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## COMERCIAL PACKAGING

1. GENERAL:
  - 1.1. This attachment is provided to describe Buyer's minimum packaging requirements for the delivery of parts listed on a Purchase Order.
  - 1.2. The requirements established by drawings, specifications, requirements, technical data package and/or notes found in the procurement data package shall be met in addition to the minimum packaging requirements found in this document.
  - 1.3. Any questions concerning the packaging requirements or materials authorized for use shall be directed to the buyer referenced on the Purchase Order.
    - 1.3.1. Deviations from these instructions and/or waivers are required to be in writing from designated Packaging Engineering authorities through the buyer referenced on the Purchase Order.
  - 1.4. \*\*Requirements documents listed within the text of this instruction shall comply with the current document revision at time of purchase order placement.
  - 1.5. Definitions for standard terminology of packaging and distribution environments can be found in ASTM-D996.
2. PREPARATION FOR DELIVERY: Preservation, Packaging, and Packing.
  - 2.1. Items shall not sustain corrosion, deterioration, or physical damage during storage, transportation or handling by any type of common carrier.
  - 2.2. The Supplier shall comply with the requirements of ASTM-D3951 (Standard Practice for Commercial Packaging) when packaging items. These requirements apply to all unit, intermediate, and shipping containers.
    - 2.2.1. The requirements listed in each of the following sections shall be met in addition to the minimum requirements of this document:
      - 2.2.1.1. Section 3 - Electrostatic Discharge Sensitive (ESDS) Devices
      - 2.2.1.2. Section 4 - Optical Components
      - 2.2.1.3. Section 5 - Tape and Reel Components & Plastic Encapsulated Microcircuits (PEMs)
      - 2.2.1.4. Section 6 -Harness, Cable Assemblies, and Circuit Card Assemblies (CCAs)
    - 2.2.2. Ammunition, explosives, and regulated hazardous materials shall be packaged per the following requirements:
    - 2.2.3. The packaging, packing and marking of hazardous materials shall comply with the requirements of the Hazardous Materials Regulations (HMR), United States Code of Federal Regulations Title 49 (CFR 49).
      - 2.2.3.1. Import or export of hazardous (dangerous goods) and magnetized materials shall comply with the applicable regulations of CFR 49 and United Nations Model Regulations on the Transport of Dangerous Goods, International Air Transport Association (IATA) Dangerous Goods Regulations or the International Maritime Dangerous Goods (IMDG) Code as determined by the country of origination and mode of transport.
      - 2.2.3.2. The supplier shall meet all document requirements listed in section 10.2 of this document.
  - 2.3. Packaging shall be performed in a manner that protects parts and eliminates Foreign Object Debris (FOD) contamination. At a minimum, packaging shall facilitate cleanliness, handling, shipping, and storage. The inner (unit) packaging shall be FOD free.
    - 2.3.1. Loose fill materials (cushioning/dunnage) are prohibited for use {inner, intermediate or outer containers}. This includes (but is not limited to) materials such as shredded paper/ tissue/plastic, popcorn, peanuts, shredded fiberboard, or silicon plastics. Specific methods and materials to be used or avoided may be written into the Purchase Order.

