

**PACKAGING STANDARD
MFG – 300-001**



Procedure Maintenance and Review:

Owner	Manufacturing	Effective Date	Revision
Review and Approvals:	Quality	9/30/10	0

BC affected	<input type="checkbox"/> Edwardsville	<input type="checkbox"/> RJE	<input type="checkbox"/> Rockford	<input checked="" type="checkbox"/> Thomasville	<input checked="" type="checkbox"/> Waukesha
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1 SCOPE/PURPOSE

This document covers basic packaging practices for shipping product.

2 REFERENCE DOCUMENTS

2.1 n/a

3 DEFINITIONS

3.1 Fumigated wood – use specially treated wood for all shipments outside of US.

3.2 Short Term Storage - Typically less then 30 days

3.3 Long Term Storage - Typically greater then 30 days.

4 Responsibilities

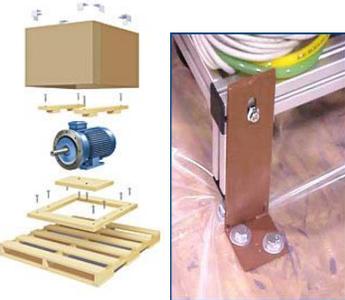
4.1 Shipping department: to conform to the requirements listed below.

4.2 Supplier: to conform to the requirements listed below.

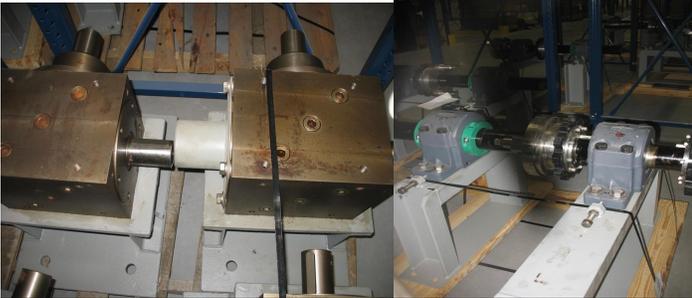
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5 PROCEDURE

5.1 The following are examples of packaging errors and what corrections should be made.

<p>Part extends below pallet. This part could be damaged by forklift. Part should be elevated so the part does not extend below pallet.</p>	
<p>Parts should be wrapped in plastic. Suggestion: wrapped parts could be nested into cardboard box.</p>	
<p>1. Pallets are not strong enough to carry weight. Use a new pallet or one with thicker boards</p> <p>2. Parts should be lag bolted to pallet</p> 	

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<ol style="list-style-type: none">1. Loose steel parts should be boxed or wrapped to protect from damage.2. All parts should be secured.3. Large assembly should be lag bolted/secured to box.	
<p>Parts should be individually wrapped or layers of protection material to separate individual parts</p> <p>Stainless steel parts should be separated from steel parts</p>	 
<p>Product should be secured to pallet with lag bolts</p>	
<p>Lag bolt parts to pallet</p>	

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<p>Pallet not strong enough to carry load.</p>	
<ol style="list-style-type: none">1. Boxes not strong enough2. shrink wrap should completely cover box to protect from weather3. triangles should be added to top of boxes to prevent other loads stacked on top	
<ol style="list-style-type: none">1. Block parts to prevent from moving2. Raise / support parts protruding below the pallet to prevent fork lift damage <p>3.</p>	

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1. Parts not secured or blocked to pallet, lag bolts
2. Use blocking to support part with sprocket
3. Larger part should be blocked and lag bolted to pallet.
4. Pallet is sturdy enough to hold the load



The scum pipe have cut outs, which if the cut out is placed on the blocking in-between the layers they lay flat and do not roll. Blocking should be placed on the sides of the scum pipe on a layer so they do not rub against one another. Enough blocking between layers should be used to support pipe.

The entire group should be banded together to prevent shifting. The trucker straps should not be the only thing holding parts together.



