

# PRELOADING PREPARATION



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SECTION

3

## PRODUCT AND PACKAGING CONSIDERATIONS

### PACKAGES

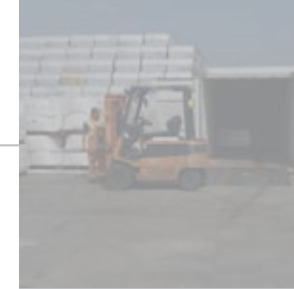
An important component of good load planning is the preparation of the packages prior to loading. This includes not only the packaging of the materials to be shipped, but the consolidation of those packages into larger units as well. Although packaging is beyond the scope of this Guide, it is worth noting that strict compliance with all applicable regulations governing the packaging of hazardous materials can greatly reduce the number and severity of incidents involving accidental release of those hazardous materials.

Some of the most serious and critical concerns involve the physical characteristics of a product. Each must be considered on its own merits when determining the packaging to be used, and how the packages will be stowed in the trailer or intermodal freight container. The compatibility of each product with the other products included in the same shipment, as well as any restrictions placed upon the coload of different hazardous materials with other hazardous materials, must also be carefully considered.

As this Guide has mentioned earlier, the loaded intermodal freight container can encounter many hazards during transport over land or aboard ship. If these dangers are not anticipated and dealt with while the shipment is being prepared, damage to the cargo, vehicle or intermodal freight container, terminal area, other intermodal containers or vehicles, and even the vessel may result.

It is important to verify that the packaging selected for use is approved for the material to be shipped, and that all of the required markings and labels have been applied to each package. A thorough inspection of the cargo before and during loading into the vehicle or intermodal freight container is a must.

Even if it has been determined that all packages comply with the applicable regulations, problems can arise if the shipper is not aware of precautions that may be needed for the particular types of packages being offered for shipment. These precautions may be based on a multitude of factors, including package integrity, amount of outage or ullage within the package, density of product (including the tendency of certain dry products to settle or “bulk down”), and unitization by palletizing – all of which are factors to be considered when planning a load.



## PACKAGES – SPECIAL CONSIDERATIONS

**Package Integrity** – It is important to consider the sturdiness of the packages when planning the load. Not all packages are built to withstand the same forces and therefore may require different bracing and securement methods. Compressed gas cylinders, closed-head, and heavy gauge drums, for example, are generally sturdier than combination packages containing glass, plastics or earthenware inner receptacles.

**Lading and Fill** – Nearly all packagings are designed and tested to contain a certain volume or weight of material. Packages that are overfilled or underfilled can lead to severe problems. Some common problems related to this are discussed below.

- **Steel Drums** – Changes in temperature during transport can cause changes in pressure and density of liquid products in steel drums. If the drums are overfilled leaving insufficient outage or ullage bulging of the drums and/or leakage could occur.
- **Fiber Drums** – A fiber drum designed to carry 200 Kg (440 Lbs.) of a product with a normal volumetric fill can fail with contents of only 100 Kg (220 Lbs.) of a low-density dry product which settles during transport, since this leaves a large empty space above the product. This condition greatly reduces available internal support against side impact, which, if it occurs, can distort

the drum and cause the lid to come off. This condition reduces the vertical stacking strength of the underfilled drums.

- **Plastic Drums** - Plastic drums rely on properly sealed closures and a full package to maintain their full stacking strength. Partially filled drums are more susceptible to fail under compression. The filling temperature of the product may affect the performance of the drum.
- **Plastic Packages** – Plastic packages tend to deform under load concentration. Any package of this type should be transported on full-surface pallets or skids, or should be floor-loaded. Uneven loading can cause partial collapse and/or toppling of the load. When such packages are stacked pallet design should support the load.
- **Bags** - Bags tend to settle and compact unevenly, leading to unstable unitized loads and/or uneven heights of the unitized load. Compacting and evening the bags prior to transport can help counteract this tendency.
- **Fiberboard Boxes** – When the outer packaging is constructed of corrugated fiberboard, it is important to remember that the strength of the fiberboard will vary with humidity and other factors such as temperature and time. The stacking strength available from the inner receptacles and other packaging materials (such as

partitions and pads) should be considered in the unitized load configuration.

- **Flexible Intermediate Bulk Container (FIBC) -**  
The securement of stacked loads requires special consideration to minimize or eliminate the possibility of shifting or toppling during transport.

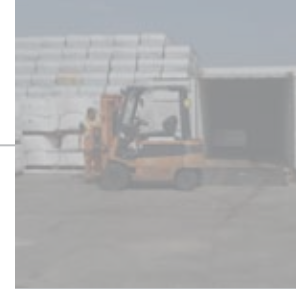


**FIGURE 3.1** Flexible IBC

- **Rigid IBC-** There are several designs and materials-of-construction for rigid IBCs (RIBC). The most common types usually consist of a combination of a polyethylene “bottle-in-a-box”, “bottle-in-a-cage”, or “bottle-in-a-can”. Other types may be constructed entirely of wood, rigid plastics, all metal, all metal with an inner liner, etc. While RIBCs can be easily stacked and secured, extra care must be taken if they are to be stacked in the vehicle or intermodal freight container. Stacking of RIBCs should be avoided.



**FIGURE 3.2** Rigid IBC



- **Gas Containers** – These containers, referred to in U.S. DOT Hazardous Materials Regulations as “Multi-unit Tank Car Tanks”, are used for gases such as Chlorine, Sulfur Dioxide and Refrigerant Gases. The tanks are cylindrical in shape, transported in a horizontal position and, as filled for shipment, can each weigh in the vicinity of 1590 Kg (3500 Lbs.). Since they are shipped in a horizontal position, they must be separately secured to prevent rolling within the vehicle or intermodal freight container, using floor-secured chocks or specially designed cradles, and must not be stowed more than one high. Also, since their lateral dimension does not extend to the full width of the vehicle or container, securement against lateral movement must also be considered.

## UNITIZING

In many cases, packages can be unitized for convenience, and to provide a measure of protection. The most common method—palletizing—is usually an economical method of unitizing, and offers advantages to the shipper, including:

**Reduced Package Damage** – Because a large number of small packages can be handled mechanically, the risk of damage during material handling is greatly reduced.

**Improved Security** – With unitized loads, the opportunity for pilfering and theft is reduced, and evidence of tampering is more easily detected.

**Greater Handling Efficiency** – Use of unitized loads speeds the loading and unloading of the vehicle or intermodal freight container, and lends itself to greater efficiency in securement.

### Key Types and Features:

**Strapped Loads** – This method is suitable for many types of packages, particularly those which are irregularly shaped (such as compressed gas cylinders). This method can be relatively expensive compared to other methods, and may, if packages are compressible, loosen and become unstable. While steel strapping is still widely used, plastic strapping is becoming the preferred choice of many shippers today. (For a discussion of Steel Strapping, see Section 2, Strapping and Webbing). Note that due to environmental and safety considerations, some customers and end users may insist on particular types of strapping.

