Closed Car Loading Guide

Part 6
(formerly Pamphlet No. 17)

Minimum Loading Standards for Prepared Food and Similarly Packaged Products in Closed Cars

Approved January 6, 2014, by the Damage Prevention and Freight Claim Committee
Minimum Loading Standards for
PREPARED FOOD AND SIMILARLY
PACKAGED PRODUCTS
IN CLOSED CARS

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1.0 INTRODUCTION

1.1 Overview

1.1.1 The purpose of this guide is to relate basic good car loading procedures that have been developed through laboratory and field testing, engineering studies, and accumulated experience in rail transportation. Compliance with the “Minimum Loading Standards” contained herein will ensure conformance with Circular No. 42-K rules and provide adequate protection for lading from sources of damage in the normal railroad environment.

1.1.2 The general rules contained in Circular No. 42-K or supplements thereto issued by the AAR are formulated for the purpose of providing safe methods of loading boxcars and must be observed.

1.1.3 The loading rules and/or practices apply to shipments transported in the USA, Canada, and Mexico.

1.1.4 The loading methods in individual closed car loading publications issued by AAR’s Damage Prevention and Loading Services are minimum standards that have been evaluated and approved by the AAR Damage Prevention and Freight Claim Committee. The minimum standards offer practical guidelines on the subjects covered. Because these are minimum standards, it may be necessary to supplement the methods in some instances.

1.1.5 Securement standards in AAR closed car loading publications are intended for safe transit of the railcar from origin to destination and for the prevention of lading and equipment damage. The standards do not address unloading practices.

1.1.6 Loading and bracing methods not currently approved may receive consideration for approval and publication under the Damage Prevention and Loading Services General Information Bulletin, No. 2, “Procedures Governing Evaluation and Acceptance of New Closed Car Loading and Bracing Methods and Materials.” Submit requests to Director, Damage Prevention and Loading Services, Association of American Railroads, Transportation Technology Center, Inc., 55500 DOT Road, Pueblo, CO 81001.

1.1.7 CAUTION: Car rocking motion caused by lift equipment entering and/or exiting the railcar may cause unsupported packages or articles with a high center of gravity to fall to the floor. Minimize access to the car. Exercise caution when inside a partially loaded car. Lift operators should stay on lift equipment, whenever possible, while inside a partially loaded car.

1.2 Reference Documents

1.2.1 Circular No. 42-K (or supplements thereto)
“General Rules Covering Loading of Carload Shipments of Commodities in Closed Cars”—These requirements must be observed in all closed car loading activities to ensure safe transit of the railcar from origin to destination, thereby eliminating hazard to railroad operation.

1.2.2 Circular No. 43-E (or supplements thereto)
“Rules Governing the Loading, Blocking, and Bracing of Freight in Closed Trailers and Containers for TOFC/COFC Service”—This publication contains the requirements covering loads in trailers or containers.
INTRODUCTION

1.3 Rail Transportation Environment

1.3.1 There are inherent characteristics of the rail environment that must be understood to recognize the need for many of the requirements identified in this publication.

1.3.2 Forces encountered within the rail vehicle are induced by shock and/or vibration. In most instances, the force is a complex result of both shock and vibration. Force input due to shock is mainly a result of impacts during switching and train slack action (run-in and run-out during train movement). Force input due to vibration is a result of the movement of the railcar's wheels on the rails. This vibration force can act either in a vertical or lateral plane. These forces are due to the movement of the car wheels on the rails, the truck geometry, rail joints, rail elasticity, nonuniformities of the rail and wheels, and overall track condition. When all these factors are acting on a rail vehicle, the resultant force is very complex.

1.3.3 The lading in a rail vehicle can also generate forces; for instance, in canned commodities, the metal cans can act as springs. For multilayer loads in the rail vehicle, any vertical force input in the bottom layers can be greatly amplified as it travels to the top layers. This is the transmissibility factor due to the harmonics of a particular stack or column of containers.

1.3.4 Uncontrolled movement and/or displacement of the lading in a rail vehicle can cause safety problems, equipment failure, damage, and unloading problems. The following minimum loading standards in conjunction with proper packaging will provide safe arrivals.
2.0 SELECTION AND PREPARATION OF CAR

2.1 Overview

2.1.1 Railroads are responsible for supplying cars that are clean and have sound roofs, sides, and square end walls; smooth floors; and snug-fitting doors. Any exception is cause for rejection. Shippers are responsible for inspecting interiors of cars to see that they are suitable to carry lading safely and damage-free.

2.1.2 Before attempting to open the doors of any railcar, check to make sure that all hardware is intact so that the doors open safely. Check the door tracks to make sure they are equipped with stops on the ends so that the doors do not fall off when opened.

- It is critical to check locking bars and related hardware to make sure you can safely open plug doors.
- Make sure the doors are operating correctly before fully opening them. There is always the possibility that material or lading may be leaning against the inside doors or is applying pressure.
- Use extreme care when opening any type of railcar door to protect against injury.

2.1.3 Always check the car to see if water entry is possible. Make sure that the car is watertight. Look for light leaks or evidence of new or large amounts of rust, which may indicate recent water entry into the car. (Note to customers: Notify appropriate carriers immediately if railcars are received with water damage to ensure that the car is repaired and repaired before the car is used again.)

