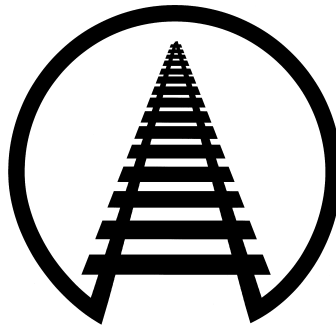


Circular 42-N

(Supersedes Circular No. 42-M)

GENERAL RULES GOVERNING THE LOADING OF CARLOAD SHIPMENTS OF COMMODITIES IN CLOSED CARS



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A—INTRODUCTION

These rules supersede all previous releases of Circular 42.

These general rules must be observed for all closed car loading and take precedence over the “Loading Methods” referred to, or included, in the loading publications. Those publications contain detailed methods for loading specific commodities.

B—GENERAL RULES

The following rules have been formulated for the purpose of providing *safe* methods of loading closed cars and *must* be observed. The primary purpose of these rules is safe transit of the railcar from origin to destination.

1. Inspection and Selection of Cars

- A. Cars must be inspected by shipper at loading point to verify that cars are in suitable condition. Car interiors must have, but are not limited to, sound roofs, sides, floors and end walls; and operable, snug-fitting doors. Any exception is cause for the car to be rejected. See [Rule 9, Opening and Closing of Doors](#),” for further information on railcar doors. See UFC 6000-M, Rule 27, for further information.
- B. Box Cars for Loading Concentrated Weight

Box cars for the loading of metals of heavy concentrated weight—for example, tin plate, copper anodes, lead ingots, cathodes, zinc slabs, and spelters and all other high-density commodities—must be inspected by the shipper (either before commodities are placed for loading or at loading point) to verify that they are in suitable condition to safely carry loads to destination.

The shipper should check the box car to verify that the floors and supporting structure are in good condition. If the shipper has any doubts concerning the condition of the car, the serving railroad should be contacted.

2. Maximum Load Weight

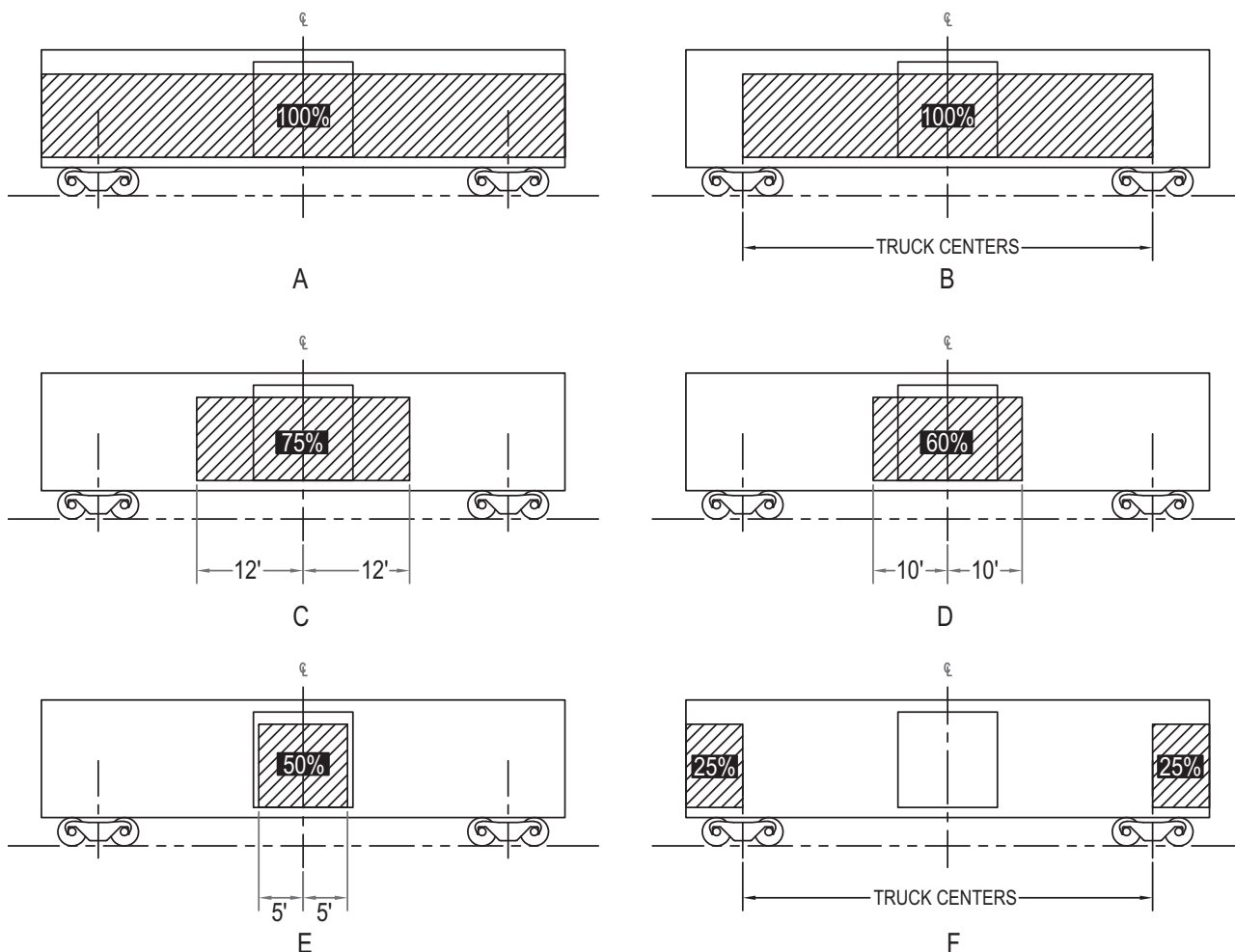
- A. The weight of the load in the car must not exceed the load limit stenciled on the car or as listed in UMLER. If there is a discrepancy between the two load limits, use the lower of the two load limits and report the discrepancy to the serving railroad.
- B. The weight of the load on one truck must not exceed one-half of the load limit stenciled on the car or as listed in UMLER. If there is a discrepancy between the two load limits, use the lower of the two load limits and report the discrepancy to the serving railroad.