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- 2.4. \*\*Packaging of unit and intermediate containers shall be limited to a single part number per shipping container. (Reference ASTM-D996 for definitions)
    - 2.4.1. Class 1 explosives shall be limited to single part number for all containers.
    - 2.4.2. Supplier Managed Inventory (SMI) is exempt from the requirements of 2.4.
  - 2.5. Commercial equivalent materials may be used in place of mil-spec materials specified in this document when certified as equivalent.
    - 2.5.1. Use only amine free packaging materials which protect items from corrosion in accordance with MIL-STD-3010, Method 3005, contact corrosion testing for long-term storage and in-plant handling.
  3. ELECTROSTATIC DISCHARGE SENSITIVE DEVICES:
    - 3.1. \*\*Electrostatic Discharge Sensitive (ESDS) devices shall be packaged to meet the requirements of ANSI/ESD S541 (Packaging Materials for ESD Sensitive Items) and ANSI/ESD S20.20 (Protection of Electrical and Electrical Parts, Assemblies and Equipment – Excluding Electrically Initiated Explosive Devices).
    - 3.2. Lead or terminal configurations for all items shall be maintained as manufactured without causing loads or stresses capable of causing damage to the item.
    - 3.3. Materials used to maintain item position and lead or terminal configuration shall permit item removal without damage to the item.
    - 3.4. \*\*Pink poly materials shall not be used for static shielding of ESDS devices.
      - 3.4.1. \*\*Pink poly packaging materials may be used for non-ESD shielding applications, provided the material complies with MIL-STD-3010, test method 3005.
    - 3.5. \*\* Electro Explosive Devices (EED's) shall be shunted and/or packaged to shield from electromagnetic and electrostatic energy.
      - 3.5.1. \*\*EED's shall be shunted whenever possible and the unit (primary) package shall be an anti-static or static shielding material.
      - 3.5.2. \*\*EED's with no means of shunting shall be packaged to shield from electromagnetic (25 db minimum) and electrostatic energy.
      - 3.5.3. \*\*Static generating packaging materials are not authorized for use as the unit (primary) package for EED's.
  4. OPTICAL COMPONENTS
    - 4.1. Optical Components shall be packaged in a manner that preserves their cleanliness. Packaging materials shall not cause immediate or latent damage to the hardware, nor shall it introduce particulate that may affect the performance characteristics of the component.
    - 4.2. Packaging materials shall not leave a foreign residue on the optical component (i.e. out gassing, particulate).
    - 4.3. If the packaging materials are in intimate contact with an optical surface, they shall be able to maintain contact with the optical surface/coating without causing damage during transportation and handling (i.e. standard abrasion test). They shall be wrapped around the component in a manner that prevents a sealed edge from contacting the optical surface directly.
    - 4.4. Bagging materials shall not be made with lubricants or anti-slip agents. Anti-static treatments shall be amine free. Topical anti-static treatments are not allowed.
    - 4.5. Components that are moisture sensitive shall employ a second bag that is capable of providing an adequate moisture barrier.
  5. TAPE AND REEL COMPONENTS & PLASTIC ENCAPSULATED MICROCIRCUITS:
    - 5.1. The packaging, handling and marking of moisture sensitive components shall conform to the requirements in the latest revision of Joint Industry Standard, IPC/JEDEC J-STD-033.

- 5.2. Axial Devices:
  - 5.2.1. Suppliers of axial lead configuration devices shall tape and reel components in accordance with ANSI/EIA-296. The inside tape spacing is to be 2.063 + 0.059 inches.
  - 5.2.2. Lot sizes 200 or greater shall be taped and reeled. A minimum 12 inch leader is required on reeled components and only on the finished length of taped components attached to the hub of the reel.
  - 5.2.3. Lot sizes less than 200 shall be taped and may be ammo packed in lieu of reeling.
  - 5.2.4. RCR05 style resistor devices shall be tape and reeled in accordance with Allen Bradley taping specification number "L01" and ANSI/EIA-296.
- 5.3. Radial Devices:
  - 5.3.1. Suppliers of radial lead configuration devices shall tape and reel components in accordance with ANSI/EIA-468. However, the height to seating plane dimension "H" shall be 0.650 inches minimum to 0.885 inches maximum.
  - 5.3.2. A tape trailer of at least 3 feed holes is required at the end of the tape to feed the last component into the dispensing head.
  - 5.3.3. Lot sizes 200 or greater shall be taped and reeled. Lot sizes less than 200 shall be taped and may be ammo packed in lieu of reeling.
- 5.4. Surface Mount Devices:
  - 5.4.1. Suppliers of surface mount configuration devices shall tape and reel all components in accordance with ANSI/EIA-481.
  - 5.4.2. Ammo packing is not allowed.
- 5.5. Plastic Encapsulated Microcircuits (PEMs):
  - 5.5.1. Major categories are (but not limited to): J-bend and gull-wing leaded packages such as Plastic Leaded Chip Carriers (PLCCs), Small Outline Integrated Circuits (SOICs), Plastic Quad Flat Packs (PQFPs) and Thin Small Outline Packages (TSOPs).
- 5.6. Packaging of Non-Tape and Reel Components shall be in accordance with this document, unless noted otherwise on the Purchase Order.
- 6. HARNESSES, CABLE ASSEMBLIES AND CIRCUIT CARD ASSEMBLIES:
  - 6.1. Harnesses and Cable Assemblies
    - 6.1.1. \*\*ESDS packaging materials, connector caps or bags shall be used at all connector locations.
    - 6.1.2. Large cables and harnesses may be packed directly into clean shipping containers or tubes in good condition in lieu of bags.
    - 6.1.3. Handle and package item and components in a manner that does not strain or distort preformed shape and bends. Unless cable or harness has performed bends packing in straight lengths is preferred.
    - 6.1.4. Coil as necessary to reduce container cube, distribute weight evenly, and to ease handling.
    - 6.1.5. Un-bagged large cables or harnesses must have all connectors capped or individually bagged.
    - 6.1.6. It is preferred that all male connectors have pin protectors installed. Cushion large connectors to prevent cable damage.
    - 6.1.7. Silver plated or metals susceptible to tarnishing must be bagged with a sheet of silver saver paper.
    - 6.1.8. Heat seal or tape bags closed with a minimum of enclosed air.
  - 6.2. Circuit card assemblies (CCA)
    - 6.2.1. Shall be packaged into single unit containers that do not allow physical contact of board-to-board