2.1.4 Check the car floors for any holes or rough surfaces that may result in leakage or damage to the product.

2.1.5 Inspect the cars for any protrusions or rough, broken, or bent surfaces that could result in damage to the product. It is important that cars are clean and free from nails, brads, staples, fragments of steel, and dunnage remnants. To prevent damage, cover projections of lining or anchor devices with protective materials taped in place or otherwise adequately secured.

2.1.6 Check the end walls to make sure they are not bowed. If the end wall is severely bowed, reject the car. If the end walls are bowed and you need to use the car, use materials of appropriate size and strength to bring the end walls back to square. This will help to ensure that the load remains tight during its journey.

2.1.7 If the car supplied is not suitable for loading and the shipper elects to load the car rather than reject it, it is the shipper's responsibility to properly prepare the car.

2.1.8 Cover rough surfaces with fiberboard sheets or other suitable materials. Do not use kraft paper.

2.1.9 In refrigerator cars, cover floor racks with at least a single thickness of corrugated fiberboard, placing the corrugations lengthwise of the car to prevent rolling or bunching. Abut sheets on the floor and do not overlap. Make the interior end wall adjacent to the motor compartment flush with the end walls by adding several thicknesses of corrugated fiberboard.

2.1.10 When plug doors do not provide a flush surface with the car's side walls, use protective material such as corrugated fiberboard.

2.1.11 The loading methods illustrated in this guide have a proven track record of success in specific car types. Please note the type of car for which each method is used. Failure to use the proper loading method in the proper type of equipment will result in damage to the product and a dissatisfied customer (i.e., if a loading method is shown for use in a cushion equipped car, use that loading method only in cushion equipped cars).
2.2 Bulkhead Equipment

2.2.1 When cars are equipped with bulkhead doors, inspect the doors to determine if they can be moved safely, then move the doors to approximately where they will be located under load. Engage the locking mechanisms to make certain they are operational. Inspect for full extension all locking pins at the top and bottom of the bulkhead doors. Locking pins must penetrate the tracks a minimum of $\frac{1}{2}$ in. Tapered locking pins must penetrate the tracks a minimum of $\frac{1}{4}$ in. beyond the taper (see Fig. 2.1).

![Diagram of bulkhead doors showing locking pins and minimum penetration requirements](image)

Fig. 2.1 Bulkhead doors

2.2.2 The weight of cargo restrained by each bulkhead must not exceed one-half of the load limit stenciled on the car sides.

2.2.3 Examine all bulkhead doors before loading. This cannot be emphasized too strongly. Before moving a bulkhead door, inspect the overhead assembly to determine if it is in good condition so the door can be moved safely.

2.2.4 Inspect locking handles to determine if they function properly. Inspect locking pins to make sure they penetrate into the holes of the overhead and floor locking tracks. If locking pins do not penetrate, DO NOT LOAD.

2.2.5 After cargo is loaded, place the door squarely (straight up and down) and snugly against the load, and lock into place. If the face of the load is not flush, use filler material to make it flush. If the door's surface is not smooth, protect the product with fiberboard.
3.0 LOAD PLANNING

3.1 General Load Planning

3.1.1 Load, block, or brace commodities tightly lengthwise and crosswise to eliminate all void spaces, which are primary reasons for damage. Take up any void spaces remaining in a car. Use blocking, fillers, and other suitable materials, and secure them in accordance with the methods outlined in this guide and other guides listed on the back cover of this book.

3.1.2 Load and secure lading to permit unloading from either side of the railcar, except when dimensions of individual units of freight prohibit unloading from either side of the car.

3.1.3 Inspect lading before loading car. Do not load damaged lading.

3.1.4 Evenly distribute the weight of loads from side-to-side and end-to-end in the car and to a uniform height of lading insofar as lading permits. Always center the units in the doorway area along the lengthwise centerline of the car.

3.1.5 Plan loads so that a combination of end wall fillers, separators, and center bracing will facilitate unloading lengthwise lifts from both sides of cars equipped with staggered doors.

3.1.6 Stow lading in a manner to prevent contact with doorposts.

3.1.7 Fill all lengthwise space with lading and with lading and filler material, or appropriately block and brace.

3.1.8 When there is a possibility of lading falling or rolling out of the doorway or coming in contact with sliding or plug-type side doors, protect openings with wood doorway protection, steel straps, or other material of sufficient strength and number, and adequately secure it.

3.1.9 Apply temporary bracing in partly loaded or unloaded cars that will be switched during the process of loading or unloading.

3.1.10 Plan load so that crosswise space is minimized without exceeding an aggregate of 18 in., unless additional appropriate bracing is used. Maintain vertical alignment to prevent crosswise movement.

3.1.11 Load units in a straight line lengthwise in the car to ensure face-to-face unit alignment. If unit alignment is not maintained, use divider sheets. Crosswise space may be filled with product placed alongside walls or down the center with protective material separating hand-stacked and unitized lading, unless other means of maintaining vertical alignment of the units are used.
3.1.12 When cars are pallet or slip-sheet loaded, load the units against the side walls and apply lateral void fillers in voids between the unit rows. Units may also be loaded tight against one side wall and fillers applied between the units and the other side wall, and alternated in opposite ends (see Fig. 3.1).