3. Distribution of Weight Lengthwise in Cars

- A. The weight of the load must be evenly distributed lengthwise in the railcar. The origin carrier should be contacted for specific information on lengthwise weight distribution.
- B. For all box cars, the percentages of stenciled load limits, as shown in [Table 1](#), must not be exceeded for loads located between truck centers, measured lengthwise of car, unless car owner has otherwise designated by note in the Official Railway Equipment Register.

Table 1: Length of load vs. percentage of load limit

Length of Load	
10 ft to 20 ft	50%
20 ft 1 in. to 24 ft	60%
24 ft 1 in. to truck centers	75%
Truck centers to full length of car	100%



Note: For cars with inside length 61 ft or greater, only Figures A and B apply.

Figure 1: Length of load vs. percentage of load limit^{a/}

- C. The weight of material loaded in either end between truck centers and end of car must not exceed 25%. See Sketch F.
- D. When crosswise bearing pieces are used, the distance between the outside bearing pieces (center to center) must exceed the minimum distances specified in [Rule 3.B](#) for that percentage of the stenciled load limit being loaded and be in sufficient number to ensure uniform distribution of lading on car floor.
- E. Bearing pieces lengthwise of car and extending beyond the lading may be used to spread the weight distribution over a greater area. In such cases, “length of bearing pieces” is substituted for “length of load” in [Rule 3.B](#). Bearing pieces must be of suitable strength in relation to the percentages stated and be continuous and in sufficient number to ensure uniform distribution of lading on the car floor.
- F. When the length of load is less than the distance between truck centers and load is not located in the center of the car, the center of the load weight must not be nearer to either truck center than that shown in [Table 2](#):

Table 2: Load weight vs. distance to truck center (when load is not centered in car)

Load Weight as Percentage of Load Limit	Distance from Center of Load Weight to Nearest Truck Center
50% of load limit or less	Any place between truck centers
60%	One-sixth distance between truck centers
66.6%	One-fourth distance between truck centers
75%	One-third distance between truck centers
87%	Three-sevenths distance between truck centers
90%	Nine-twentieths distance between truck centers

- G. No lengthwise shift of lading is permissible unless the load is secured as a floating unit under the following conditions:
- (1) All recommended securement and doorway protection methods are observed.
 - (2) Retardation aids are used on all floating loads in closed cars where specified in individual loading pamphlets to prevent excessive shifting on car floor.
- H. When loading covered hopper cars, all compartments shall be uniformly loaded to an equal height unless the car is listed in the Official Railway Equipment Register as being designed for unequal compartment loading. When a car is loaded with high-density material to gross rail load that is less than 60% of the available volume, the car owner must be contacted for approval.
- I. If subjected to stopover unloading, covered hopper cars may have the following compartments partially or completely unloaded:
- (1) Two-compartment car—not permitted
 - (2) Three-compartment car—both end compartments or the center compartment
 - (3) Four-compartment car—both center or both end compartments

Consignee must inspect the car before releasing to ensure that the remaining load is equally distributed and meets the provisions of [Rule 4](#).