**Plastic Strapping** – This type of strapping can be woven or non-woven, taking the form of flat extrusions or adhering strands. Strapping comes in a variety of widths and is widely available in nylon, polyester, rayon and polypropylene. It is most common use is in unitizing packages on a pallet or skid. Some materials have the limited ability to stretch under load. Properties and sizes of

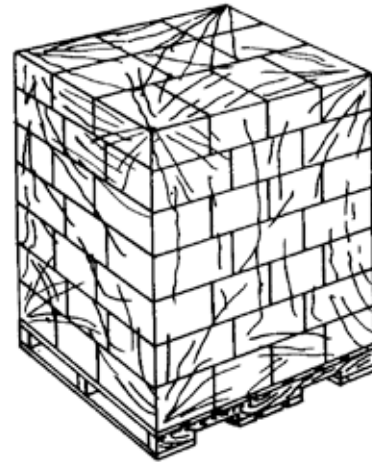
plastic strapping should be considered when deciding upon the most appropriate method.

**CAUTION:** The shipper may use lumber, plywood or another type of full-surface cap to assist in providing stacking protection. Loads that are subject to compression may also be supported with vertical framing, such as corner posts which provides the necessary additional stacking strength. When fiberboard packages are unitized, they should be interlocked to provide stability and strength to the unit.

**Stretch or Shrink Film Wrap** – This method is an excellent medium-cost system for many packages. It helps keep packages clean, and can provide some atmospheric protection. It is, however, not desirable where unsupported gaps exist between packages in the unit. Both wrap types require special application equipment. Shippers should note that if regulatory markings and labels on the packages cannot be seen through the wrap, it will be necessary to mark and label the outside of the unit.

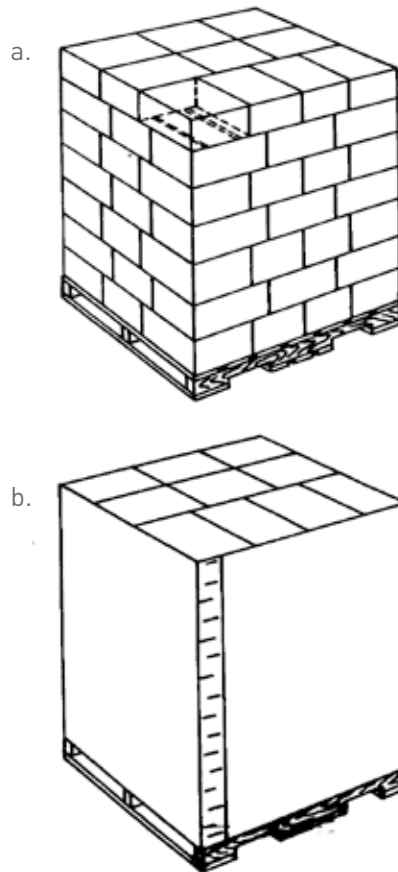
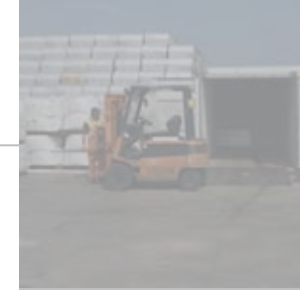
**Stabilized or Bonded Block** – Non-skid, low tensile adhesive is used to “tack” /stick bags or boxes to form a tight, strong load. This method is low-cost and effective; however, the adhesive may cause tears in the outer surfaces of fiberboard packages and multi-wall paper bags.

**Corrugated Fiberboard Sleeves** – These provide relatively low-cost unitization along with some cosmetic protection of packages and, subject to the caution regarding susceptibility to humidity, some stacking strength. Shippers must ensure compliance with regulations applicable to marking and labeling of the outer sleeve if this is the chosen method for unitizing the packages.



**FIGURE 3.3**

Pallet Load Utilizing one of the Stretch Wrap or Shrink-Wrap Films



**FIGURE 3.4  
& 3.5**

a. Spot Gluing of Containers. Double Dash  
Represents Glue Lines  
b. Corrugated Fiberboard Sleeves.

**Precautions Concerning Use** – There are three factors which must be first considered in using pallets. The first relates to requirements imposed by certain national governments, while the other two relate to pallet dimensions:

First, in choosing to use wooden pallets, the shipper should be aware that the agricultural authorities of most countries require compliance with the ISPM15 standard for solid wood packaging materials. This requires that the wood used for pallets and other packaging is first treated to ensure the ISPM15 requirements are met. Wooden pallets and any other wood used for load securement should meet the ISPM15 requirements. when exported from the U.S.

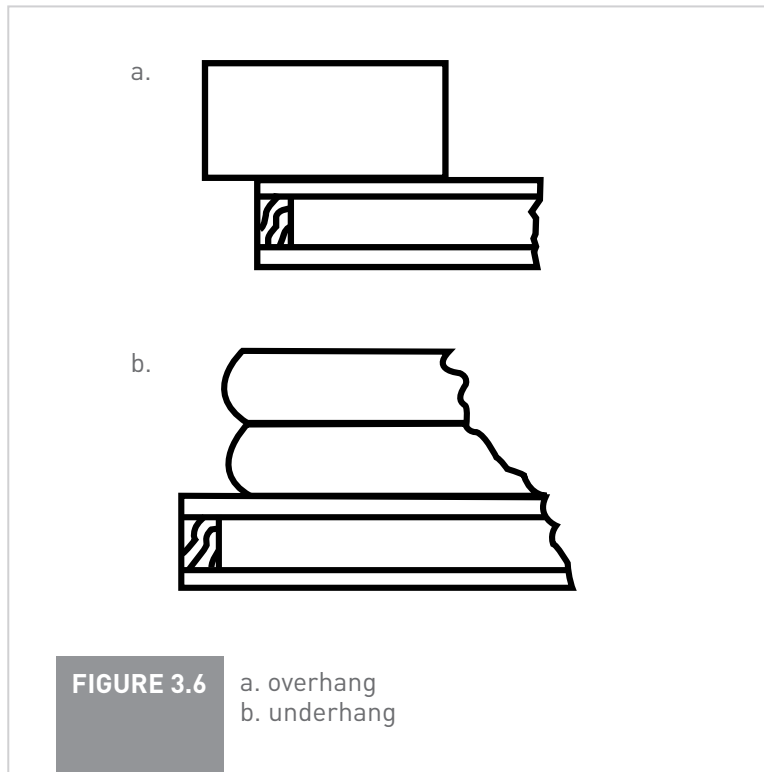
Second, the shipper must consider the interior dimensions of the vehicle when selecting a pallet size. The following recommended sizes are considered compatible with dimensions of most freight containers and over-the-road highway trailers. Note that the first dimension given is the stringer length of two-way pallets. The pallet designation is that which is recognized for Chemical Industry Pallets (CP). Also, see Appendix D for Chemical Industry Shipping Pallet Guidelines as recommended by the Chemical Packaging Committee.

CP6 – 1200 x 1000 mm (48 x 40 inches)

CP7 – 1300 x 1100 mm (52 x 44 inches)

CP9 – 1140 x 1140 mm (45 x 45 inches)

Third, the lading must fit, to the greatest extent possible, the dimensions of the pallet. If an optimum fit is not possible, the lading must fit entirely within the dimensions of the pallet. Should underhang or overhang exist, it should be minimized. Underhang should be filled with appropriate void filling material to prevent lading shift.



**FIGURE 3.6** a. overhang  
b. underhang

## ORDERING THE INTERMODAL FREIGHT CONTAINER

While the objective of this Guide is to aid shippers in successfully and safely shipping cargo from origin to destination, it is recognized that absolute prevention of loss or damage to the cargo is not possible; however, proper selection and use of the vehicle or intermodal freight container will go a long way toward achieving this goal.