![Fig. 3.1 Use of crosswise fillers](image-url)
3.2 Care and Protection of Rail Equipment

3.2.1 Have lift truck operators use extreme care in turning units within cars or backing a lift truck out of car doors to avoid damage to side walls and bulkhead doors. Do not use lift equipment to open or close railcar side doors or to position bulkhead doors.

3.2.2 Some lift truck forks are longer than the units being loaded or unloaded. Have lift truck operators use extreme care so that the forks do not protrude through and beyond the units and damage the product or the end wall of the car beyond the unit being handled (see Fig. 3.2).

![Forks Extended Beyond Bottom of Unit](image)

3.2.3 Secure bulkhead doors across the doorposts or as otherwise stenciled, and lock in position before releasing empty cars.

3.3 General Loading Principals

3.3.1 Load is tight crosswise and lengthwise in the car.

3.3.2 Follow proper loading procedures, such as the following:
- Do not load damaged product.
- Place lighter products on top of heavier products.
- Load containers together that combine well into a bonded pattern.
- Load shipping containers with similar characteristics together.
- Avoid floating layers, if possible.
- Use separators and dividers, as necessary. (See Fig. 4.3 and Fig. 4.4.)

3.3.3 When shipments in noninsulated cars are subjected to climatic changes leading to condensation, it may be necessary to use protection over the top of the load.
4.0 PACKAGING AND UNITIZING

4.1 Shipping Containers

4.1.1 Use fiberboard boxes that have dimensions that will afford maximum tightness of fit to contents. If the containers have manufacturer’s joints, a good tight closure can be obtained at the case sealer only if the corners are square. Check case sealers and adjust as often as necessary to ensure that flaps will be parallel and abut each other, flaps do not protrude beyond the edge of the case, and the required amount of adhesive is applied.

4.1.2 Do not load either overfilled or under-filled bags. A bag flattener or de-aerating machine is helpful in detecting poor closures. Flattened bags also lend themselves more readily to unitizing and car loading, permitting a more compact and stable load. If stitching is the method of closure, inspect the machine as often as necessary to ensure that the proper tension is being maintained and that the spacing and the size of the hole are correct. If heat sealing is the method of closure, securely close bags to carry contents safely and prevent leaking.

4.1.3 Use bales that have dimensions that afford a tight fit of contents. Check closure process periodically to see that the proper amount of adhesive is being applied.

4.1.4 Do not load shipping containers that are fatigued, torn, wet, or severely creased.

4.2 Unitized Products—General

4.2.1 Unitizing product is an efficient means of handling, storing, loading, transporting, and unloading products.

4.2.2 Form individual units of shipping containers into a bonded block pattern, when practical.

4.2.3 Eliminate all voids within the pattern.

4.2.4 Use space fillers, corrugated sleeves, corner protectors and strapping, shrink/stretch wrapping the unit, spot-gluing, or other approved methods to maintain vertical alignment of shipping containers (boxes, bags/bales, as shown in Fig. 4.1.

4.2.5 When strapping is used, do not over-tension.

4.2.6 When shrink/stretch wrapping is applied to units on pallets, ensure that all layers of the unit are wrapped and, if possible, have wrap also encircle the pallet base.
**4.3 Slip-Sheeted Units**

4.3.1 Match slip-sheet strength to the weight of the load. For lightweight cases, use corrugated slip sheets (with corrugations running lengthwise to load), lightweight solid fiber, or plastic slip sheets. For heavyweight cases and bagged or baled products, use heavyweight solid-fiber slip sheets to avoid tearing the lips.

4.3.2 Use the same size stacking surface of the slip sheet as the unit load.

4.3.3 Tape or secure slip-sheet lips to prevent damaging adjacent units and to facilitate unloading, as shown in Fig. 4.2.

![Fig. 4.2 Taping slip sheet lips](image)

4.3.4 Have units provide unit-to-unit contact lengthwise in car.

4.3.5 To facilitate unloading, double sheet the doorway units so that a lip under each unit faces each car door.

**4.4 Palletized Units**

4.4.1 Ensure that pallets are of sufficient strength for the type of product handled and are in good condition with no broken boards or protruding objects.

4.4.2 When loading, provide palletized units with unit-to-unit contact with minimum overhang of shipping containers on pallets. Pallet under-hang is not permitted lengthwise of the railcar except when filled with approved filler material (see Fig. 5.1).

4.4.3 In double-layer pallet loads, have units equal in height to ensure pallet contact both longitudinally and laterally. If this is not the case, separate stacks of units with suitable divider sheets (see Fig. 4.3). Use separators between pallet and product (see Fig. 4.4).

4.4.4 Load and brace lading to permit unloading from either side of railcar. Use four-way entry pallets in doorway, if possible.

**4.5 Clamped Units**

4.5.1 When cars are clamp-loaded and side voids exist, apply fillers along both side walls in the car and in the center void.