^{a/} Source: *Manual of Standards and Recommended Practices*, Section C-II, M-1001, “Design, Fabrication, and Construction of Freight Cars,” paragraph 4.1.3.1

4. Distribution of Weight—Crosswise of Car

- A. The load must be located so that the weight along both sides of car is about equal for the entire length of the load.
- B. When the load cannot be placed so as to obtain equal distribution of weight crosswise of car, suitable ballast that is properly secured must be used to equalize the weight.
- C. Lading in box cars must be secured to prevent tipping or moving toward the car's sides where the vacant space across the car exceeds the following:
 - (1) An aggregate of 18 in. crosswise of car
 - (2) Vacant crosswise space of less than 18 in. as may be specified in closed car loading guides covering methods for loading, bracing, and blocking carload shipments of individual commodities
 - (3) For primary metals, vacant crosswise space cannot exceed an aggregate of 6 in.
- D. In cars with longitudinal partition sheets, partial unloading of covered hopper cars crosswise of the car or complete unloading of any compartment along one side is prohibited.

5. Loading, Blocking, and Bracing—Box Cars

- A. Lading must be loaded and secured so as to permit unloading from either side of the railcar.
- B. All lumber used for blocking and bracing must be of sound material and free of defects that could impair its strength or interfere with proper nailing.
- C. Machines and other items that have a high center of gravity or narrow base must be secured to prevent them from tipping over in transit.
- D. When a car floor is not satisfactory for use of material handling equipment in a loading/unloading operation, suitable steel plates or other adequate material must be placed in the car to facilitate use of the equipment and prevent the equipment from breaking through the floor.
- E. All high-tension steel straps used for securing the load must meet the specifications published in ASTM Specification D3953 (latest edition). All high-tension non-metallic straps used for securing the load must meet the specifications published in ASTM Specification D3950 (latest edition).
- F. High-tension steel straps used to secure a load to a car may be substituted by an equal number of AAR-approved Type 1A non-metallic strapping if of equal or greater breaking strength, unless otherwise specified in a loading guide or method. All high-tension straps securing a load must be machine-tensioned and sealed.
- G. Metal protectors, such as corner guards or plates, sufficient to provide a suitable radius must be used to protect straps at all points on lading having sharp edges. Apply them so as to prevent displacement.
- H. The manner of attaching straps to car walls must be in accordance with the methods prescribed for the individual commodities that reduce the possibility of straps shearing.

- I. Unless otherwise specified in the loading guides, the number of straps for rigid braced loads must have the combined joint strength in each longitudinal impact direction equal to the weight of the lading being secured.

EXAMPLE: Lading weighs 150,000 lb

Restraint for longitudinal is 1.0 G at each end \times 1/2 the lading weight = $1.0 \times 75,000 = 75,000$ lb

Required # of AAR Type 1A Grade 5 straps with
ladder-type buckle (5,400 MBS) = $75,000 \div 5,400 = 14$ Type 1A Grade 5
in a single strap configuration (one ladder buckle)

Required # of AAR Type 1A Grade 5 straps with
ladder-type buckle (5,400 MBS) = $75,000 \div 10,800 = 7$ Type 1A Grade 5
in a belt loop strap configuration (two ladder buckles)

NOTE: For the latest updates of approved strapping, go to <http://www.aar.com/standards/OpenTop-approvals.html>

- J. Non-metallic strap may be used for load securement only when specified in applicable commodity loading publications.

Users of tensioning and sealing equipment must be properly instructed in the correct use of these tools, and tools must be checked periodically to ensure their efficiency.

High-tension bands used for load securements shall be marked to indicate the following:

- The letters “AAR”
- The manufacturer’s or distributor’s name, or abbreviated name, or registered trademark, or symbol, or two-digit AAR code

Markings shall be in characters not less than 1/8 in. high for steel die imprint and not less than 1/4 in. high for paint, ink surface printing, or embossing, spaced at not more than 5 ft intervals.

Markings applied to high-tension straps manufactured to metric dimensions must be followed by the letter “M” of the same size as the original marking.