and must be adequately cushioned to prevent damage.

6.2.2. The CCA individual packages may be consolidated into a larger over pack containers but it must not preclude easy removal of individual packages {i.e. foam in place that encases single unit container}.

6.2.3. Special precaution must be taken to prevent damaged pins and/or connectors.

6.2.4. All ESDS and moisture requirements shall be strictly adhered to.

**7. SHIPPING CONTAINER REQUIREMENTS:**

7.1. Containers shall be packed to ensure carrier acceptance, safe delivery and adequate storage at end location.

7.2. Containers shall be in accordance with the rules and regulations of carrier applicable to the mode of transportation.

7.3. \*\*Containers size will be minimized to provide a snug fit for the item.

7.4. Unit containers shall also be constructed so as not to permit damage to the contents and to facilitate subsequent handling.

7.5. Corrugated Containers:

7.5.1.1. Corrugated containers shall, at a minimum, meet the standards of the National Motor Freight Classification (NMFCTM ) Item 222.

7.5.1.2. The box manufacturer's certificate that appears on all conforming boxes shall include size & weight limits and strength of fiberboard used.

7.6. Wood Containers:

7.6.1. Wood-Cleated Panel Board Boxes shall be constructed to the specifications listed in ASTM-D6251.

7.6.2. Wood-Cleated Shipping Boxes with skidded, load bearing bases shall be constructed to specifications listed in ASTM-D6256.

7.6.3. Containers constructed of or containing {i.e. wood cleats or skids} natural wood materials shall bear the appropriate stamp showing conformance to the latest revision of the International Standards for Phytosanitary Measures No. 15 (ISPM 15).

7.6.4. Processed wood materials {i.e. plywood or particle board} are exempted from the requirements of ISPM 15.

**8. UNIT LOAD AND PALLETIZATION REQUIREMENTS:**

8.1. Unit load requirements:

8.1.1. Unit load shall be assembled and/or restrained in a manner to eliminate the possibility of any free movement during handling and transport.

8.1.2. Once secured, unit loads shall be capable of handling as one entity throughout its distribution cycle.

8.1.3. Unit loads of Class 1 explosives shall be limited to one part number.

8.2. Palletizing load requirements:

8.2.1. Wooden, metal or plastic pallets shall be used for palletized loads.

8.2.2. \*\*Pallets shall be in good working condition and show no signs of structural damage that could compromise the safety of the load or personnel.

8.2.2.1. Wooden pallets:

8.2.2.1.1. \*\*The pallet shall not be missing any wood members of the pallet, as designed, or contain any rotted wood members.

8.2.2.1.2. Shall bear the appropriate stamp showing conformance to the latest revision of the International Standards for Phytosanitary Measures No. 15 (ISPM 15).

8.2.2.2. **\*\*Plastic/Metal Pallets**

8.2.2.2.1. **\*\*Plastic pallets shall not contain any cracks or deformation to the pallet.**

8.2.2.2.1.1. **\*\* Cracked/damaged welds are not permitted when metal pallets are used.**

8.2.3. A palletized unit load shall never exceed 6 feet in total height.

8.2.3.1. The height requirement does not apply to items shipped as a single unit or in a single bulk packaging.

8.2.4. Pallet loads shall be configured with the heaviest items located on the bottom.

8.2.5. Materials are to be stacked in a method that creates a centered, balanced, and square load. Overhanging of containers shall be kept to a minimum.