4.5.2 In the doorway area, use fiberboard divider sheets adjacent to each side of the doorway units to facilitate unloading.
4.6 Stretch Wrap and Shrink Net Characteristics and Application

4.6.1 Stretch Wrap
- Minimum of 1 mil, low-density (0.92 g/cc) polyethylene with a stretch range of 150% to 200% or equivalent.
- Three successive layers of film applied to cube weights of 1,000 lb or less, and four successive layers of film applied to cube weights of over 1,000 lb. Tension should not crease products but should be sufficient to stretch film 150% to 200%.
- Stretch film must encompass all layers of each unit, including the pallet.
- Place slip-sheet lips inside the stretch film or tape lips to the stretch wrap. This will ensure that lips will arrive in usable condition; however, the unloader should cut the film or tape to expose the lip.

4.6.2 Shrink Net
- Use woven polypropylene with a density of 1.29 oz/yd2, with four strands per inch in the machine direction and three strands per inch in the cross direction, with a shrink range of 12% to 15%.
- Use netting to encase all layers of the product, including the pallet.

4.7 Divider Sheets

4.7.1 The construction and quantity of properly installed divider sheets will vary based on many factors (e.g., density of product and weight of load). The following are the minimum standards for use of divider sheets in cars that do not have cushioning devices or load restraining devices. Shippers are expected to cooperate with carriers when it can be demonstrated that additional use of divider sheets is necessary to avoid excessive damage.

4.7.2 When shipping containers of significant height differences or when bags/bales and boxes are loaded in cars that do not have cushioning devices or load-restraining devices, use corrugated or solid fiberboard divider sheets where these differences occur within the load. The divider sheets may also absorb some of the creasing that would otherwise appear on the shipping containers. Use corrugated or solid fiberboard divider sheets approximately the same width and height as the load. When corrugated divider sheets are used, place the divider sheets so that corrugations are vertical, as shown in Fig. 4.3.
4.7.3 For stretch-wrapped units of fiberboard boxes, use divider sheets between doorway stacks to facilitate unloading. Divider sheets are not required for loads that are stretch-wrapped and meet the following criteria:

- Weight limitation: Floor layer units must not exceed 35,000 lb; double-decked loads must not exceed 70,000 lb.
- No lengthwise void is allowed in unit patterns, except for pinwheel or chimney-stacked units or similar bonded blocks.
- If the load is double-layered, bottom-layer units must be equal in height throughout the load.

4.8 Separator Sheets

4.8.1 Use separator sheets to protect the top of units when stacked, as shown in Fig. 4.4.

![Separator Sheet Diagram](image)

Fig. 4.4 Unitized double layer bag or bale loads
5.0 BLOCKING AND BRACING MATERIALS

5.1 Steel Strapping

5.1.1 Use the proper combination of steel straps, seals, sealing tools, notches, or crimps to provide a minimum breaking strength of 4,725 lb and 75% joint efficiency for all doorway protection straps.

5.1.2 Use metal protectors, such as corner guards or plates, sufficient to provide a suitable radius to protect straps at all points on lading having sharp edges and/or sharp corners.

5.1.3 Use tensioning and sealing equipment properly. Check the tools periodically to ensure their efficiency.

5.1.4 More detailed information regarding steel strapping is available in the Closed Car Loading Guide, Part 1, (formerly Pamphlet No. 14), “Minimum Loading Standards for Freight in General Purpose Boxcars.”

NOTE: For the latest updates of approved strapping, go to the TTCI Web site at http://www.aar.com/standards/open_top_loading_approvals.php.

5.2 Nonmetallic Strapping

5.2.1 Use the proper combination of steel straps, seals, sealing tools, notches, or crimps to provide a minimum breaking strength of 4,725 lb and 75% joint efficiency for all doorway protection straps.

5.2.2 More detailed information regarding nonmetallic strapping is available in the Boxcar Loading Guide, Part 1, (formerly Pamphlet No. 14), Minimum Loading Standards for Freight in General Purpose Boxcars.

NOTE: For the latest updates of approved strapping, go to the TTCI Web site at http://www.aar.com/standards/open_top_loading_approvals.php.

5.3 Lengthwise Filler Material

5.3.1 Filler construction: lengthwise void fillers must be of uniform strength over the face of the void filler and capable of withstanding a load of 1,500 lb/ft² (test full-dimension filler sheet), as shown in Figs. 5.1 and 5.2.

![Fig. 5.1 Using lengthwise filler to fill pallet underhang](image-url)
5.3.2 Make the height and width dimensions of the faces of the filler material as near as possible to the dimensions of the faces of the units they will be separating.

5.3.3 Do not reuse filler material if it has been damaged and is no longer capable of filling the intended void, or if there is any evidence of creasing or damage to the core, which might reduce the compression strength of the filler.

5.3.4 Do not use lengthwise void filler material as a bulkhead or in lieu of a bulkhead.

5.4 Crosswise Filler Material

5.4.1 Plan load so that crosswise space is minimized without exceeding an aggregate of 18 in., unless additional appropriate bracing is used. Maintain vertical alignment to prevent crosswise movement. See Fig. 5.3.
5.5 Pneumatic Dunnage

5.5.1 Table 5.1 defines five levels of performance for pneumatic dunnage:

- Level 1 for pneumatic dunnage as lateral void fillers (and load securement in certain intermodal applications)
- Levels 2 to 5 for pneumatic dunnage as lengthwise void fillers in flat platen-type applications with varied performance requirements

Pneumatic dunnage meeting Level 2 to 5 requirements fulfill all Level 1 requirements.

