



PACKAGING SPECIFICATIONS

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FORWARD

The goal of this publication is to achieve quality packaging systems that will increase productivity and competitiveness, and minimize packaging costs through a cooperative effort between our suppliers and EMP.

Questions relative to the interpretation and recommendations for future issues of these guidelines should be directed to the EMP Purchasing Department or your plant level materials contact.

1.0 INTRODUCTION

The following are basic requirements that each supplier must adhere to in developing expendable packaging, returnable containers and identification. The goal of the manual is to inform suppliers of the general guidelines required to reach our goal of optimum part quality. With the cooperation of all parties, we can continually make productivity improvements, increase our competitiveness and minimize packaging costs.

Non conformance to this specification can and will lead to re-handling , repacking and /or any other miscellaneous nonconformance costs being charged back to the supplier at the discretion of EMP.

2.0 PACKAGING DATA

New suppliers shall be furnished a copy of this booklet by Purchasing to apprise them of EMP basic packaging and shipping requirements.

The supplier is to describe in detail the projected method of packaging and shipping the part or material, or an alternate package when using returnable containers. If at that time, exact quantities, weights, packaging costs per piece, or dimensions, etc. are not available, the supplier must provide his/her best possible estimate. Please see form Appendix A. On an exception basis, the buyer may request more complete packing data by requesting the supplier to furnish information in sufficient detail to permit evaluation of the packing and shipping method. The buyer will receive concurrence on acceptance of the packing and shipping method from the plant level Materials Department.

Once a packing and shipping method has been established, any change in the packing must have approval from the buyer in concurrence with plant level Materials Department.

3.0 GENERAL REQUIREMENTS

This portion of the guidelines covers basic requirements to be used in developing packaging for all production and service, and MRO material.

It is the supplier's responsibility to insure that their products and pack arrive at our facilities within part specification limits and can be handled by EMP in the most economical manner. We encourage supplier initiated packaging improvements and strongly recommend that suppliers visit EMP prior to submitting their bid.

The shipping system must be designed to accomplish many goals. It must contain and protect service and production parts, ease of economical packing and unpacking, and maximize the number of parts per selected container. Generally, the layout of aisles, storage, and work areas is based on standard size containers, pallets, and racks.

The overriding requirement of the package is to protect and preserve the contents from transportation and handling damage. In addition the package should:

1. Provide for ease of handling and shipping of materials.
2. Be cost effective.
3. Keep the parts clean, corrosion free and ready for assembly or machining. For service, parts should be preserved for long term storage.
4. Reduce waste and increase efficiency and part quality by aiding in EMP's manufacturing process.
5. Develop standard primary and secondary pack quantities. Part schedules will be generated in multiples of primary pack quantities.
6. Orient parts in the pack to make them easily handled at the assembly line.
7. All material must be palletized to permit handling with industrial trucks when sufficient parts are shipped. One full layer of cartons is sufficient volume to require parts to be palletized.
8. All containers must be secured to pallets. Securement can be non-metallic strapping (at least two bands lengthwise and two bands widthwise) or by stretch or shrink film.

These functions are considered the normal view of industrial packaging in the world marketplace. These Packaging Specifications are designed to eliminate double handling and to develop an environment that is most cost effective for all concerned.

4.0 PACKAGING REQUIREMENTS

4.1 Package Design

All part quotations are to assume expendable packaging. The supplier is responsible for the design of this packaging.

4.2 Part Cleanliness and Protection:

All parts will be clean prior to packaging. Cleanliness of the part is not to be degraded by any of the packaging materials used to pack and ship. All parts being packaged must be free of dirt, rust, scratches, etc.

When part shifting or rubbing will cause damage and/or entanglement of the part or package, separation is required. All fragile parts should be cushioned properly for protection from shock and vibration damage.

4.3 Part Protection

4.3.1 Surface Protection

1. Painted and/or machined gasket surfaces must be protected against rust, abrasions, nicks, scratches, dents, etc. Surface protection should be provided to any part which requires the need, by using an approved protective material.

4.3.2 Package Closure Requirements

1. The package closure must maintain interior cleanliness and ensure that the contents remain intact during shipping and handling.
2. Package closure and construction shall permit access to the contents for inspection without destroying the usefulness of the container.
3. Preferred materials for closure of a carton is reinforced (non asphaltic) gummed tape or pressure sensitive tape, minimum width two (2) inches.

