 - Center of balance;
 - ESDS contents;
 - Identification of any special sling needed;
 - Pressure relief valve(s);
 - Hoisting and tie down attachment points;
 - Cover lift;
 - Reusable container (“Do Not Destroy”);
 - Approximate gross weight for reusable containers;

- Identification of special storage environment;
- Items that require a constant energy source during storage and/or transportation;
- “Packaged with desiccant. Do No Open Until Ready to Use or Inspection.”;
- “Caution: Inspect shock indicators (or environmental recorders) inside container for indication of damage”.

7. LABELING (WHEN APPLICABLE)

- 7.1 Apply appropriate label(s) to all levels of packaging.
- 7.2 Label(s) must adhere permanently to all package materials. When not in conflict with applicable regulations, style and color is optional providing that precautionary wording and international symbology is used.

8. RETURN POLICY

- 8.1 The receiver has the option of returning damaged or improperly packaged item(s) for corrective action.