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tr>
<td>Level 1</td>
<td>For filling lateral voids, primarily in intermodal loads</td>
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<tr>
<td>Level 2</td>
<td>For filling lengthwise voids in loads weighing up to 75,000 lb</td>
</tr>
<tr>
<td>Level 3</td>
<td>For filling lengthwise voids in loads weighing up to 160,000 lb</td>
</tr>
<tr>
<td>Level 4</td>
<td>For filling lengthwise voids in loads weighing up to 216,000 lb and horizontal applications in approved roll paper loading methods weighing up to 190,000 lb</td>
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<tr>
<td>Level 5</td>
<td>For filling lengthwise voids in loads weighing up to 216,000 lb and horizontal applications in approved roll paper loading methods</td>
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5.5.2 Usage guidelines: follow the manufacturer’s instructions on care and storage of bags prior to use. Inflate bags with an approved inflator, in accordance with the manufacturer’s instructions.

5.5.3 After inflation, check to see that dunnage bags are approximately the same size as the face of the load. Do not extend the dunnage bag beyond the face of the load. See Fig. 5.4.

5.5.4 Use buffer material of sufficient strength to prevent it from conforming to dunnage bag contour, to prevent chafing, to prevent dunnage bag from crushing load at proper inflation pressure, and to prevent lading from damaging dunnage bags.

5.5.5 Use buffer material equal or slightly larger in size than face of lading. Have lading adjacent to bag(s) nearly equal in height on each side of bag..
5.5.6 Inflation pressure may vary from 2 psig to 10 psig depending on the nature of lading and the level of air bag used.

5.5.7 Void size after inflation will be from 4 in. to 12 in. See applicable commodity publications for possible exceptions to this limitation.

5.5.8 Use inflatable dunnage to fill lengthwise voids of 4 to 18 in. after inflation for bales and bags. For fiberboard box goods, keep the void as narrow as practical, preferably 4 to 10 in. to a maximum of 12 in. after inflation. Inflate to 3 psi to 6 psi depending on the nature of the lading, and use an air gauge to ensure proper inflation pressure.

5.5.9 Install bag(s) so that the bottom(s) will be a minimum of 1 in. above the floor after inflation. Apply protective material (e.g., fiberboard) between the bag and floor.

5.5.10 Use hold-down methods when necessary to prevent bag displacement from the void area.

5.5.11 Use an air gauge to ensure prescribed air pressure at inflation. Recheck air pressure one-half hour after inflation for leakage.

5.5.12 Use clean and dry air to fill dunnage bags.

5.5.13 Do not use bags in tandem (back-to-back). Do not use dunnage bags to fill more than one lengthwise void in a car.

5.5.14 Use two bag systems unless otherwise specified.

5.5.15 When loading single layer units, use one bag positioned horizontally. For units loaded two layers high, use two bags positioned vertically or horizontally adjacent to each other. Normally a 48- by 96-in. bag is compatible with side-by-side unit loads measuring 48 in. long by 40 in. wide to 54 in. high.

5.5.16 For bags and bales, use a minimum of two sheets of 275-lb double-wall fiberboard buffer material between each side of dunnage and lading. When bracing fiberboard box goods, use suitable buffer material between dunnage bags and lading to prevent deformation of the lading.

5.5.17 Reusable dunnage bags intended for use only in filling crosswise (lateral) voids must be prominently marked by the manufacturer to indicate proper application. Never use bags marked for this application to fill lengthwise voids.

5.5.18 Leave the door of the car open after loading is completed, and check bag 30 minutes after installation for leakage.

5.5.19 For further information, refer to AAR General Information Bulletin No. 9, “Product Performance Profile for Pneumatic Dunnage.”

5.5.20 See http://www.aar.com/standards/dpls/pfds/PPPD_Verification_List.pdf for the most current “Product Performance Profile for Pneumatic Dunnage Product Verification List.”
6.0 UNIT LOADING

6.1 Cased Goods on Slip Sheets

6.1.1 Fill all lengthwise voids.

6.1.2 For loads centered in the ends of the car, divide voids equally at side walls, as shown in Fig. 6.1.

6.1.3 Total crosswise void is not to exceed 18 in., except in the doorway area where it is necessary to turn units to fill lengthwise void.

6.1.4 Cross-car fillers are not required under these conditions if vertical alignment is maintained during transit.

6.1.5 Divider sheets are not required for loads that are stretch-wrapped and meet the following criteria:

- Weight limitation: Floor layer units must not exceed 35,000 lb; double-decked loads must not exceed 70,000 lb.
- No lengthwise void is allowed in unit patterns, except for pinwheel or chimney-stacked units or similar bonded blocks.
- If load is double-layered, bottom-layer units must be equal in height throughout the load.

6.1.6 Doorway protection is required for sliding-door cars.

6.1.7 All units placed in the doorway area of the car must have two slip sheets to allow unloading from either door of the car. These units must have the slip-sheet lips taped at both sides of the units.
6.2 Cased Goods on Slip Sheets with Pneumatic Dunnage

6.2.1 The slip-sheet method was evaluated with a 60-unit load of fiberboard cases of canned goods, stacked in a bonded pattern. The test load weighed 135,000 lb. See Fig. 6.2.