4.3.3 Protection of Parts, with consideration of eventual removal from the package:

1. Parts should be adequately protected for handling up to point of use.
2. Design package so parts may be removed without special maneuvering.
3. Construct packaging so it does not fall away from the part when the closure is removed.

4.3.4 Packaging Material for Electrostatic Discharge (ESD) Susceptible Items

Packaging materials used to supply electrostatic discharge (ESD) susceptible items to EMP shall conform to the requirements of the ESD Association Standard ANSI/ESD S541-2003 Packaging Materials for ESD Sensitive Items. This standard is available through the ESD Association at www.esda.org.

Specifically, packaging materials shall meet the requirements for transporting sensitive products outside of an ESD Protected Area (EPA). Materials must be low charge generating, dissipative when in intimate contact of ESD sensitive (ESDS) items and provide shielding capable of attenuating an electrostatic discharge when completely enclosing an ESDS item.

4.4 Safety:

All packaging must be free from handling hazards (protruding nails, loose banding, staples, etc.) Staples are permissible if their removal is **not** required to open the package.

5.0 HANDLING AND SHIPPING REQUIREMENTS:

5.1 Manually Handled Packages:

The design of the container shall fall within the action limits as defined by the National Institute for Occupational Safety.

The gross weight of any one package shall not exceed 40 pounds. The unsupported bottom of a carton must be able to hold the contents within the carton.

1. Cartons must be constructed of fiberboard having a minimum bursting strength of 275 psi (pounds per square inch), or e.c.t. (edge crush test) unless a pre-shipment test indicates a lower strength material will perform satisfactorily.
2. Hand holes are desirable for bulky packages.

5.2 Mechanically Handled Packages:

Any part(s) or component part(s) weighing 45 pounds or more **must** be palletized.

Note: Drums and barrels will also be included in this classification. NO drums or barrels may be used as shipping containers for production parts. Oils and chemicals apply only.

5.3 Palletization:

Note: Suppliers should minimize the use of internal dunnage without being detrimental to the parts being shipped.

5.3.1 Palletized Materials

1. **Corrugated Unit Loads-** Cartons, trays, pieces, etc. stacked in layers on a pallet to form a unitized, uniformly dimensioned load. Some loads may require plywood or corrugated separators between layers and on top.
2. **Corrugated Pallet Box-** One large, single carton attached to a pallet.
3. **Palletized Bulk Loads-** large, bulky parts not in containers, nested or individually stacked on a pallet.
4. **Miscellaneous Palletized Corrugated Cartons-** Several individual cartons on a pallet (not uniformly dimensioned).
5. **Miscellaneous Pallet Loads-** Drums, barrels, single metal containers or trays on pallets (oils, chemicals, bulk liquids only).

5.3.2 Palletized Specifications

1. Any pallet load that is leaning, bulging, unstable or over hanging will not be acceptable.
2. Suppliers may **not reuse** any expendable packaging materials previously used in other shipments, unless approved by EMP.
3. All pallet loads must be adequately banded or secured to prevent shifting in handling and transportation.
4. All palletized loads should only contain one part number per load, unless the load is marked "Mixed Load". A Mixed Load is acceptable ONLY when:
 - I. Multiple part numbers are required to be shipped in which the individual parts have a release quantity that is less than one layer on a pallet. However, no part number will appear in more than one mixed pallet in one shipment.
 - II. All containers on the pallet are individually identified with a bar code label along with a "Mixed Load" label in bold 1.0" (25.4 mm) or larger letters, attached in a noticeable location.
 - III. Individual part numbers are sorted on the pallet with all labels easily readable on the pallet without need to break down pallet.
 - IV. Packing list is broken down on a pallet level basis for part quantity checking purposes on our Receiving Dock.

5. Shrink or Stretch Wrap is acceptable.
6. Metallic or non-metallic banding is acceptable.
7. Maximum weight per pallet should not exceed 4000 pounds.
8. Broken or cracked pallets are not acceptable.
9. Top surfaces of pallets should be flat to permit stacking.
10. See Section 9.0 "Pallets" for detailed description of pallet sizes, construction, etc.
11. Returnable Packaging Materials- Supplier owned.

Note: Supplier must have authorization from the buyer before any returnable items are used.

EMP has put great emphasis on standardization of receiving, transporting and storage of all incoming materials. As a result of this, many suppliers can obtain the benefits of working with EMP in a "returnable container program." All applications should be discussed with EMP before proceeding. A reusable item is defined as specific packaging material having indefinite life due to design, material or application. Suppliers are urged to consider the reuse potential of each packaging item during package development, and discuss this potential with EMP. Proper application of a returnable container program by shipper and receiver can result in important economic benefits for both the supplier and EMP.