8.2.6. To accommodate movement during shipment and after receipt, large, heavy or bulky boxes shall be provided with skids in good condition and of adequate construction to support the load.

8.3. **Banding and load securement requirements:**

8.3.1. Banding is mandatory when any load height equals or exceeds pallet width.

8.3.2. Totes and loose individual containers will always require banding.

8.3.3. Banding will encircle container's full width and be at least 2 inches from any edge.

8.3.4. To ensure all containers are secure, banding may be necessary in multiple directions.

8.3.5. Ensure banding is routed around the container as closely as possible. This may require the banding to be routed through the spaces of pallet decking boards.

8.3.6. Corner protectors shall be used when securing corrugated fiberboard boxes/containers to a pallet.

8.3.6.1. Corner protectors may also be required to protect containers from the banding when the tension required to stabilize the load could damage/degrade the containers.

8.3.7. Steel banding material is preferred, but nylon or plastic strapping may be used if the tensile strength is adequate for proper load securement.

8.3.8. Banding shall be tightened to a degree that ensures load is properly secured to pallet but must not deform or damage containers.

8.3.9. When using stretch wrap to secure a load to the pallet for shipping the stretch wrap must be properly tensioned to prevent any load movement and stretch wrap must be secured to all 4 corners of the pallet.

9. **MARKING REQUIREMENTS:**

9.1. Markings shall be in accordance with carrier rules and regulations.

9.2. The marking requirements for containers shall contain the following at a minimum:

9.2.1. **Buyer Part Number**

9.2.1.1. **\*\*Part number shall be visible on the exterior of unitized/palletized loads without breaking down the load.**

9.2.2. **\*\*Quantity**

9.2.2.1. **\*\*Unit of Issue is required when unit is a measurement of issue other than each (i.e unit of issue is feet – ft).**

9.2.3. **\*\*Purchase Order Number – Exterior Shipping Container**

9.2.4. **\*\*Serial Number(s) (as required)**

9.2.4.1. **\*\*Required for reportable as-built configuration hardware.**

9.2.4.2. **\*\*Unit, intermediate, and exterior shipping containers (packages) shall be marked with all**

- the serial numbers packaged within their respective level of packaging (See FIGURE 1).
- 9.2.4.3. \*\*Serial numbers may be marked on the exterior of the container utilizing labels, stencils, packing sheets and/or Buyer form 2379RMS.
  - 9.2.4.4. \*\*A list of all serial numbers contained within unitized/palletized loads shall be accessible without breaking down the load.
    - 9.2.4.4.1. \*\*International shipments will provide two copies of the shipping paperwork, one copy will be attached to the exterior of the container and one copy will be placed on the inside of the container. ITAR controlled documents will not be included with the shipping paperwork.
  - 9.2.5. Unit containers are exempt from marking requirements when they hold one (1) each part and the Buyer part number is visible on the part through the container {i.e. a clear plastic box}.
  - 9.2.6. \*\*Supplier Managed Inventory parts may be identified by a list of parts contained within their respective shipping container.
- 9.3. Shipping containers containing hazardous materials shall be marked to comply with the requirements of the Hazardous Materials Regulations (HMR), United States Code of Federal Regulations Title 49 (CFR 49).
- 9.3.1. United Nations Performance Oriented Packaging (POP) tested containers shall bear the markings on the exterior of the container to show the level of performance tested per CFR 49.
- 9.4. \*\*Electrostatic Discharge Sensitive (ESDS) devices shall be marked on the unit and intermediate packages with the ESD cautionary (attention) label per the requirements of MIL-STD-129.
- 9.5. \*\*Supplier reusable shipping containers, that are to be returned to the supplier, shall conform to the following minimum marking requirements:
- 9.5.1. \*\*The supplier's container part number and "REUSABLE CONTAINER" shall be marked or labeled on an exterior surface of the container.
  - 9.5.2. The only acceptable markings will be those that are applicable to the current shipment. All old labels and markings, those which no longer apply, shall be removed, obliterated, or obscured {i.e. EMPTY labels, "BOX \_ of \_" markings, UPS labels, etc.}
    - 9.5.2.1. UN POP Markings are exempted and shall remain on the container.
10. PACKAGING DOCUMENTATION REQUIREMENTS
- 10.1. The following documentation is required to be provided through the SPDMS portal to the Buyer at the beginning of a new contract, as new revisions/updates are issued and/or upon request by Buyer:
  - 10.2. Hazardous Materials Documentation:
    - 10.2.1. Suppliers of assemblies containing explosives must provide classification documents of explosives. These may include but are not limited to the following applicable documents:
      - 10.2.1.1. Department of Transportation Competent Approval Authority
      - 10.2.1.2. Competent Approval Authority/Classification of Explosives
        - 10.2.1.2.1. \*\*Shall contain the assigned EX-Number (by definition is the Final Hazard Classification - FHC).
      - 10.2.1.3. Department of Defense issued Interim Hazard Classification (IHC) letter
      - 10.2.1.4. Net Explosive Weight (NEW)
      - 10.2.1.5. Chemical Composition/Technical Name (only required for items with a Proper Shipping Name containing "n.o.s.")
    - 10.2.2. Suppliers shall provide Buyer Packaging Engineering Department a copy of the United Nations Performance Oriented Packaging (POP) test report for supplier built/supplied containers required to ship a regulated hazardous material.