### INTERMODAL FREIGHT CONTAINER SELECTION

Before an intermodal freight container is ordered, the shipper should have a thorough understanding of the types and sizes of intermodal freight containers that are available, along with the product characteristics and packaging of the products that are to be loaded into the intermodal freight containers.

As a general rule, most cargo can be stowed, subject to co-lading limitations in the applicable regulations, in general-purpose or dry-cargo containers. These containers will vary as to overall dimensions, and even those with the same external dimensions may vary, from one to another, in their internal dimensions. Appendix C of this Guide contains detailed specifications for intermodal freight containers.



**General Purpose Intermodal Freight Containers** - These are most commonly available in 20- or 40- foot lengths with 8-foot external widths and heights. Other, less commonly available sizes, may be 24, 25, 27 and 45 feet in length.

**Insulated Intermodal Freight Containers** - Insulated intermodal freight containers are used for cargo that cannot be subjected to rapid changes in temperature. They should be selected for use when extreme changes in ambient temperatures are anticipated. Because these intermodal freight containers are insulated, interior dimensions and cubic capacities are less than those of general-purpose containers.

**Refrigerated (“Reefer”) Intermodal Freight Containers** - Cargo that must remain frozen or under refrigeration is transported in a intermodal freight container which is fitted with standard refrigeration units powered by electricity, liquid-gas or diesel fuel. The interior volume of these intermodal freight containers is less than those of insulated containers, since space is taken by the refrigeration units in addition to the necessary insulation.

### PRODUCT AND SHIPPING CONSIDERATIONS

Before a vehicle or intermodal freight container is ordered, it is crucial that anything that could cause delay in shipment and delivery of the cargo must be examined and eliminated or minimized.



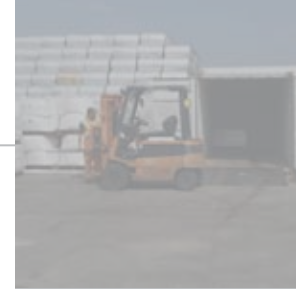
**FIGURE  
3.7**

20/40 Foot General Purpose  
Intermodal Freight Containers



The factors that should be examined include:

- Do the Terms of Sale affect the selection of the carrier? Does the ocean carrier have limited intermodal freight container service?
- Does the Letter of Credit stipulate the ports of exit and entry? If so, does this limit the types and sizes of available intermodal freight containers?
- Can the destination port accommodate the size intermodal freight container selected? Does the customer have the capability to unload the intermodal freight container?
- Total weight of cargo, including all dunnage and securement equipment and devices, must not exceed the limits of the vehicle or freight container and must not exceed any of the highway weight limitations. NOTE: The person filling the container must certify the total gross weight of intermodal vehicles or containers (including cargo, pallets, dunnage, securement devices or equipment, and even ice, if used as a refrigeration medium), for all intermodal shipments.
- Cargo dimensions and stackability may require vehicle or intermodal freight container door openings of a particular size.



## PRELOADING PREPARATION

- If cargo dimensions or weight limitations prevent the full order from being shipped in one vehicle or intermodal freight container, shippers should seek means to adjust the quantity of cargo to be shipped.
- Consideration should be given to maximizing the cube for intermodal freight containers.
- Certain goods must not be loaded into the same vehicle or intermodal freight container with other goods which are liable to contaminate or be contaminated by those goods, unless appropriate precautions can be taken (as, for instance, by separation) to prevent any contamination. Goods, particularly hazardous materials, must not be loaded into the same intermodal freight container with other goods if the possibility exists that mixing can cause the production of excessive heat, fire, or formation of flammable or toxic gases. Restrictions imposed by regulations as to co-loading, stowage and segregation must be strictly adhered to, by shippers as well as transporters.
- A determination must be made as to whether there are special needs for each product to be loaded – including ventilation, need for insulation or refrigeration, and the like.
- The transportation modes that are to be used throughout the entire route should be known before loading.
- Consult the carrier for any specific commodity restrictions.

It must be emphasized that all aspects of the movement of goods must be carefully planned and coordinated with all parties involved in the supply chain.

## INSPECTION OF THE INTERMODAL FREIGHT CONTAINER

On receipt of the intermodal freight container or vehicle, it is vitally important that the shipper conduct an inspection of both the interior and exterior, and confirm a valid inspection decal, sticker, stamp, or other is affixed on or near the CSC (International Convention for Safe Containers) Safety Approval Plate, or that the container is marked with the required Approved Continuous Examination Program (49 CFR Part 452.7). This will ensure that the goods are not subjected to risk due to defects that could damage them or cause loss of product. Section V of this Guide addresses this subject in greater detail.

## CONCLUSION

While it is the responsibility of the supplier of the intermodal freight container or vehicle to furnish those which are clean, dry, free of residue of previous loadings, odor and mechanical defects, and are structurally sound, it is the responsibility of the shipper to inspect each vehicle or intermodal freight container to assure that it is in fact suitable to safely carry the intended lading to destination. If a vehicle or intermodal freight container is found to be unsuitable for loading, it should be rejected, and returned to the carrier or lessor for replacement.

# LOADING



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# LOADING

With knowledge of shipping environments, materials, unitizing loads and the bracing methods just described, the reader is ready to load cargo into a transport unit. This section will serve as a general guide to loading, showing the reader what to look for in the preloading inspection of transport equipment, how to create and use a load plan, and how to use dunnage. Additionally, solutions to special loading patterns such as dense loads, less-than truckload (LTL), and double deck sections are described. Finally, preferred loading patterns for some typical loads are illustrated.

Remember, **GOOD LOAD PLANNING IS IMPORTANT**. Experience has shown that proper preplanned load patterns and restraint systems not only reduce damage and loss, but are much more efficient to install. **IMPLEMENTATION OF A GOOD LOAD PLAN** will minimize load shifting in transit.

## PRE-TRIP INSPECTION OF EQUIPMENT

The first question to ask yourself: “Is this the correct container/vehicle for the product to be loaded?”

49 CFR 176.27 and IMDG 5.4.2 requires the container and the container/vehicle unit should be inspected inside and outside before it is loaded. If the equipment appears severely damaged,

it should not be loaded and the carrier/operator should be contacted with a view to obtaining a replacement. The following checklist may be used as a guide to inspecting the container/vehicle before loading.

## PRE-TRIP ORDERING/INSPECTION CHECKLIST

### Ordering Container/Vehicle

- Determine size and type of container/vehicle needed.
- Advise supplier of container/vehicle the nature of the goods to be shipped.
- Advise supplier of special requirements (e.g. temperature controls, etc.)

### Inspection-Exterior

- Did we receive the correct container/vehicle for this shipment?
- Is there obvious damage to main framework:
- Corner Posts and Doors?
- Corner Fittings?
- Do doors and locks operate properly and can receive a security device - gaskets and seals in good condition?
- Is there a Safety Approval Plate (SAP) (49 CFR 451.21 Subpart C - Appendix C – Container Safety Approval Plate).
- Have old hazardous material placards been removed?

- Check vehicle lights, brakes, tires, etc. for proper operation.

#### Inspection-Interior

- Is light visible from inside closed unit? Check floors, walls, and ceiling for holes and other visible signs of leakage.
- Is floor solid and clear of all bolts, nails, or material, which could damage packages and/or cause injury to personnel? Are cargo tie-downs (D - Rings) and door posts in good condition?
- For wall mount restraint systems - check for wall/panel cleanliness and soundness.
- Are the side-wall panels securely fastened to the wall and free of protruding objects?
- Is unit free from residue or odor from previous lading?