Proper end support



No support of end of unit, which give stress to unit.



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Good packaging. It protects return track, allows stacking to reduce square footage storage space.



Crating not strong enough to withstand side loading. Addition of cross bracing would help.



General Packaging guidelines:

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- Boxes for smaller parts need to be constructed using an adequately thick material to prevent any crushing damage to the contents. When the quantity and size of boxes allows, the boxes should be on a pallet and secured with shrink-wrap or by other appropriate means. Box contents must not exceed the gross weight capacity of the box. Most box manufacturers indicate the weight capacity on the bottom flap. If you are reusing a box, be sure that it is in good condition with all flaps intact, and that it is free of rips, punctures, and tears, and of old labels and markings.
- Larger product such as structural steel, are to be loaded and secured on trucks in such a manner as to prevent damage during the loading process as well as during transportation (such as affecting camber of a beam). The product must be adequately secured to the truck to ensure product does not fall off during the loading/unloading process or during transportation; however,
Trucking companies must be instructed not to add additional tie downs after the truck leaves the suppliers facility.
- To reduce the probability of damaging product, it is recommended to avoid stacking of structural material. If it is not possible to avoid stacking, devices such as dunnage, wood, plastic, rubber, or other material (that does not deteriorate during shipping) be used to protect the surface of the metal (especially if the product is painted).
- Loose parts for assemblies must meet the requirements listed above. Shipping loose parts in any shipment is not acceptable.
- Flex hoses require special crating to prevent shipment damage.

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Internal packaging – Protecting the contents

Just as important as how you contain the contents of your shipment is how you package them on the inside. You need to ensure that the contents of your shipment are properly protected. Use any combination of:

- Corrugated fiberboard
- Molded plastic materials
- Loose shredded paper
- Bubble wrap or bubble pack
- Plastic or foam "peanuts"

Use enough material (at least two to three inches on each side) to ensure that the contents of the shipment do not shift significantly during shipping. Also, wrap items individually to further protect them. If the package contains fragile items, be sure to write "FRAGILE" on the outside of the container

Shipping large or irregularly-shaped packages

To avoid possible damage, larger or irregular items should be packaged in crates, boxes or other secure containers with adequate cushioning. Waybills and other paperwork should be securely attached to the flattest surface of the package. Ensure that all sharp or protruding edges are covered for protection.

Aspects of Proper Packaging

Packaging must be strong enough to withstand loading and unloading, processes that happen many times between original shipment and final destination. Proper packing requires blocking and bracing, the process of providing physical and mechanical protection that mitigates the free movement of shipped items.

Palletizing

A pallet is nothing more than a platform that something can be strapped to and moved with a fork-lift or pallet jack. The most common size pallet is 48(L) x 40(W), but there are plenty of different size pallets to use. The idea is to make sure the item is not hanging over the sides of the pallet, and not higher than 8 feet. Also, the freight needs to be fastened to the pallet without blocking area where forklift enters pallet. With more delicate items, it is a good idea to wrap pallet with cardboard for added protection.

- Pallets should be large enough to accommodate the shipments without overhang
- Pallets should be large enough to accommodate the shipments without overhang. Anything overhanging the pallet edges will be subject to impacts that can result in punctures, abrasions and compression damage.
- Pallets with broken or missing parts must not be used.
- Any fasteners that protrude must be removed or re-secured so they are flush or below the surface before loading packages on the pallet.
- Spacing between the deck boards should be as narrow as possible to ensure the corners of corrugated boxes are supported and not aligned over the gaps and to prevent forklift damage from below.
- Know the rated capacity of your pallet and never exceed it.
- Pallets or other forkable bases are required on any shipment with a floor-bearing load of more than 100 pounds per square foot.
- Bottom deck boards should always be used. They increase the strength and integrity of the pallet and can help stabilize the load during handling operations.