6.2.2 Unitize all units on slip sheets with the slip-sheet lips taped in an upright position. Place units in stacks two units high in the car or place two units on a pallet that is loaded into the car. Place the units (48 in. dimension) crosswise inside the railcar. Place void fillers in the center void to prevent crosswise movement.

6.2.3 Place fiberboard divider sheets in front of each unitized stack, one against each stack for the full length of the car. These units are placed tight lengthwise in the car.

6.2.4 All units placed in the doorway area of the car must have two slip sheets to allow unloading from either door of the car. These units must have the slip-sheet lips taped at both sides of the units.

6.2.5 Fill remaining lengthwise void in the doorway area with double-faced cellular honeycomb void fillers and two inflatable dunnage bags, one per row. The void fillers are restricted to 4 in. thickness maximum on each side of the verified pneumatic dunnage bag. This can be either one 4 in. sheet or two 2-in.-thick sheets. Minimum required crush strength is 1,500 lb/ft² for the void fillers.

6.2.6 Inflate the verified pneumatic dunnage bags from 3 psi to 6 psi, depending on the nature of the lading. Maximum void filled by the bag after inflation is 12 in. If origin void is larger, use additional lengthwise void fillers at different stack locations to reduce the void to 12 in. after inflation of the bag.

6.2.7 Hold-down methods may be necessary to prevent bag(s) displacement from void area. Secure bags with tape, double-faced tape, and glue.

6.2.8 Doorway protection is required, except in plug door cars.
6.3 Cased Goods on Slip Sheets in Bulkhead-Equipped Cars

6.3.1 Fill all lengthwise voids between bulkhead and end walls.

6.3.2 In double-layered loads, divider sheets are not required if the bottom layer is equal in height throughout the load.

6.3.3 In double-layered loads, place the units against each side wall utilizing appropriate cross-car fillers between the units. Extend fillers from the top of the second layer unit to a length at least covering the top third of the bottom layer unit.

6.3.4 Use load divider bulkhead doors to brace each end of the car (see Fig. 6.3). See subsection 2.1 for instructions on bulkhead doors.

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6.4 Cased Goods on Pallets in Bulkhead-Equipped Boxcars—Offset Stack Loading Method

6.4.1 The offset stack loading method is intended for use with cases or shrink-wrapped trays on pallets or slip sheets. For shrink-wrapped trays, the shrink film must encircle the package covering all exposed container ends, have a secure seal extending the width of the film, and extend down over the containers in the outside rows at the ends of the tray.

6.4.2 Unitize the cases or shrink-wrapped trays on pallets or slip sheets using minimum 80-gauge stretch film to encompass all layers of each unit. Use three layers of stretch film over the entire unit with a fourth layer at the top and bottom of the unit. Extend the stretch wrap below the bottom layer to include the pallet when unitizing on pallets. Proper unitization with the stretch film is essential to the success of this loading method.
6.4.3 Load the units in two-wide stacks with the stacks positioned alternately against opposite side walls of the boxcar, as shown in Fig. 6.4. Load the units tight both crosswise and lengthwise of the car. The units in each layer are of the same height in each end of the boxcar.

6.4.4 Fig. 6.4 shows the load as tested for this method. The actual number of stacks in any load may vary depending on the requirements of that shipment.

6.4.5 Fill all lengthwise voids, including any voids existing between the bulkhead doors and the lading.

6.4.6 Crosswise void fillers are not required in the ends of the railcar if the crosswise voids are 18 in. or less. Use void fillers if crosswise voids exceed 18 in.

6.4.7 Use load divider bulkhead doors to brace each end of car. See paragraph 2.2 for instructions for bulkhead doors.

6.5 Bagged Products on Pallets Secured with Cargo Nets

6.5.1 Use only cushion-equipped boxcars specially equipped with side-wall anchors to accommodate cargo net straps.

6.5.2 Inspect the cargo net and associated assemblies for suitability prior to loading. Worn, missing, or corroded components and/or stitching may be cause for rejection.
6.5.3 General Loading Procedure

6.5.3.1 For this loading method, use polyester web strap cargo nets for securing bagged products stowed on wood pallets loaded in cushioned-equipped boxcars. Use four cargo nets to secure four sections of product, two sections in each end of the boxcar. Secure the cargo nets to each side wall across the face of each section. Cargo nets are typically 117 in. high by 96 in. wide and constructed of two 12-, five 3- and ten 2 in.-wide straps. The minimum breaking strength of each cargo net assembly is 65,000 lb. See Fig. 6.5 for cargo net.

![Diagram of cargo nets and straps](image)

**Fig. 6.5 Bagged products on pallets secured with cargo nets**

6.5.3.2 Secure all palletized bags loaded by this method with plastic stretch film.
6.5.4 Loading Procedure

6.5.4.1 Use this loading method with bagged products stowed on wood pallets and secured with plastic stretch film in specially cushioned equipped boxcars. The units are generally loaded two wide by two and/or three high. Fig. 6.6 shows an example of the load patterns and position of the cargo nets. The number of units actually loaded will depend on product weight and order requirements.

Fig. 6.6 Cargo net attachment—top view

6.5.4.2 Prior to commodity loading, secure the cargo nets along one side wall by connecting the five short 3-in.-wide cross straps into the locator bolts in the channel iron attached at the side walls. Securement points are on the side wall opposite of the side wall with the ratchets attached. There are multiple bolt holes in the channel to allow adjustment so that nets are properly placed at the corner of the load. Thread the steel rod through the end loop of the strap and through the holes in the channel iron attached to the side wall. Hang the five long 3-in.-wide cross straps on the side wall. The cargo net should be above the railcar floor.