**REJECT UNITS WHICH DO NOT MEET THESE CRITERIA OR MAKE THE NECESSARY CORRECTIONS.**

## PLANNING THE LOAD – GENERAL GUIDELINE

### CONTAINER OR TRAILER LOADING DO'S AND DON'TS

#### DO

1. Keep within the load limits of the unit and meet both Federal and Local weight restriction limits. Never overload. See the Bridge Formula.
2. Distribute the weight evenly on floor of container or over the axles of the vehicle. Special weight distribution requirements must be considered for dense cargo.
3. Load hazardous materials in accord with applicable regulation: See the Segregation Chart "Regulation" section. If export, check International Maritime Organization (IMO) segregation chart. It may be different.
4. Load ALL cargo tightly to prevent shifting which could damage cargo or container/vehicle.
5. Observe special handling instructions - such as "This side up"; "Do not drop"; or "Fragile".
6. Separate cargo with sharp corners/protrusions using dividers, slip sheets, and cushioning materials, as necessary.





7. Load lighter cargo on top of heavier cargo and load dry goods cargo over liquid cargo wherever possible.
8. Beware of environmental (ie. condensation/pressure) problems that may develop due to changes in temperature/humidity/altitude.
9. If an export shipment is to be made where wood is used to secure the load, check the agriculture requirements of the destination country for possible restrictions (ISPM 15). [www.ippc.int](http://www.ippc.int)
10. Arrange the load with blocking and bracing such that labels and markings are visible to inspectors.
11. Use approved cargo securement methods based on the lading, mode of transportation, and trailer/container utilized.

#### **DO NOT**

1. Do not load damaged/leaking cargo or cargo with external contamination (including water).
2. Do not load without a plan.
3. Do not ship without proper labels and/or placards.
4. Do not ship until doors are properly closed / sealed.
5. Do not load more than 60% of load weight in half length of equipment.

Do not ship without utilizing approved cargo securement methods.

## **PLANNING THE LOAD - (DETAILED)**

**Example - This discussion follows the actual load plan from the next page.**

**The project:** The Shipping Department has just received a Bill of Lading to move 78 drums of a flammable liquid weighing 500 pounds each (gross). The Traffic Department has routed the load by Container On Flatcar (COFC) to a port. A 20-foot container on chassis (on 5 axles) will be used over the road to the rail loading facility. The state of origin has an allowable axle limit of 34,000 pounds, and permits a total gross of 80,000 lbs. (Tractor, chassis, container & packages).

<b>Check Equipment Tare:</b>	Tractor	16,000 lbs.
	Chassis	6,000 lbs.
	Container	6,000 lbs.
		28,000 lbs.

Note that loads to 52,000 pounds can be carried (80,000 - 28,000). Checking state regulations - axle weight limit is 34,000 pounds. Since this load is 39,000 pounds (78 drums x 500 lbs.) and tare is 28,000 pounds for a total of 67,000 pounds on 5 axles, axle weight limit is not a problem.

**Select Method** - We decided to use Method D - 'T' Gates for a Double Layer Drum Load in a 20' Container. This is acceptable for all modes. Three modes will be used in this shipping ... road, rail, and ocean. Six "T" bar units, 3 for each layer, will be used (39,000/6,700 = 5.82). **Load Plan** - We lay out on a sketch the load plan and determine materials required. **Specify Package Protection (dunnage and restraint)** - Plywood; ½" between layers or AAR approved equivalents ½" for load facing, lumber – 2x6" for "T" bars and 2x4" for spacer bars.

**Recheck General Guidelines (Section IV) - Note: All Do's and Don'ts are met.**

**THIS IS THE PLAN BY WHICH THE LOAD IS TO BE MADE. IT IS IMPORTANT TO TAKE THE TIME TO DO THIS WORK CAREFULLY. IN MOST LOCATIONS MANY LOADS WILL BE REPETITIVE AND IF THE PLAN IS DONE CAREFULLY IT CAN BE REUSED.**

## LOAD PLANNING FORM

**Note:** This form is set up for an 80,000 lb. gross 20 ft. intermodal container. Make suitable adjustments for other equipment.

**Step 1:** Check tares to assure the load is legal.

Tractor:	16,000
Trailer or Chassis Tare:	6,000
Container:	6,000
Total:	28,000

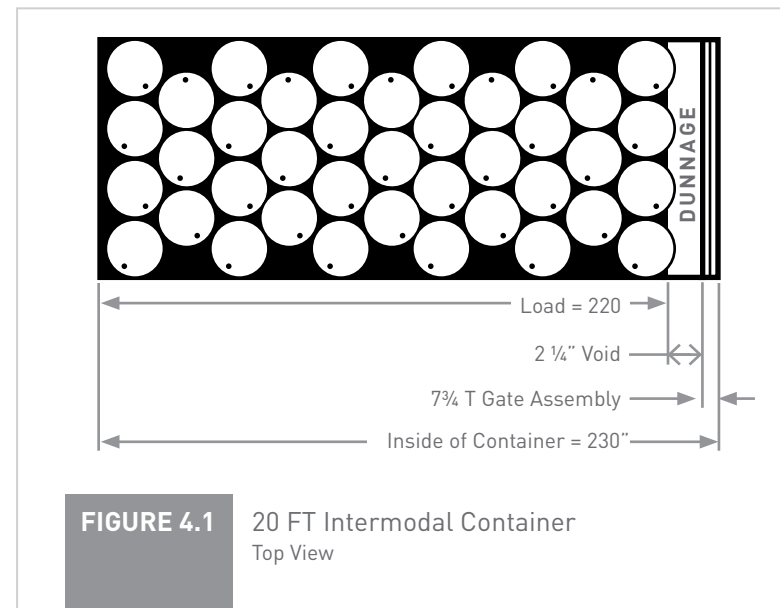
Good for up to 52,000 lbs. Allowable Weight is 80,000 – (Tare) 28,000

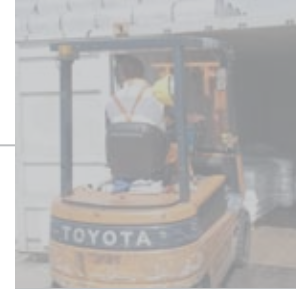
**Step 2:** Select restraint system: **METHOD 4 "T" GATES (Section IV, Method 4B)**

Anchor type: Door post slots or vertical brace slots.

**Step 3:** Lay out load approximately to scale. Follow the Rules.

T" gate assembly requires 7-3/4 inches





In this load 2-1/4 inch void should be filled with appropriate dunnage.

**Step 4:** Specify lading protection. Bulkhead, protectors, cushioning at gate.

**“T” bars & dunnage. Appropriate dunnage for this load may be “cut to size” 2X4” boards placed between plywood and “T” gates to fill void. Detail of other material requirements is found in method description.**

**Step 5:** Recheck key loading rules. All General Guidelines are met

### SPECIAL CAUTIONS

While the example just given is relatively simple, many loads are more complex. Some additional cautions are:

- Where goods of regular shape and size are concerned, a tight load from wall-to-wall should be sought. However, in many instances some void spaces occur. If the spaces are too large, then the load should be completed by using filler dunnage, i.e., honeycomb, folded corrugated board, air bags or other suitable means.
- Cargo weight should be evenly distributed over the floor of the container or the axles of the vehicle. Where the cargo items of varying weight are to be loaded onto a container, or where the container will not be full (either

because of insufficient cargo or because the maximum weight allowed will be reached before the container is full) then the load should be arranged and secured so that the approximate center of the weight of the cargo is close to the mid-point of the container. In no case should more than 60 percent of the load be in less than half of the length of the container.