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Crating

A crate could be made of wood, metal, or plastic, and has sides and a top. Many crates are built by using a pallet as the base for the crate; this is probably the easiest way to make a crate. The most important thing to remember when making your own crate is to make sure the crate can be moved by fork-lift or pallet jack. Properly size the crate to the load. The more air (such as the crate is 2 times larger than the part) the more it will cost to ship the product.



Cardboard box

Although this way of packaging is acceptable for shipping, it is not very safe. This would be considered the minimal amount of protection given. The entire item needs to be enclosed in heavy duty cardboard or the freight carriers will not even pick it up.

Remember, packaging your freight is to help eliminate the potential for damage, not to make it harder for you to ship. Shipping freight on an LTL (*less than a load*) truck is not like putting something on a moving truck; it does not remain on one truck the whole way. From the time your freight is picked up it will be moved onto a minimum of two trailers, with a potential of being on as many as six or seven throughout transit. With all this loading and unloading, there are many opportunities for incurring damage.

Hazards of Distribution

The most common hazards present in packaging. These are “normal” hazards of distribution and therefore must always be considered when preparing your shipment.

Punctures and Abrasion: Occurs when the package shifts or comes in contact with other packages or material handling equipment during sorting and other shipping operations. They can also be the result of improper or insufficient internal packaging that does not prevent the contents from shifting, resulting in the product being damaged or the package failing to contain the product.

Compression: Occurs when external forces are applied to the sides, faces or corners of a package. Stacking, shock, vibration, material handling equipment and tie-down straps all generate compression forces that may result in package or product damage. Proper packaging offers the necessary level of protection against these forces.

Environmental exposures: High and low atmospheric pressures are not restricted to air transit and can have a dramatic effect on some products or packages. High and low humidity can result in condensation or corrosion, and it can greatly reduce the stiffness and compression resistance of paper-based products. Temperature extremes globally can range from -80° F to +160° F and can dramatically affect the performance characteristics of packaging material. Other common environmental exposures include, but are not limited to, dirt, dust, odors and precipitation. If a product or package would be considered damaged if exposed to these hazards, then the shipper must take extra measures to ensure the package can protect the shipment from these known hazards.

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Shipment Handling: Proper cushioning can reduce damage caused by the shock incurred during shipment handling. It is important to note that your shipment will most likely be handled with a forklift at some point during distribution. Proper packaging must be able to protect the contents from the drops and impacts commonly associated with handling operations.

Shock: Occurs during handling and transportation as a result of impacts with forklifts, racks, containers, floors and other shipments. Proper cushioning can reduce damage caused by shock. Most products will require some level of shock protection to prevent damage during normal distribution.

Vibration: Occurs in transport vehicles like trucks, planes or ships and on virtually anything else that moves, such as forklifts or conveyor belts. Proper cushioning can absorb and reduce the negative effects vibration can have on your product

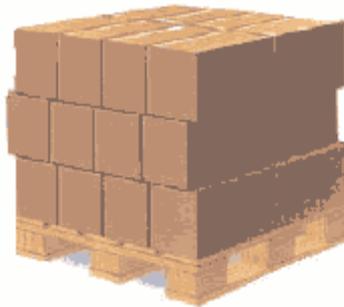
Sealing Corrugated Fiberboard Boxes: Another common problem occurs when the boxes are closed and sealed. Glue, staples, tape or strapping can be used as closures. Tape is the most common closure used by our customers, and improper application is the leading cause for closure failure. Taping a CFB to contain the product and improve the integrity of the package is easy if you follow these steps:

- Use a quality packaging tape specifically designed for box sealing. Non-packaging tapes such as masking tape, duct tape, cellophane and other such tapes should not be used as a substitute for quality box sealing tape
- Completely seal all flaps, top and bottom. One strip where the flaps meet is seldom adequate.
- Rub the entire tape surface to ensure contact and adhesion.