IMPORTANT: High-tension straps must be applied to packages and/or loads with the AAR identification markings facing outward.

NOTE: For the latest updates of approved strapping, see Tables 17.8, 17.9, 17.10, 19.2, and 19.3 at <http://www.aar.com/standards/OpenTop-approvals.html> or in *Open Top Loading Rules*, Section 1, “General Rules for Loading All Commodities.”

6. Doorway Protection

- A. When there is a possibility of lading falling or rolling out of a doorway or coming in contact with sliding or plug-type side doors, openings must be protected with doorway protection, steel straps, or other material of sufficient strength and number and adequately secured. Cars equipped with plug-type doors loaded with cylindrical items such as rolls of paper or drums require doorway protection unless specifically exempted by applicable commodity pamphlets.
- B. Lumber wedged between car door posts is not considered doorway protection.

7. Center of Gravity

- A. The combined center of gravity of a railcar and its contents must not exceed 98 in. above top of rail. In closed cars, there is no practical possibility of exceeding this center-of-gravity limitation except in cars that exceed Plate C dimensions. See *AAR Manual of Standards and Recommended Practices*, Section C, “Car Construction Fundamentals and Details.”

GENERAL RULES

B. Cars exceeding Plate C dimensions may extend to 17 ft above top of rail. Certain loadings, such as rolled paper, that are loaded two layers high may result in excessive combined center-of-gravity dimension. Shippers must calculate the combined center of gravity of the railcar and contents whenever any part of the load will exceed 11 ft 8 in. (140 in.) in height above the car floor. Shipper's tender of billing information for such cars to the origin carrier will signify compliance with this rule. Any questions on loading limitations in cars exceeding Plate C dimensions should be handled with the mechanical department of the origin carrier.

Use the following formula to calculate the combined center of gravity:

$$\text{Combined Center of Gravity (CG)} = \frac{(B \times E) + (D \times F)}{(E + F)}$$

where

- A = Height of car floor above top of rail (in.)
- B = Empty center of gravity of railcar above top of rail (in.), obtainable from car owner (Empty center of gravity may be stenciled on the railcar.)
- C = Center of gravity of load above the car floor (in.)
- D = Height of center of gravity of load above top of rail, equal to A+C
- E = Lightweight of railcar (lb)
- F = Weight of load (lb)

NOTE: The following table may be used as a guideline when determining A in the above formula:

Weight of Loads (lb)	Spring Deflection (in.)
122,000–138,000	1.00
138,000–165,000	1.25
165,000–192,000	1.50
192,000–207,000	1.75

EXAMPLE: Roll Paper^{a/}

Load: Seventy-seven 45 in. diameter × 50 in. wide rolls each weighing 2,500 lb, loaded in 29 floor spots with two complete layers plus 19 rolls in an incomplete third layer.

6 in. high risers are used to block the incomplete layer. Incomplete layer unitizing not shown.

NOTE: When loads consist of multiple sections or units having different unit heights and weights, each section or unit must be taken separately when calculating the CG of the load.