6.5.4.3 Starting at each end wall, load all units tight together—two units wide with each stack centered in the boxcar leaving any remaining lateral void between the units and the side walls.

6.5.4.4 After loading three stacks of units, position the first cargo net across the face of this section. Starting at the top, thread each of the five long 3-in.-wide straps behind the locator bolts, located a minimum of 12 in. from face of load, and through the reel bars in the ratchets attached to the side walls. (Use any of the positioning holes on the channel iron to achieve the desired distance.) Pull the straps tight to eliminate any slack. Position the 12 in. vertical cargo net corner pieces to achieve a balanced “wrap” at each corner. Operate the ratchet handle back and forth until the cargo net is properly tensioned. Ratchets must have at least two wraps of webbing on the reels to ensure no slippage. Avoid excess wrapping because this may cause the ratchet to jam and become difficult to unlock at destination.

6.5.4.5 After loading the next three stacks of pallets, position the second cargo net across the face of this section. Secure the cargo net in the same manner as outlined in paragraph 6.5.4.4.

6.5.4.6 Continue to load the opposite end of the car in the same manner.

6.5.4.7 When loading is completed in each section, check that each cargo net strap is properly tensioned.
6.6 Beverage Products on Slip Sheets with Pneumatic Dunnage and Polyester Web Strap

6.6.1 Use this loading method for plastic stretch-wrapped units of cased beverage products stowed on plastic slip sheets. Some variation may be necessary depending on the dimension and number of units being loaded. The number of units actually loaded will depend on weight and order requirements. See Fig. 6.7.

![Diagram of loading method](image)

**Fig. 6.7** Beverage product on slip sheets—plan view

6.6.2 Prepare each end of the car by temporarily affixing two 2-in.-wide polyester web straps (minimum break strength of 10,000 lb each) around the side walls and end walls starting at the doorposts. Position the straps approximately 38 and 80 in. from the floor so that the ratchet assemblies can be joined in the doorway area. Place two corner protectors against each end wall spaced apart at the approximate distance of a width of a slip-sheeted unit times two and equal distance from the centerline of the railcar. Corner protectors should be equal in height to the top of the upper units and constructed of fiber-reinforced plastic, each 3/8 in. thick and 7 × 10 × 108 in. long.

6.6.3 Load two slip-sheeted units, one unit on each side of the centerline of the railcar, on the floor in each end of the railcar against the corner protectors. Adjust the positioning of the corner protectors as necessary.

6.6.4 Load a second layer of slip-sheeted units against the end wall of the railcar and against the corner protectors.

6.6.5 Continue loading in two layers on the centerline of the railcar to the doorway using 3-in.-thick honeycomb void fillers (capable of withstanding a load of 1,500 lb/ft²) as required to reduce the doorway void to be filled by dunnage bags. After both ends of the railcar are loaded, place two corner protectors at the corners of the last units. Unitize each section by applying the 2-in.-wide polyester web straps around the face of the section and securing with the ratchet assemblies.

6.6.6 Install 3-in.-thick fillers across the face of one section. Load one stack two layers high and wide crosswise of slip-sheeted units against the void fillers. Palletized units may be loaded in the doorway area to facilitate loading. The pallets must be faced away from the adjacent lading by fiberboard dunnage suitable to prevent pallet-to-lading contact and any damage that might result from such contact.
6.6.7 Fill the remaining doorway voids with 3-in.-thick honeycomb void fillers and one 48 × 108 in. pneumatic dunnage bag for each row. Inflate pneumatic dunnage bags to 5 psi. Use pneumatic dunnage bags to fill 4- to 12-in. space after inflation. See Fig. 6.8.

![Fig. 6.8 Beverage products on slip sheets—isometric view](image)

6.7 Bright-Stack Cans with Reusable Void Fillers and Pneumatic Dunnage

6.7.1 This loading method was tested in boxcars having 50 ft 6 in. and 60 ft 9 in. inside lengths.

6.7.2 Use only cushion-equipped cars when employing the loading method described herein. **NOTE:** Due to the nature of this concept and product, some damage to product (up to 1%) could occur. If this is objectionable, do not use this loading and bracing method.

6.7.3 Pallets loaded in the ends of the car are loaded with their long dimension across the car. Pallets loaded in the doorway area are loaded with their long dimension lengthwise in the car.

6.7.4 If necessary, use 4-in.-thick reusable polyethylene filler panels or other suitable material at the ends of the car to square up bowed end walls.

6.7.5 Use drop-down void fillers or other suitable fillers to fill all crosswise voids, including those in the doorway area.
6.7.6 Plan load so that bulkhead spacers are placed at least one pallet apart from pneumatic dunnage centered in the doorway, as shown in Fig. 6.9. Use a minimum of one 4-in.-thick reusable polyethylene filler panel on either side of the bulkhead spacers.