10.2.3.A Department of Transportation Special Permit letter or Department of Defense Certificate of Equivalency shall be provided for pressurized gas bottles.

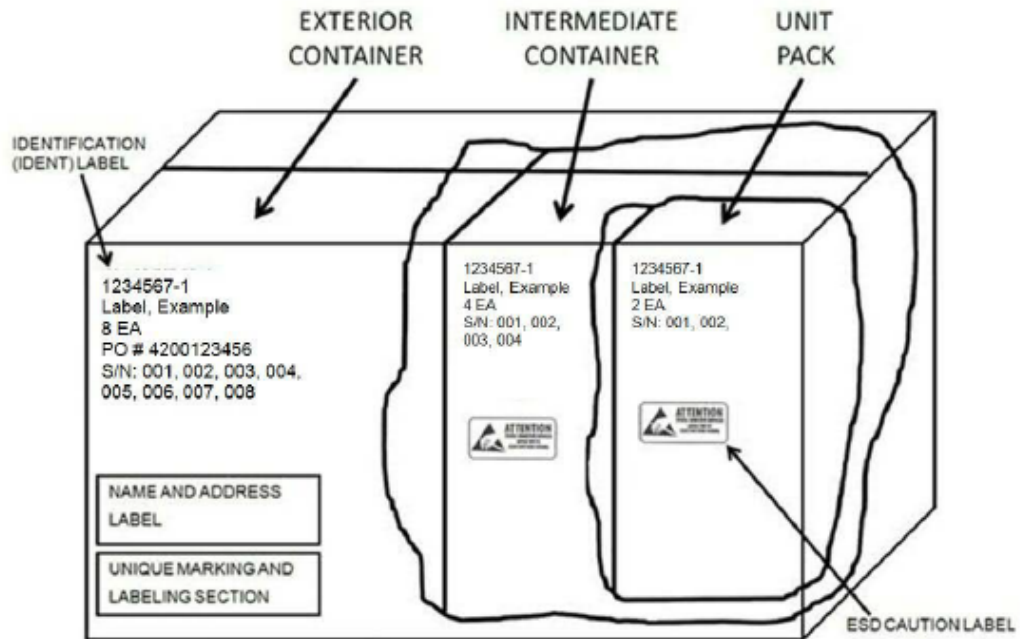
10.3. Reusable Container/Return-to-Vendor Shipments

10.3.1.\*\*Reusable Containers – Suppliers which have established a reusable container program with Buyer shall provide Buyer Packaging Engineering Department packaging instructions and any relevant documentation to establish common packaging practices for that container’s use.

10.3.1.1.Container material selection may require approval prior to implementation of the reusable container to ensure it meets the receiving factory requirements.

10.3.2.Return-to-Vendor Shipments – Suppliers shall provide Buyer Packaging Engineering Department container part number, packaging instructions and any additional supporting information if a Supplier’s container is required to be used for return-to-vendor shipments.

\*\*FIGURE 1:



Serial Number Marking Example: Unit, Intermediate, and Exterior Shipping Containers