Circular 43-H

RULES GOVERNING THE LOADING, BLOCKING, AND BRACING OF FREIGHT IN CLOSED CONTAINERS AND TRAILERS IN INTERMODAL SERVICE

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A—Introduction

These rules, which supersede all previous releases of Circular 43, apply both to container and trailers in intermodal rail service.

These rules are designed for the benefit of all parties concerned. By adhering to the rules, both freight and equipment will be protected in the absence of unusual circumstances.

Intermodal containers or trailers may move in a backwards or reverse direction for all or a portion of their journey. During its journey, normal transportation forces will shift an unsecured load or cause freight to exert excessive pressure against the nose, rear doors, or sidewalls. It is therefore imperative that containers or trailers moving in rail service be loaded by the shipper in strict compliance with the General Rules as contained in this publication. Shipper is defined in these rules as that party or his agent who is responsible for the physical loading and securement of the freight in the container or trailer.

If loading rules, illustrations, or principles contained in this publication appear not to cover a specific shipment being tendered for intermodal movement, contact the origin carrier's loss and damage prevention representative for assistance and/or instructions.

Loading rules contained herein apply to shipments transported in the USA, Canada, and Mexico.

General information and approved loading methods for intermodal shipments are published in the *AAR Intermodal Loading Guide for Products in Closed Containers and Trailers*.

B—General Rules

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

1. Inspection and Selection of Equipment

A. There can be differences between the loading and securement of freight in containers or trailers. Ensure the type of equipment prior to loading. If not able to confirm equipment type during equipment inspection please contact the equipment provider.

- Containers are temporarily loaded onto wheeled chassis for over the road transportation and will likely be removed from the chassis for rail transportation. Individual container marks will typically end with a "U". Container walls can be constructed with contoured corrugated sidewalls.
- Trailers have permanently attached tandems (rear wheels) and landing gear and will be shipped on rail with the trailer underframe. Individual trailer marks will typically end with a "Z". Trailer walls are typically smooth sided and will be constructed with panels of various materials

B. Containers or trailers must be inspected by shipper at loading point to verify that containers or trailers are in suitable condition. Containers and trailers must have sound roofs, sides, floors and end walls; and operable, snug-fitting doors. There must be no obvious damage, distress, weakened parts, or weakened sections. The container or trailer must be appropriate for the freight it is to transport. Any exception is cause for the container or trailer to be rejected.

C. It is important that containers or trailers be clean and free from nails and other protruding objects.

D. When open top containers are equipped with tarpaulins or other types of coverings, the coverings must be of adequate construction to resist tearing or other forms of degradation brought about by such things as, but not limited to, wind, vibration, movement, and abrasion. No part or portion of the load may extend beyond the tarp line.

2. Load Planning

A. Plan loading to prevent damage to freight and equipment. Freight that is obviously unsuitable for movement in a container or trailer, as far as safety in handling and protection to freight and equipment are concerned, is not to be loaded.

3. Maximum Weights and Weight Distribution

A. The load weight must not exceed the limit as stated on the manufacturer's plate. Combined weight of trailer and freight may not exceed 65,000 lb.[1] Combined weight of container and freight may not exceed the weight specified below for the length of container being loaded:

Table 1: Maximum gross weight vs. container length

Nominal Length (ft)	Maximum Gross Weight (lb)[a/] (Freight Plus Tare)
53	67,200
48	67,200
45	67,200
40	67,200
28	52,900
20	52,900

[a/] Maximum weights as defined in current AAR Manual of Standards and Recommended Practices, Section I, Specification M-930, for containers and subject to revisions thereto.

B. Load weight in containers or trailers must be evenly distributed both crosswise and lengthwise, and combined weight of freight and container or trailer must conform to all federal, state, provincial, and local regulations and transportation service requirements used at origin and to final destination. See Figure 1.