![Diagram of loading guide](image)

6.7.7 Fill the remaining voids between the two doorway stacks on each side of the boxcar with the appropriate level of 48 × 108 in. pneumatic dunnage for the weight of load (use to fill a 4- to 12-in. space after inflation). A minimum of one 4 in. reusable void filler panel is required on each side of the pneumatic dunnage to serve as a buffer/filler. Inflate each pneumatic dunnage bag to 6 psi. Check the bags 30 minutes after inflation for leakage.

6.7.8 Only the polyethylene void fillers listed in Table 6.1 have been evaluated and found acceptable for use with this securement system.

<table>
<thead>
<tr>
<th>Type</th>
<th>Compression Strength</th>
<th>Company</th>
</tr>
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<tbody>
<tr>
<td>Void filler panels (4 in.)</td>
<td>25,000 lb</td>
<td>Fabri-Form</td>
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<tr>
<td>Bulkhead spacers</td>
<td>70,000 lb</td>
<td>Fabri-Form</td>
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</table>

a/ See ASTM Standard D642 for information on testing procedures

6.7.9 The “degree of reusability” was not addressed during testing. As with other reusable dunnage products, they should not be used if they are torn, damaged, or in any way compromised from fulfilling their original intent when new.
6.8 Flour in Paper Bales on Slip Sheets

6.8.1 Fill all lengthwise voids.

6.8.2 All single-layer loads must have the units loaded down in the center of the railcar with voids equally divided at side walls.

6.8.3 Total crosswise void is not to exceed 18 in., except in doorway area where it is necessary to turn units to fill lengthwise void.

6.8.4 Cross-car fillers are not required under these conditions if vertical alignment is maintained during transit.

6.8.5 All units placed in the doorway area of the car must have two slip sheets to allow unloading from either door of the car. These units must have the slip-sheet lips taped at both sides of the units.

6.8.6 Doorway protection is required for sliding door cars.
7.0 DOORWAY PROTECTION

7.1 Doorway protection is required to prevent lading from falling or rolling out of the doorway or coming into contact with sliding doors. Protect opening with wooden guide rails, steel straps, or other materials of sufficient strength, and adequately secure.

7.2 Use flush doorway protection in boxcars with sliding doors to prevent the lading from coming into contact with the side doors or to prevent the weight of the lading bearing against the side doors.

7.3 Unit Loads
To keep lading in position, secure openings with 1¼ × 0.029 in. steel straps or equivalent, covered with corrugated fiberboard (see paragraph 5.1). If lading is unitized by stretch wrap, shrink film, gluing, or other means, one strap is required for the bottom layer units and two straps for the top layer units.
## CLOSED CAR LOADING STANDARDS

<table>
<thead>
<tr>
<th>Part</th>
<th>Subject/Title</th>
<th>Publication Date</th>
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<tr>
<td>1</td>
<td>Minimum Loading Standards for <strong>Freight</strong> in General Purpose Boxcars</td>
<td>1/2014</td>
<td>Pamphlet No. 14, Minimum Loading Standards for Freight in General Purpose and Specially Equipped Boxcars (12/84)</td>
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<tr>
<td>3</td>
<td>Minimum Loading Standards for <strong>Plywood and Similar Building Products</strong> in Closed Cars</td>
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<td>Pamphlet No. 8, Minimum Loading Standards for Sanded and Sheathing Plywood in Closed Cars (11/85)</td>
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<tr>
<td>4</td>
<td>Minimum Loading Standards for <strong>Lumber</strong> in Closed Cars</td>
<td></td>
<td>Pamphlet No. 20, Minimum Loading Standards for Lumber in Closed Cars (10/87)</td>
</tr>
<tr>
<td>5</td>
<td>Minimum Loading Standards for <strong>Building Brick</strong> in Closed Cars</td>
<td></td>
<td>Pamphlet No. 6, Minimum Requirements for Loading, Bracing and Blocking Carload Shipments of Building Brick in Closed Cars (8/83)</td>
</tr>
<tr>
<td>6</td>
<td>Minimum Loading Standards for <strong>Prepared Food and Similarly Packaged Products</strong> in Closed Cars</td>
<td>2/2014</td>
<td>Pamphlet No. 17, Minimum Loading Standards for Packaged Food Products in Closed Cars and TOFC/COFC (10/88)</td>
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<tr>
<td>7</td>
<td>Minimum Loading Standards for <strong>Intermediate Bulk Containers</strong> in Closed Cars</td>
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<td>8</td>
<td>Minimum Loading Standards for <strong>Bagged and Baled Commodities</strong> in Closed Cars</td>
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<td>Pamphlet No. 3, Minimum Loading Standards for Bagged and Baled Commodities in Closed Cars (10/93)</td>
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<tr>
<td>9</td>
<td>Minimum Loading Standards for <strong>Coiled Metal Products</strong> in Closed Cars</td>
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<td>Pamphlet No. 23, Minimum Standards for Loading Steel Products in Closed Cars, Trailers or Containers (4/95)</td>
</tr>
<tr>
<td>10</td>
<td>Minimum Loading Standards for <strong>Primary Metal Products</strong> in Closed Cars</td>
<td></td>
<td>Pamphlet No. 37, Minimum Standards for the Safe Loading of Ingots, Pigs, Anodes, Rods and Similar High Density Metallic Commodities in Closed Cars (11/84)</td>
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</table>

See also:
- *Open Top Loading Rules Manual, Sections 1–7*