- If an export shipment is to be made, be certain that all wood in the container complies with agriculture regulations - some countries have wood treatment requirements.
- In a mixed load with more than one barrier, with a fragile freight section such as glass case goods, always put the more fragile freight in the door section (the last bay loaded).
- In a load made up with a single barrier the more fragile packages should be in the center of the load.
- Less Than Truckload (LTL) Shipments should be given special consideration. By regulation, the load must be secure before leaving your site. Remember that all packages should be secured from falling or shifting in transit. Load locks, air bags, plywood, 2 x 4's or 2x 6's, fillers, etc. should be used for this purpose.

## USING DUNNAGE

The important thing to remember is that voids should be filled to prevent packages from shifting or falling.

### DO'S AND DON'TS

#### DO

- Use strong dunnage such as bulkheads across the container (to fill longitudinal voids) for rail movement - minimum load capability - 1,500 lb./sq.ft.
- Size it to fit the section of load to be protected. Width and height as near as possible to face of packaging or unit load.
- Use vertical separator sheets such as corrugated, fiber kraft laminated veneer or plywood to segregate sections of load.
- Use AAR approved or equivalent divider sheets as decking when load sections are layered - e.g., boxes over drums, drums over drums, other cargo over rigid intermediate bulk containers, etc.

#### DO NOT

- Reuse damaged filler - crushed honeycomb or broken pallets, etc. They will cause damage.
- Use cushioning or fillers as a bulkhead.

**REMEMBER - CUSHIONING AND FILLERS ARE NOT BULKHEADS. BULKHEADS ARE STRONG, RIGID SEPARATORS DESIGNED AS PART OF A GATE OR BARRIER OR SOMETIMES AS A STRONG VOID FILLER.**

## SPECIAL CONSIDERATIONS

### RISERS

Risers may be used to elevate alternate rows of cylindrical packages to minimize chafing and damage. Risers are used with open head drums having locking ring closure. The elevation of alternate rows will minimize the contact of the locking ring closure. **Caution:** Transverse risers are acceptable for rail movement but should not be nailed in place.

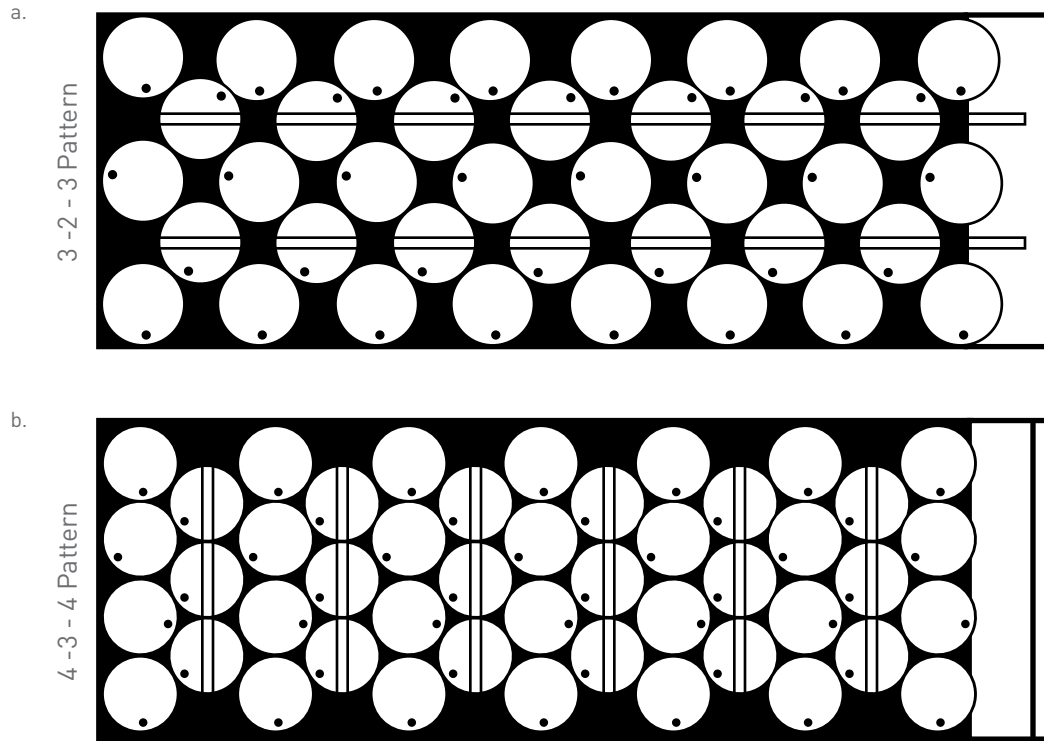
### RUBBER MATS

Rubber Mats have been approved and tested for rail shipments (ref. Association of American Railroads "Intermodal Loading Guide for Products in Closed Trailers and Containers"). Method E-7 "Closed Head Steel Drums In a 3-4-3 Pattern on Rubber Matting with Steel or Polyester Cord Strap describes this method.

**This rubber matting method should be considered for over the road vehicles as well.**



LOADING



**FIGURE**  
4.2 & 4.3

a. Open head drums longitudinal risers  
b. Open head drums lateral risers

**FIGURE 4.4**

Partial Deck-Lightweight Load  
Ty-Gard2000®  
Check load plan for weight distribution

## PARTIAL SECOND LAYER LOADS

A partial second layer is often necessary to obtain maximum load in the container/vehicle.

There are several solutions to this problem.

### Guideline

- Apply Ty-Gard as shown in Method C.
- Load cargo tightly to nose and alternate bottom/second layer cargo with divider sheets as decking.
- Add dunnage/filler as required.
- Secure Ty-Gard.
- Recheck load plans for compliance with axle weight restrictions.
- Partial Second Deck - Heavy cargo such as drums (to meet axle weight restrictions)

### PROCEDURE:

First secure last row of partial second tier and then secure last row of lower deck.

Apply horizontal divider sheets/decking when Section A-B is loaded and then load second layer of cargo. Be sure to utilize appropriate separator material between tiers of cargo.



**DENSE LOAD**

**NOTE:** Method C is shown

To meet axle weight restrictions which prevent loading to the nose of the transport equipment.

a.