5.3.3 Expendable Packages

The design objective for an expendable package must be to protect the part until removal from the package. This means durability to withstand handling in transit, as well as allowing for multi-tiered storage.

An expendable shipping system is any container or container system having a life expectancy of only one half loop i.e. normal shipment from supplier to customer.

This method of packaging is designed for one use only; it is often the most convenient method but is not always the most practical or economical method. Expendables do not require control or return.

5.3.4 Restricted Packages

Bags and Bales- Granular and other materials packed in bags or bales will be palletized.

Bundles- Where palletizing would prove excessively costly or where product configuration prohibits palletization, material may be shipped in bundles. This applies to such items as: tubes, rods, sheet metal and steel, etc.

Barrels and Drums- Bulk liquid or granular materials shipped in barrels or drums will be palletized.

5.3.5 Special Handling Requirements

Emergency Shipments- It is mandatory that packing limitations for air freight, air, and parcel delivery be observed and the supplier will be responsible for compliance. The supplier will also be responsible for providing additional protection on emergency packs to offset the excessive handling that usually occurs in this type of transportation and handling cycle.

6.0 IDENTIFICATION OF INCOMING MATERIAL

Incoming material is to be identified by the supplier with an identification label (HAND WRITTEN INFORMATION IS NOT ACCEPTABLE). Hazardous materials are to be packaged in accordance with relevant U.S., State, and local regulations.

6.1 Labeling Requirements:

All shipments are required to be easily and quickly identified. Each label should be placed on each individual shipping container. This label should contain at a minimum EMP's part number, part description, the quantity contained, and the vendor's lot number where applicable, or date of manufacture.

6.2 Miscellaneous

Banding shall not cover the identification markings on incoming palletized loads.

Hand lettering will **not** be acceptable without prior approval from EMP. In the event hand lettering is approved, it will only be temporary in order to avoid delays in shipment.

7.0 LABEL LOCATION AND PROTECTION

7.1 Label Location

Labels should be located either on two adjacent sides or on the largest side of the box that is still less than 11.5in.

8.0 SPECIAL LABELS

While these specifications will cover most situations, there will be circumstances where requirements will dictate special arrangements between customers and suppliers. Every effort to minimize these situations should be a goal of all so that complexities and costs are not added. Supplier and customer will work together for any special circumstances not covered in these standards. (i.e. Multiple, common item packs, mixed item loads, returnable material labeling, line delivery locations)

9.0 PALLETS

9.1 Size

Maximum pallet dimensions shall be 48" long x 45" wide with a maximum fork entry opening of 3-1/2" and minimum of 9" wide, to allow entry of standard lift truck or hand truck forks. The centerlines of each fork entry openings should be 16" to 24" apart. Pallet load(s) should meet the ideal height requirement of 32" including pallet. Parts that cannot conform to this height restriction will be addressed individually.

9.2 Material and Construction

Construction should meet the minimum requirements for the load handled. All material used in pallet construction shall be sound lumber in accordance with the National Wood Pallet and Container Association's pallet specification.

The smallest possible load size for a particular commodity should be used at all times based on the current part volume requirements.

9.3 Weight Requirements

Pallet shall support load of material with a minimum of 45 pounds to the maximum of 2285 pounds straight weight.

10.0 RETURNABLE CONTAINER / RACK PROGRAMS

"Returnable" pertains to either supplier owned or EMP owned containers such as wood knockdown crates, plastic or metal bins, pallets, racks, trays, separators, and/ or loose components.

In order to use EMP owned returnable containers an analysis must be performed to determine economic justification. The analysis compares cost of returnable container, inbound and return freight, all handling costs, disposal costs, and part piece price reduction savings.

10.1 Standard Containers

Many parts can be shipped in standard containers which are available and require little or no modification. Some examples include plastic modular boxes, collapsible plastic pallet boxes, and steel racks and wire baskets. The 45" x 48" and 30" x 32" footprint are the standard bases used for manufacturing and assembly operations. Height requirements are dictated by the process.

10.2 Unique Containers

Many times, parts require unique or specialized packaging design due to part characteristics, automated handling, ergonomics, etc. Special characteristics include part geometry, fragility, cleanliness, and etc. requirements.

Specialized packaging can be constructed from various materials which are dependent upon the part. Common examples include plastic trays and pallets, specialized dunnage, and tubular steel racks or combinations of.