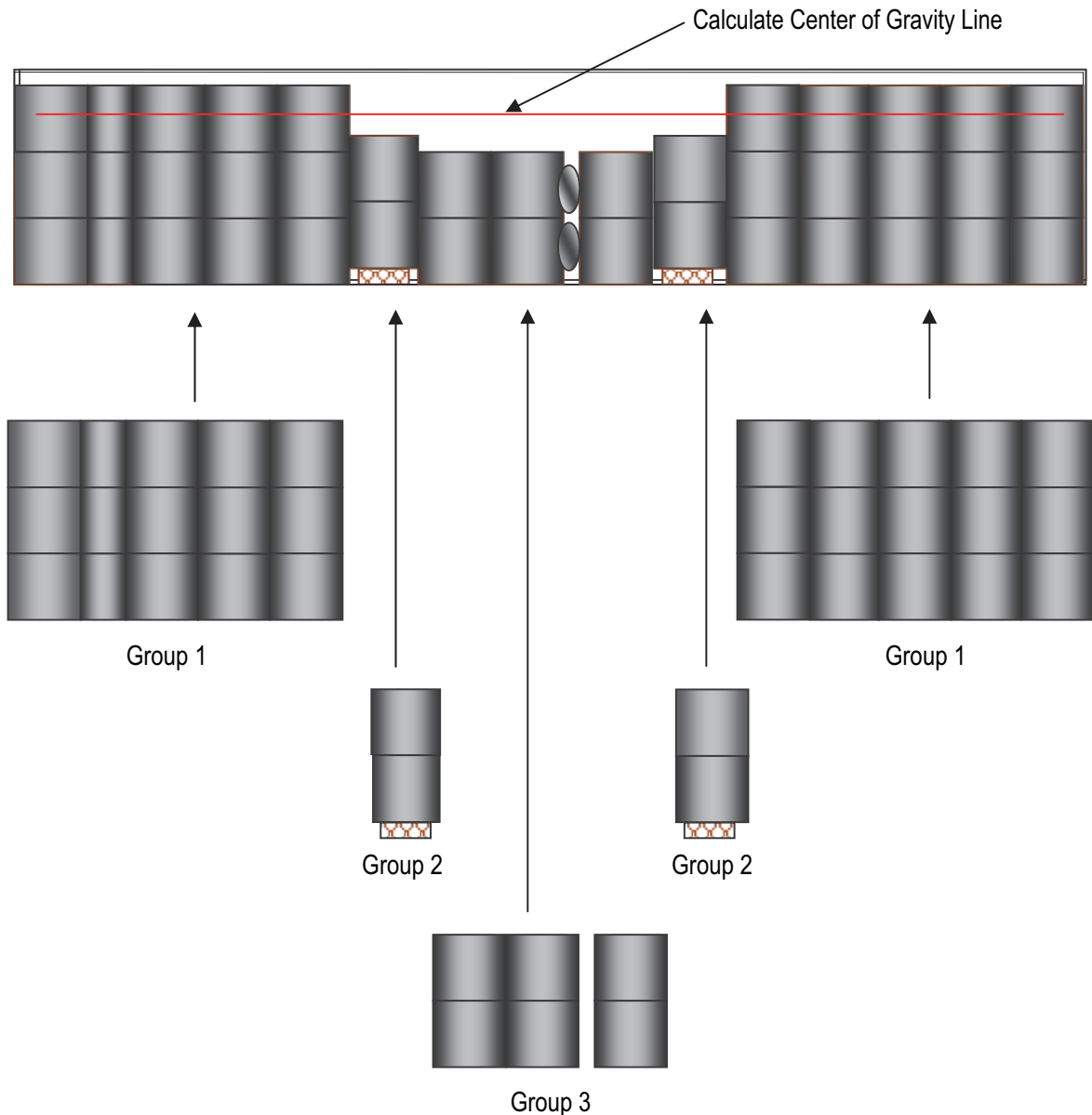


Figure 2: Side view of example load

All rolls in Group 1 would be considered a section of this multi-section load. All rolls in Group 2 would be considered a separate section, as would all rolls in Group 3. Riser height should also be added in when calculating the center of gravity for that section.

^{a/} Source: *Closed Car Loading Guide*, Part 2, "Best Practices for Loading Roll Paper in Railcars"

GENERAL RULES

$$A = 44 \text{ in.}$$

$$B = 58 \text{ in.}$$

$$\text{Group 1} = C1 = (50 \text{ in.} \times 3) / 2 = 75 \text{ in.}$$

$$\text{Group 2} = C2 = (50 \text{ in.} \times 2 + 6) / 2 = 53 \text{ in.}$$

$$\text{Group 3} = C3 = (50 \text{ in.} \times 2) / 2 = 50 \text{ in.}$$

$$\text{Group 1} = D1 = 75 \text{ in.} + 44 \text{ in.} = 119 \text{ in.}$$

$$\text{Group 2} = D2 = 53 \text{ in.} + 44 \text{ in.} = 97 \text{ in.}$$

$$\text{Group 3} = D3 = 50 \text{ in.} + 44 \text{ in.} = 94 \text{ in.}$$

$$E = 72,800 \text{ lb}$$

$$\text{Group 1} = F1 = 19 \text{ rolls} \times 3 \text{ layers} \times 2,500 \text{ lb} = 142,500 \text{ lb}$$

$$\text{Group 2} = F2 = 4 \text{ rolls} \times 2 \text{ layers} \times 2,500 \text{ lb} = 20,000 \text{ lb}$$

$$\text{Group 3} = F3 = 6 \text{ rolls} \times 2 \text{ layers} \times 2,500 \text{ lb} = 30,000 \text{ lb}$$

$$\begin{aligned} \text{Combined CG} &= \frac{(B \times E) + (D1 \times F1) + (D2 \times F2) + (D3 \times F3)}{E + F1 + F2 + F3} \\ &= \frac{(58 \times 72,800) + (119.5 \times 142,500) + (97 \times 20,000) + (94 \times 30,000)}{72,800 + 142,500 + 20,000 + 30,000} \\ &= 97.8 \text{ in. above top of rail (ATR)} \end{aligned}$$

8. Special Equipment

Load protection devices in specially equipped cars must be used in accordance with carrier instructions. Restraining devices must be left in car when empty and be properly secured.