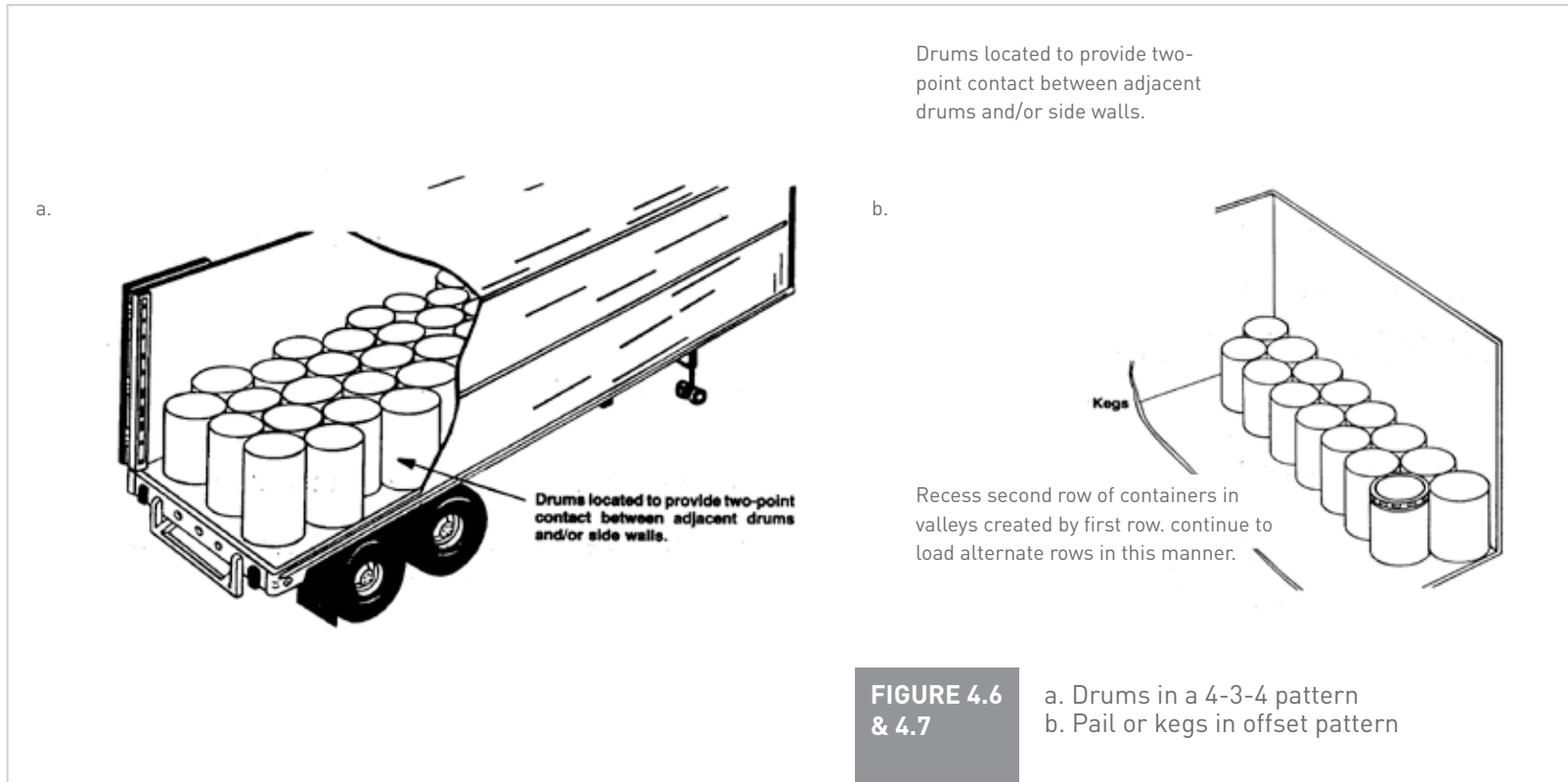


**FIGURE 4.5** Method C

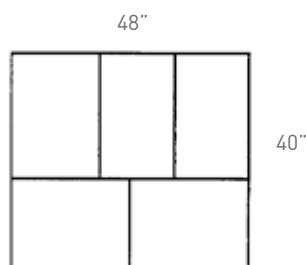
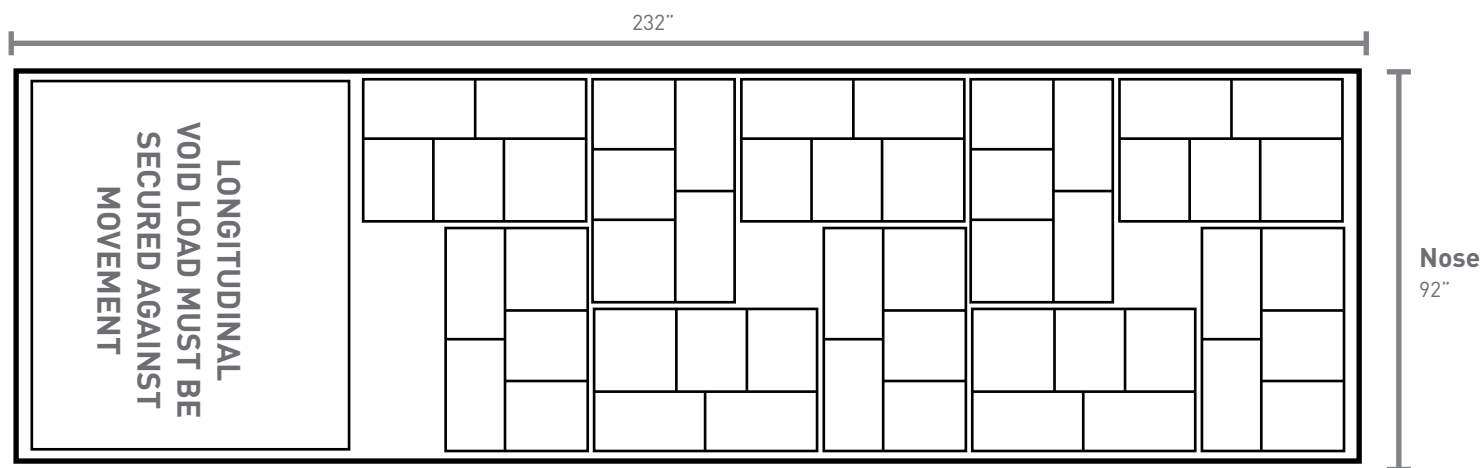
## EXAMPLES OF PREFERRED LOADING PATTERNS