10.3 Economics

EMP strives to receive packaged parts utilizing the most economical method possible.

Economic factors that influence the use to returnable packaging include material selection, quality, labor, freight, cleaning, disposal, recycling, and tooling costs.

10.4 Supplier Responsibilities

All supplier owned returnable containers must be clearly identified as such and must have the supplier name and "return to" address permanently stenciled to dunnage.

Container cleanliness shall be maintained by the part supplier. Part contamination due to wet or dirty returnable containers shall be the sole responsibility of the part supplier.

EMP owned returnable containers are provided for the sole purpose of protecting parts in transit to EMP and the handling of parts at EMP. Part suppliers shall refrain from using the containers in their process or otherwise mishandling the containers without written approval by EMP. Only goods ready for delivery may be packed in EMP packaging material, not to be used for storage or work in process.

Returnable packaging must be cleaned of all old shipping labels by supplier to insure that current part numbers and quantity of material are correct.

10.5 Container Maintenance

Maintenance cost procedures for returnable systems will be handled on an individual supplier/customer basis. EMP will be responsible for the maintenance and replacement costs of EMP owned containers and purchases of new containers for volume increases and/or replacements.

10.6 Annual Inventory

Once a year, EMP may ask for an inventory of how much EMP packaging material is currently on hand at the supplier.

Additional inventories may also be requested should the need arise, usually on an individual basis.

After each annual inventory, the result of the inventory is compared with your closing balance. If it becomes apparent that packaging materials is missing without just cause, an explanation for the discrepancy will be required as soon as possible. If no explanation is available the supplier will be held responsible for the missing containers.

11.0 EXPENABLE CONTAINER SYSTEMS

This portion of the guidelines is to be used in developing expendable packaging for production parts.

Although it is the responsibility of the suppliers to develop packaging design for their products, EMP is interested in obtaining the most economical packaging, transportation, and handling costs, while ensuring part protection and quality.

11.1 Pallet Size

Maximum overall load size shall not exceed 48" L x 45" W x 45" H.

11.2 Special Considerations

In some instances, unique part configurations will require pallet sizes which vary from the standard dimensions previously indicated. Parts may have unique characteristics such as fragility, cleanliness, or part design that require consideration in package design.

11.3 Determination of Packaging Method

The determination of the type of package is the supplier's responsibility. You must ensure that the parts and all packages of all shipments are received in acceptable (damage free) condition, and are efficiently and economically packaged for the method of transportation and type of handling planned. Once the packaging is decided upon the supplier will seek approval of the EMP buyer.

11.4 Selection of Method

Generally, selection of the method of packaging will depend upon the specific part or material, the method of transportation and the method of handling required by the receiver. However, certain basic factors deserve consideration. Release quantities, when available, should be reviewed by both supplier and EMP so that the package can be designed to contain increments of the release quantity, if possible. Packages which are hand handled are subject to rougher handling than those handled mechanically, and consequently require more protection.

Other factors of equal importance that must receive due consideration are the packaging costs. In finalizing the design, the following cost factors must be considered:

1. Handling Labor
2. Handling equipment
3. Transportation costs
4. Packaging
5. Floor space
6. Direct Labor
7. Housekeeping

The use of Styrofoam popcorn as a cushioning device is unacceptable for housekeeping purposes.

Expendable packaging shall be designed to keep the overall dunnage down to a minimum for disposal and housekeeping reasons.

12.0 FASTENER AND SMALL PARTS PACKAGING

12.1 Container Size and Weight

All containers should have one side of less than 11.5in in width in order to fit into standard gravity flow racks.

The maximum gross weight of any individual item container shall be limited to **45** pounds.

Container should insure the fasteners are adequately protected from damage and spillage.

Only **one** item part number will be packed per container.

13.0 BULK LIQUIDS AND POWDERS

All shipments of bulk liquids, paints and powders shall comply with all federal, state, and local laws and regulations.

14.0 HAZARDOUS MATERIALS

The packaging of hazardous materials must follow relevant regulations of the U.S. and Canadian Departments of Transportation, which prescribe the proper method of classification, packaging, marking and labeling of each shipment. Furthermore, where other federal, state, provincial or local standards and/or regulations are in effect, the packaging and labeling must comply.

15.0 PACKAGING FROM OVERSEAS SOURCES

It is required that the pallets used for overseas shipments conform to ISPM-15 regulations.

Oversea suppliers must adhere to all sections of this specification where applicable.