Cardboard strength guidelines:

Maximum Weight of Contents (LBS)	Size Limit of Box (inches)	Bursting test in pounds per square inch	Edge crush in Pounds per Inch Width	Maximum Weight of Contents (LBS)	Size Limit of Box (inches)	Bursting test in pounds per square inch	Edge crush in Pounds per Inch Width
30	75	200	32	60	85	200	48
40	75	200	40	80	95	275	51
50	85	250	44	100	105	350	61
65	95	275	55	120	110	400	71
80	105	350	N/A	140	115	500	82
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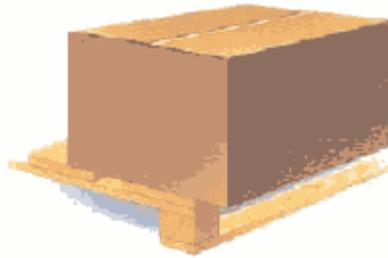
Misaligned



Misaligning cartons can reduce the boxes' compression strength by as much as 30 percent.

Overhanging

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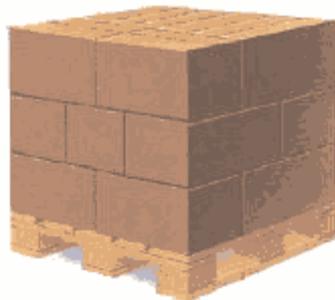
Cartons that overhang the pallet edge can have their compression strength reduced by as much as 32 percent. Overhang also exposes the packages to tears, punctures and impacts during normal handling and sorting operations.

Column Stack



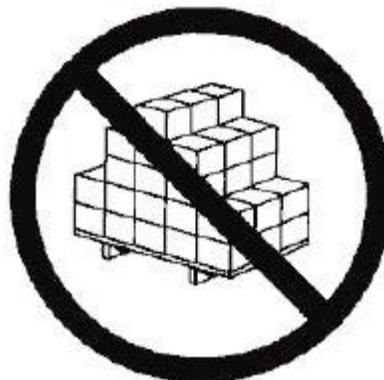
A common misconception is that interlocking cartons on a pallet is a good practice. In all cases but one, this can reduce the carton's top-to-bottom compression strength up to 50 percent. Therefore, column-stacked loads on pallets are the recommended method.

Interlocking Stack



The exception to the interlocking rule would be if the items inside the cartons were rigid, such as pails of paint. Interlocking these type of cartons will result in a more stable load. Stack boxes in columns, corner-to-corner and edge-to-edge for the greatest stacking strength.

Pyramid-Shaped Loads



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Pyramid-shaped pallet loads are one of the biggest packaging problems confronting the transportation industry. Since pyramid pallet loads don't provide a level surface, the top cartons are exposed to potential damage from other shipments. A level surface will provide maximum strength and stability, and ensures that the load, to the extent practicable, will remain intact. Pyramid-shaped loads also have the potential for costing more to ship because transportation costs are based on the greater of the actual weight or the dimensional weight. In addition, pyramid-shaped pallet loads are subject to being broken down and/or delayed in transit.