Cylindrical packages such as steel, plastic, or fiber drums

### METHOD OF LOADING CYLINDRICAL PACKAGES





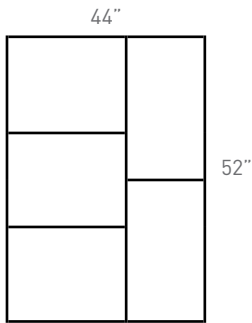
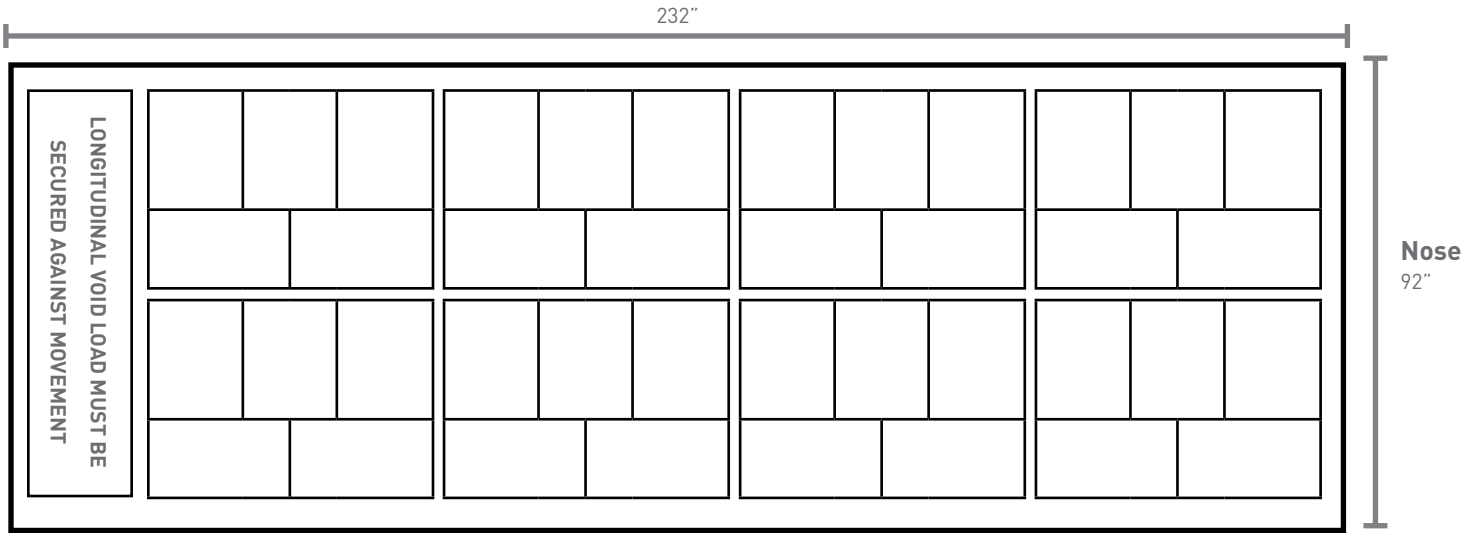


- 20 KG Multiwall bags on CP6 pallet (1200mmx1000mm/48"x40")
- 50 Bags per skid, 5 per layer & 10 Layers=2,204.6lbs. per pallet
- 2 rows of 5 pallets, pallets are pinwheeled.

**Note:** Inside dimensions shown are approximate.

**FIGURE 4.8**

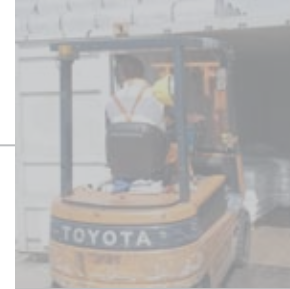
20 KG Palletized Bags in 20 foot Intermodal Container



- 25 KG Multiwall bags on CP7 pallet (1300mmx1000mm/52"x44")
- 40 Bags per pallet, 5 per layer & 8 Layers=2,204.6lbs. per pallet
- 2 rows of 4 pallets. 52" pallet side is parallel to container wall.

**Note:** Inside dimensions shown are approximate.

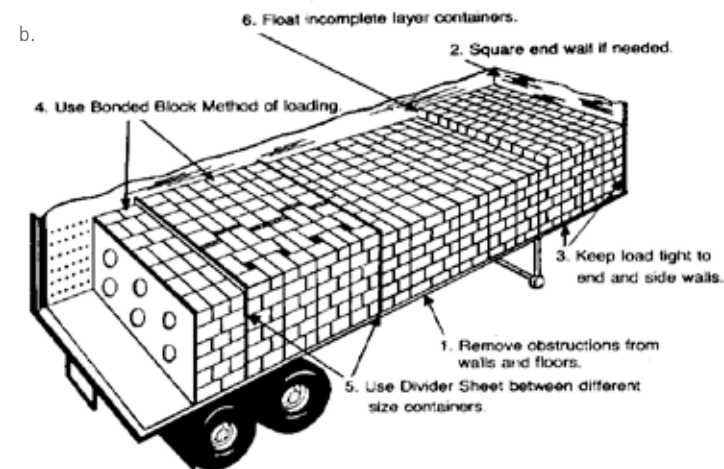
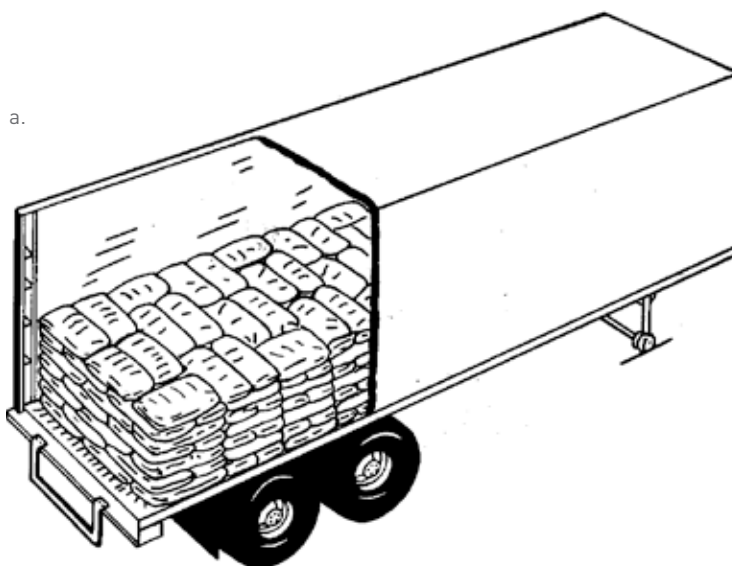
**FIGURE 4.9** 25 KG Palletized Bags in 20 foot Intermodal Container



### Loose Loaded Bags

Trailer should be lined with a heavy duty liner paper to protect bags from abrasion. Layers of each unit should have bags lengthwise and crosswise in manner illustrated.

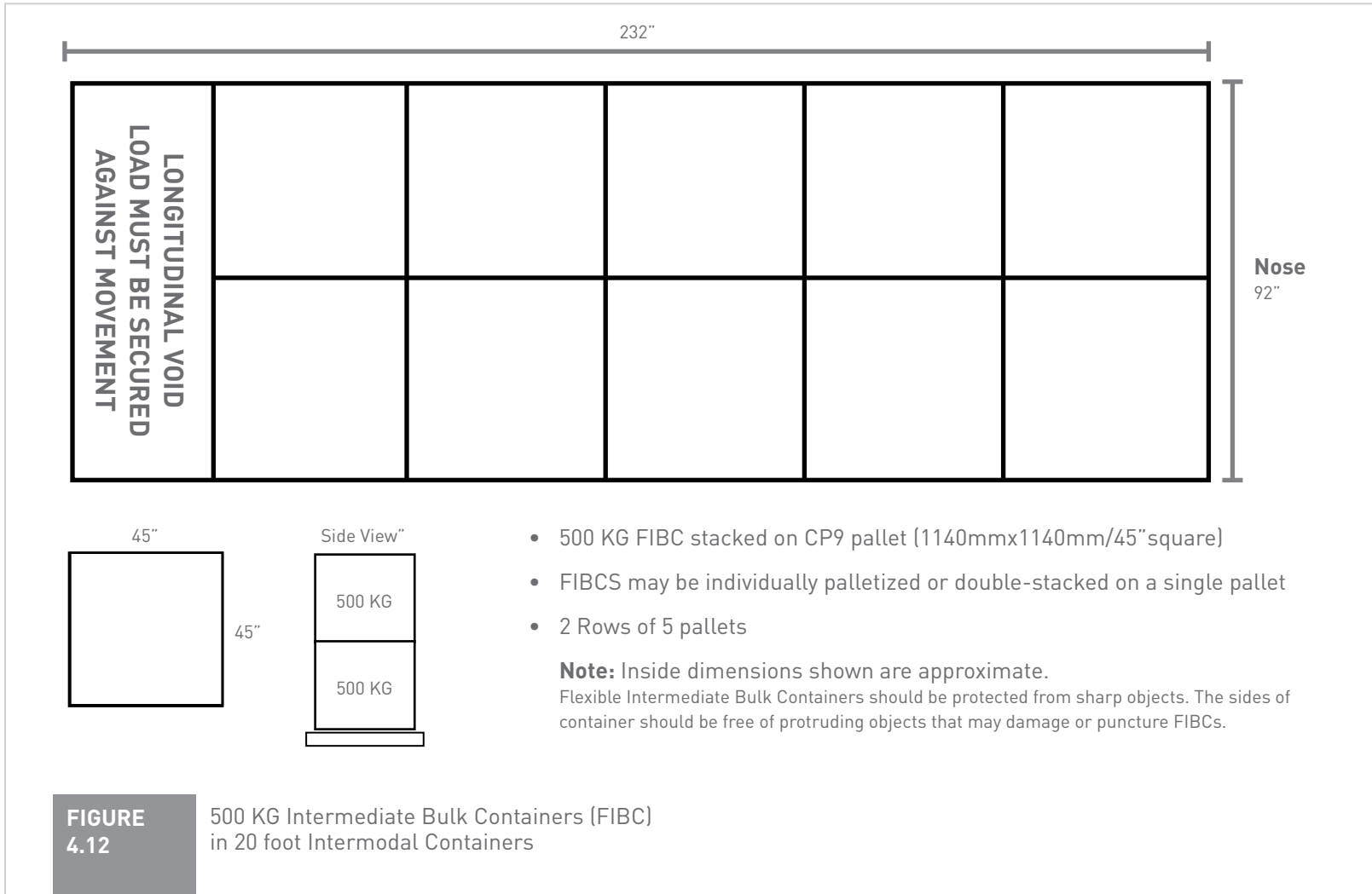
Location of lengthwise bag staggered by layers to bind bags in lower layers.