9. Opening and Closing of Doors

Mechanical trucks (forks lifts, etc.) must not be used to open or close freight car doors. If doors cannot be opened, contact the serving railroad for assistance. Ensure that doors can be fully closed and properly locked. For more information regarding the proper use and care of box car doors, see <http://www.aar.com/standards/damage-training.php>.

APPENDIX A
UNIFORM FREIGHT CLASSIFICATION 6000-M, RULE 27

Rule	Subject	Application
27	Loading and Unloading	<p>SECTION 1. Owners are required to load into or on cars freight for forwarding by rail carriers and to unload from cars freight received by rail carriers, carried at CL rates, except where tariff of carrier at point of origin or destination or stopover station (as the case may be) provides for loading or unloading of CL freight by carrier.</p> <p>SECTION 2. Owners are required to load into or on cars heavy or bulky freight for forwarding by rail carriers and to unload from cars heavy or bulky freight received by rail carriers, carried at any quantity rates that cannot be handled by regular station employees or at stations where carrier's loading or unloading facilities are not sufficient for handling.</p> <p>SECTION 3. Shippers must comply with carrier's rules regulating safe loading of freight and protection of equipment (see Note 1). Weight of lading must be approximately the same on each side of the car, van, container, trailer, or other vehicles. Freight in closed cars equipped with other than plug-type doors must be so loaded as to prevent any contact with car doors during transit. Cars equipped with plug-type doors loaded with cylindrical items such as rolls of paper or drums require doorway protection unless specifically exempted by applicable commodity pamphlets. The weight of load on one truck must not exceed approximately one-half of the load limit weight stenciled on car. When shipper is responsible for loading, both initial and intermediate shippers of cars, vans, containers, trailers, or other vehicles that are to complete loading at more than one point must comply with the regulations referred to above. Intermediate receiver of cars, vans, containers, trailers, or other vehicles must reload in a level manner or brace or rebrace, if necessary to prevent damage, the remaining portion of lading destined to subsequent receiver.</p> <p>NOTE 1. All nonused securement devices must be returned to and stored in same car from which removed, and devices must be secured.</p> <p>SECTION 4. When articles are loaded on open cars, small detachable parts must be removed and placed in barrels or boxes or secured within the article. Barrels and boxes must be encircled at ends with iron straps and securely attached to the article or to floor of car. Such barrels or boxes must be specified on shipping orders and bills of lading. Fragile parts not detached must be protected.</p> <p>^{a/}SECTION 5. To complete unloading, consignee must remove all lading (unless otherwise provided by applicable rate tariff), non-railroad-owned dunnage, blocking, bracing, strapping, and any other non-railroad-owned material that was part of the inbound shipment and secure interior equipment (see Note 2).</p> <p style="text-align: center;">NOTE 2. CLOSED CARS</p> <p>(a) Consignee is required to return and secure to same car all railroad-owned securement devices removed to complete unloading, securely lock all bulkhead doors, return wooden doors used in transportation of bulk grain or grain products, and close all top hatches and bottom outlets and exterior doors.</p> <p style="text-align: center;">OPEN CARS</p> <p>(b) Consignee is required to return and secure to same car all railroad-owned securement devices removed to complete unloading, store chains, ratchets, tension devices, and other appurtenances in appropriate facility and to close all bottom outlets.</p> <p>SECTION 6. In the interest of promoting car efficiencies, certain exceptions may be allowed under Section 3, Note 1 and Section 5, Note 2, provided that said exceptions will not disrupt the uniform continuity desired and that the affected carrier(s) mutually approve.</p> <p>In those instances, request for exception will be made in letter form to the serving carrier citing the exception desired and the circumstances for relief.</p> <p>Relief may be approved only by the carrier(s) whose cars are affected. In those instances of exceptions approval, carrier(s) must have on file copy of letter of approval in the following locations:</p> <ol style="list-style-type: none"> 1. Local agent's office 2. Office of Chief Transportation Officer 3. Association of American Railroads Transportation Division

^{a/} Does not apply for account of the NYA.

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