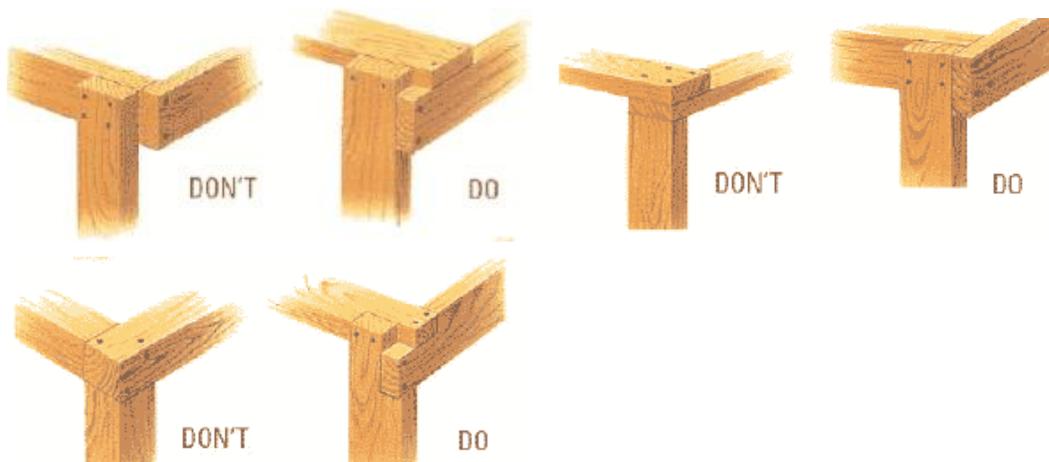
Wood Packages

Crating your shipment can help protect the product and allow for safe, damage-free transit if it is done properly using quality lumber.

- Always use interlocking corners when building crates.
- Do not locate fasteners in the end grain of wood, especially plywood. A fastener's resistance to pullout can be reduced by 35 percent when located in end grain rather than in the side or edge grain of a board.
- Use plywood not Oriented Strand Board (OSB), Medium Density Fiberboard (MDF) or Particleboard. Experience has shown these materials do not withstand the normal rigors of transportation as well as plywood.
- Knots cannot be larger than one-third of the surface they appear in. For example, a 3"-wide board should not have a knot that occupies more than 1" of space across the width of the board.
- Fasteners should not be located in knots or other defective areas of the wood.
- Use diagonal braces on each panel to increase the strength and integrity of the crate.

Corners and Diagonal Braces

Diagonal braces have a dramatic effect on the strength of a crate. The graphics below illustrate the relative strength of four different designs. It is not the amount of wood used as much as how the wood is used.



Dunnage

Empty spaces in packages can greatly reduce stacking strength, resulting in the package being crushed during normal handling, sorting and loading operations. Remember, stacking does occur and in many cases we cannot guarantee stacking will not occur. Empty spaces can sometimes allow the contents to move freely causing damage to the product and package. Properly block and brace product with dunnage to prevent movement inside the package.

We also highly recommend all voids be filled when shipping product in corrugated fiberboard boxes. Dunnage can be as simple as rolled-up newspaper and blocks of wood or as complex as custom designed corrugated wraps or molded foam. The main function of dunnage is to block or brace the product and prevent it from shifting during transit. In some cases dunnage may also offer some cushioning protection, but that is not its main function. Selecting the appropriate dunnage material will depend on a variety of factors including, but not limited to, the strength of the outer box, the internal

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cushioning material, the size of the voids and the fragility of the product or products being packaged. Remember, in-transit boxes can be stacked up to 8' high in trailers, and sometimes more than 100 pounds per square foot of downward force can be applied, even in short stacks.

Wrong



Picture A



Picture B

Picture A the parts would sink to the bottom of the box, Picture B, the parts would move and would break the box,

The package at right contains steel pins placed randomly into a box. The parts are not bundled together and the voids are left unfilled. Ideally the pins should be wrapped, taped or bagged to create a bundle. The box should then be filled halfway with dunnage and the bundled parts placed in the center. The rest of the package should then be filled with dunnage and all the box flaps sealed shut.

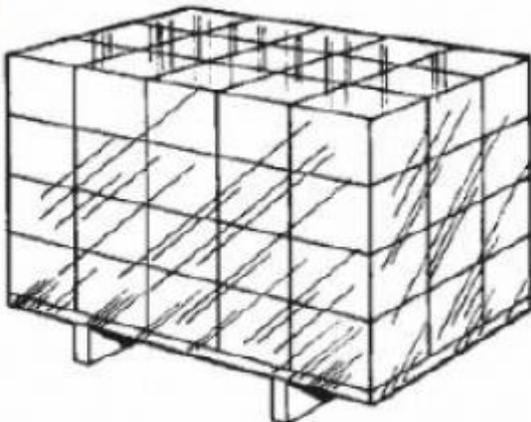
Correct

The package shows the product repacked correctly prior to the top flaps being sealed shut.