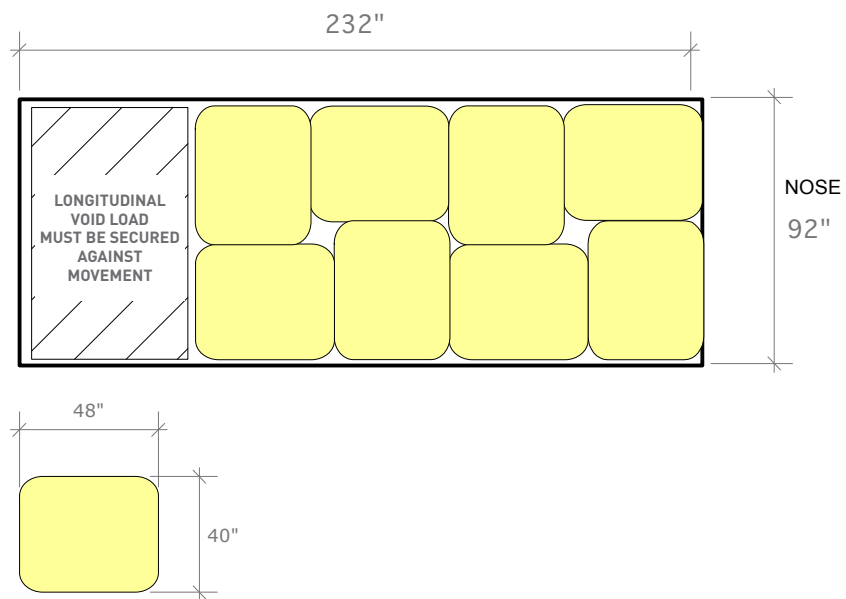
**FIGURE**  
4.10 & 4.11

a. Figure 4.10  
b. Figure 4.11  
Loading Fiberboard Containers

Apply securement to restrain load from damaging doors and/or lading falling out during transit or when doors are opened at destination. Height and nature of lading and type of trailer will determine restraining method used. See Section 5.



**FIGURE 4.12** 500 KG Intermediate Bulk Containers (FIBC) in 20 foot Intermodal Containers

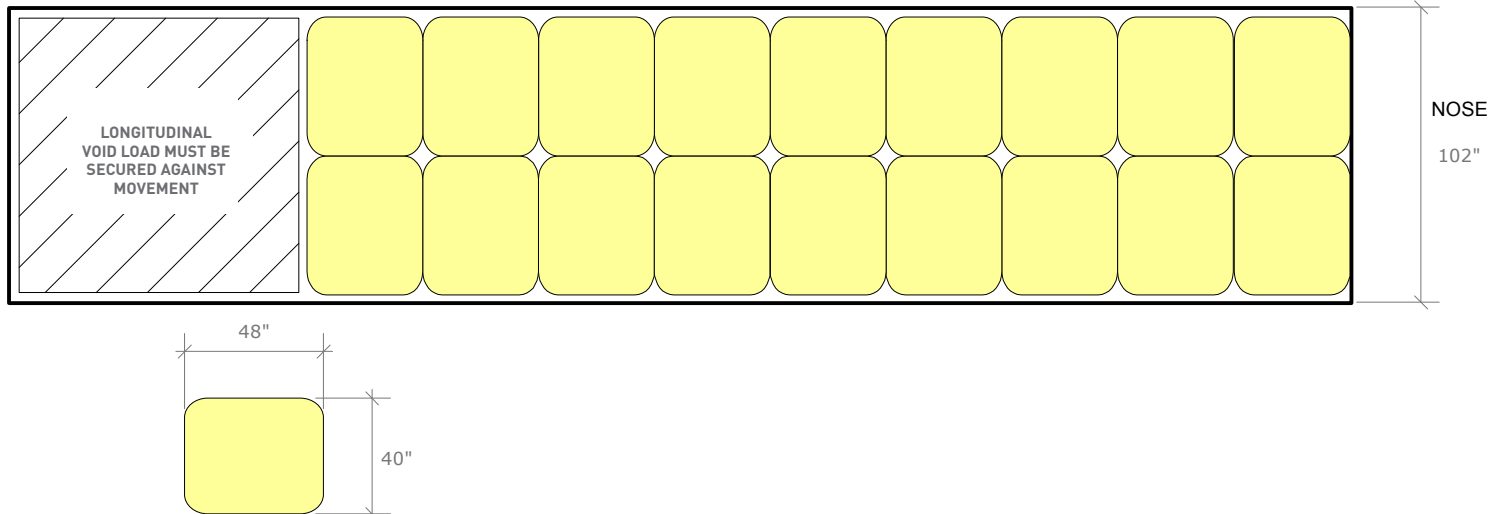


- 275 Gallon RIBC (48"x40")
- 2,204.6 LB. NET, 194 LB. TARE
- 2 Rows of 4 RIBCS, RIBCS are double Stacked.

**Note:** Inside dimensions shown are approximate.

**FIGURE 4.13**

275 Gal. Rigid Intermediate Bulk Containers (RIBC) in 20 foot Intermodal Container



- 275 Gallon RIBC (48" X 40")
- 2,204.6 LB. NET, 194 LB. TARE, 2,398.6 LB. GROSS
- 2 ROWS OF 9 RIBCS

**Note:** Inside dimensions shown are approximate.

**FIGURE 4.14**

275 Gal. Rigid Intermediate Bulk Containers (RIBC) in 40 foot Over-the-Road Trailer