16.0 FREIGHT LOSS OR DAMAGE

In the case where potential damage to material has occurred in transit, a receiving report shall be filled out by the Receiving Dock Personnel and distributed according to company policy. After EMP has determined fault the supplier/carrier shall be notified and if necessary money lost to damages shall be charged back to the supplier/carrier responsible.

17.0 RUST INHIBITORS

All parts supplied should have a rust free shelf life of six months or longer. Higher volume mass production components may be used within a matter of days after leaving the supplier's dock. Lower volume service type components and material supplied by overseas sources may not be used for much longer periods and these suppliers should pay much closer attention to the type of rust inhibitor used.

In general, volatile corrosion inhibitors (VCI) rust proofing methods and materials are preferred over the use of oil based rust inhibitors for cleanliness reasons. This form of preservation is a group of chemicals that evolve vapors which protect metal surfaces from corrosive substances in the atmosphere. The layering of VCI papers (where applicable) in the load is preferred over individual wrapping of parts for labor and cost reasons.

Suppliers should refer to EMP's rust-proofing specifications below for how to protect each type of component supplied to EMP.

1. Scope

This specification applies to all metallic purchased parts, both rough and purchased complete.

2. General

Parts must be free of rust/corrosion as received and be inhibited to same resulting from condensation due to changing atmospheric conditions for a period of 180 days in EMP's parts storage area.

Rust/Corrosion is defined as oxidation that is readily discernible with the naked eye under normal lighting, existing on the exposed surface and internal passageways of metallic materials in either machine or un-machined areas.

3. Categories of Parts

It is the intent of EMP to be able to use component parts "as received". This requires the parts to be clean and inhibited to rust/corrosion with products compatible with EMP internal machining and assembly processes. Purchased metallic parts have therefore been divided into five general categories:

- I. Purchased complete parts- internal to the engine.
- II. Purchased complete parts- external to the engine.
- III. Purchased rough parts that will be machined in-house.
- IV. Direct ship service parts for short-term storage.
- V. Direct ship service parts for long-term storage.

Type A parts will require a rust inhibitor that is compatible with engine fluids and the various non-metallic components used in our engine: i.e., seals, gaskets, gasket eliminators. These inhibitors may be wet or dry as defined below in Section IV.

Type B parts will require a rust inhibitor that can be readily painted over.

Type C parts will require a coolant soluble inhibitor that will be flushed off during the normal machining process.

Type D parts will require rust/corrosion protection against seasonal temperature and humidity fluctuations during transportation to our facility and for a minimum of six months indoor storage.

Type E parts will require rust/corrosion protection as stated for Type D parts but for an indoor storage period of 1,000 days.

4. List of suggested types of commercially available products.

I. For Type A parts:

1. Dry Type

- a) Industrial Cleaner #809- Product-Sol, Inc.
- b) II. Benchmark F-145 -- Benchmark, Inc.
- c) III. Daubert 35D (VCI Paper) for completely wrapped parts- Daubert Chemical

2. Wet Type

- a) Ferro-Cote #1516MHF- Quaker Chemical Co.
- b) Ferro-Cote #5856 FM-BD- Quaker Chemical Co.

II. For Type B parts:

- a) Industrial Cleaner #809- Product-Sol, Inc.
- b) Benchmark F-145 -- Benchmark, Inc.
- c) Daubert 35D (VCI Paper) for completely wrapped parts- Daubert Chemical

III. For Type C parts:

- a) Industrial Cleaner #809- Product-Sol, Inc.
- b) Benchmark F-145 -- Benchmark, Inc.
- c) Daubert 35D (VCI Paper) for completely wrapped parts- Daubert Chemical
- d) Ferro-Cote #1516MHF- Quaker Chemical Co.
- e) Ferro-Cote #5856 FM-BD- Quaker Chemical Co.

IV. For Type D parts:

- a) Ferro-Cote #1516MHF- Quaker Chemical Co.
- b) Ferro-Cote #5856 FM-BD- Quaker Chemical Co.
- c) Daubert 35D (VCI Paper) for completely wrapped parts- Daubert Chemical.

V. For Type E parts:

- a) Ferro-Cote #5856 FM-BD- Quaker Chemical Co.
- b) Tectyl 502C - Ashland Chemical Co.
- c) Safeguard Blue - Sanchem, Inc.

5. Process Changes

Process changes by a supplier are of major concern to EMP. Therefore, please notify the EMP Product Buyer, should you decide to change a process.