Stretch Wrapping

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Stretch wrapping is a common and effective method of keeping all pieces of a shipment together, increasing the chances of damage-free, on-time delivery. However, 70 percent of all wrapped shipments are incorrectly wrapped. The stretch wrap should first be applied around the pallet and continued around the load and upward. **Do not wrap only the cartons or load.** Stretch wrap is designed to stabilize the load, not secure it to the pallet, so strapping should be used in conjunction with stretch wrap to secure the load.

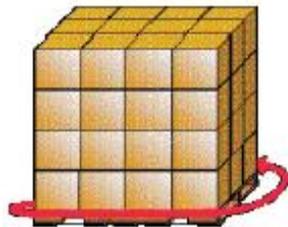
Applying Stretch Wrap

Stretch wrap is often applied incorrectly and, as a result, is incapable of keeping the packages tightly bundled during normal distribution, resulting in loss or damage. The method illustrated below works for most pallet loads.

Applying Stretch Wrap for Damage-Free Shipping

Step 1

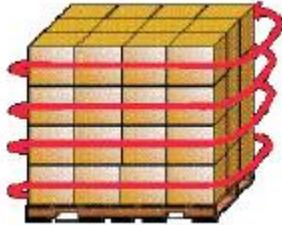
Tie the stretch wrap to the pallet and wrap the lower layer and pallet three to four times. The stretch wrap



must extend to the ground.

Step 2

Spiral up the pallet load overlapping the previous wrap by approximately 40 to 60 percent.



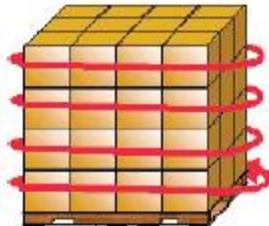
Step 3

Wrap top layer three to four times with half of the stretch wrap width extending above the top layer.



Step 4

Spiral down overlapping the previous wrap approximately 40 to 60 percent and tie it off at the pallet.



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Pipes and Similar Freight

Pipe shipments require special packaging before UPS Supply Chain Solutions can accept them for distribution. The method illustrated below works for most pallet loads.

Packaging Pipes and Other Similar Loads

These types of shipments will require special packaging to prevent the product from puncturing or damaging the aircraft, equipment or other shipments during flight, loading, unloading and sorting operations. Any shipment where the product(s) can telescope away from the rest of the load will require end protection. Examples include, but are not limited to, pipes, rods, tubing, antenna components, angle iron, steel or other heavy objects.

Bundle: Two or more articles bound together to form a single package or pack. Multiple bundles may also be combined to further unitize a load and ensure containment throughout distribution. This can be done with strapping or filament tape. Bundling increases the integrity of the load and can reduce loss and damage in the event the load becomes separated from the pallet during transportation and handling.

Pallet: A low portable platform of wood, plastic, metal, fiberboard or combinations thereof, that is elevated enough to allow for forklift access and aid in handling. The platform must elevate the entire load at least 6" from the ground. Long shipments will require a platform to run the entire length to allow for end blocking.

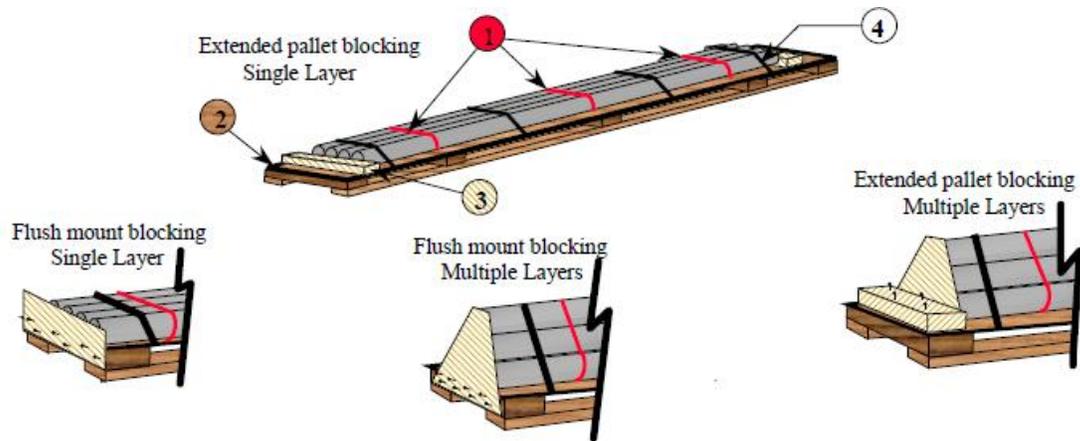
Blocking: To maintain product in a fixed position during transit, use bracing against the packaging to prevent the product from moving. The most common material used for blocking is wood. The blocking is fastened to the pallet to prevent the load from shifting and keep the individual pieces from telescoping out from the end of the shipment.

Securing: Use strapping material to secure the bundled load to the pallet. The strapping is designed to hold the shipment to the pallet and prevent it from coming out of the blocking.



- ① **Bundle:** Two or more articles bound together to form a single package or pack. Multiple bundles may also be combined to further unitize a load and ensure containment throughout distribution. This can be done with strapping or filament tape. Bundling increases the integrity of the load and can reduce loss and damage in the event the load becomes separated from the pallet during transportation and handling.
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- ③ **Blocking:** Materials used in packing and loading to maintain shipments in a fixed position during transit by bracing them against the shipment. The most common material used for blocking is wood. The blocking is fastened to the pallet to prevent the load from shifting and keep the individual pieces from telescoping out from the end of the shipment.
- ④ **Securing:** Use strapping material to secure the bundled load to the pallet. The strapping is designed to hold the shipment to the pallet and prevent it from coming out of the blocking.

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Banding

Banding should not be placed directly on metal surfaces. A layer of protection, such as cardboard, should be placed between the banding and the product.

- Metal banding should not be run directly under any pallet supports (boards that touch the ground) because the banding may break due to abrasion with the contact surface
- **Carbon metal banding should not be used with stainless steel**
- Metal or plastic banding is not adequate for securing heavy loads (such as a fabrication or drive reducer). The banding is only a supplementary device. Screws, lag bolts, etc. should be used as the primary method of securing a heavy load.

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PACKING INSTRUCTIONS FOR VALVES

All valves must be dispatched in total assembled form.

Valve Tag No's. shall be incorporated in all the dispatch documents

Each valve shall be cleaned and prepared and suitably protected in such a way so as to minimize the possibility of rust, damage and deterioration during transit and storage.

Discs of all valves shall be properly secured so that there is no risk of damage to the disc & seat.

Body ends shall be suitably sealed to protect them against damage during transit and storage.

Valves with screwed, socket welding and butt-welding ends shall be protected by means of polythene caps/rubber and cover protectors to prevent damage or contamination of foreign material entering the valve while shipment.

Proper care shall be taken to avoid damage to the painted surface during transit

All the valves shall be packed suitably in wooden cases in order to avoid damage during transit and also during storage at site.

Expandable Foam-In-Place methods may be used. However, valves with weight in excess of 50 lbs. may not be stacked in crates or boxes without being secured by wooden bracing and cross sectioning.

Special attention to the proper packing method shall be applied actuated valves

Neoprene or Cross Link foams may be used with smaller valves.

6 DOCUMENT RETENTION

DOCUMENT NUMBER	DOCUMENT NAME	DOCUMENT LOCATION	RETENTION TIME
	none		

7 CHANGE LOG

Revision Level	Description of change
0	Initial Release
1	Added outside storage