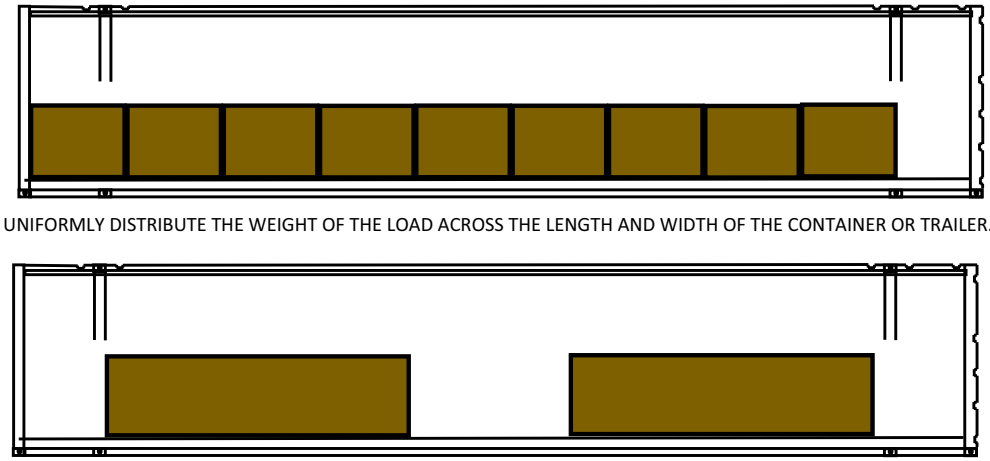

Figure 1: Weight distribution

4. Hazardous Materials/Hazardous Substances

A. Loads containing any quantity of hazardous materials/hazardous substances must conform to the regulations of the agency of authority of the countries within which the shipment will move. Some but not all regulations are as follows:

1 Maximum weights as defined in current AAR Manual of Standards and Recommended Practices, Section I, Specification M-931, for trailers and subject to revisions thereto.

- Department of Transportation Regulations as published in Bureau of Explosives Tariff 6000 series and supplements thereto
- Transportation of Dangerous Goods Regulations and supplements thereto, as administered by the Transport of Dangerous Goods Directorate (Transport Canada)
- Mexican shipments are governed by Bureau of Explosives Tariff 6000 series and supplements thereto.

B. Carrier is to be specifically informed on shipping orders as to the presence, type, characteristics, and volume of all hazardous materials/hazardous substances.

C. Pneumatic dunnage bags (air bags) must not be used to secure shipments of hazardous materials.

D. Container or trailer doors may not be used to secure loads containing hazardous materials per carrier requirements. Reference rail carrier specific shipping tariffs for further information.

E. All packages intended for intermodal, TOFC, or COFC shipments of hazardous materials in the United States must meet appropriate US DOT hazardous material regulations concerning packaging specifications, labeling, and marking as specified in CFR Title 49.

F. In general, the regulations of the United States Department of Transportation, the National Transportation Agency of Canada, and Transport Canada require that packages of hazardous materials or dangerous commodities be securely loaded, blocked, and braced to prevent them from changing position, falling to the floor, or sliding into each other during transportation. The US regulations, as found in CFR Title 49, read, in part, as follows:

"Sec. 174.55 General Requirements"

(a) Each package containing a hazardous material being transported by rail in a freight container or transport vehicle must be loaded so that it cannot fall or slide and must be safeguarded in such a manner that other freight cannot fall onto or slide into it under conditions normally incident to transportation. When this protection cannot be provided by using other freight, it must be provided by blocking and bracing.

(b) Each package containing a hazardous material bearing package orientation markings prescribed in Sec. 172.312 of this subchapter must be loaded within a transport vehicle or freight container to remain in the correct position indicated by those markings during transportation.

G. Special Rules for Explosives:

(a) Division 1.1, 1.2, or 1.3 explosives must be loaded, blocked, and braced within or on the truck body or trailer so that packages will not change position under impact from each end at a speed of at least 8.1 mph. Each truck body or trailer must be secured on the railcar so that it will neither permanently change position nor show evidence of failure or impending failure of the trailer securement method when impacted from each end at a speed of at least 8.1 mph. (Ref. 49 CFR 174.101 (o)(2))

(b) For the TOFC or COFC transportation of Division 1.1, 1.2, or 1.3 explosives, trailers or truck bodies must meet the requirements of Part 177 of the Department of Transportation Regulations applicable to shipments of explosives by motor vehicle (Ref. 49 CFR 174.101 (o)(1)), and requirements of AAR interchange rules.

(c) Divisions 1.1 and 1.2 explosives may not be loaded, transported, or stored in a railcar equipped with any type of lighted heater or open-flame device, or electric devices having exposed heating coils. Additionally, divisions 1.1 and 1.2 explosives may not be loaded in a railcar equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation. (Ref. 49 CFR 174.101 (L), 174.112)

(d) Explosives must not be loaded into trailers or truck bodies equipped with automatic heating or refrigerating machinery unless these are disconnected from the source of power for their operation, and all fuel tanks for heaters or refrigerating machinery are drained. (Ref. 49 CFR 174.101 (o)(5))

(e) Metal floor plates must be completely covered with wood, plywood, fiber, or composition sheets of adequate thickness and strength to prevent contact of the metal floor plates with the packages of explosives during transportation. Covering metal floor plates is not necessary for carload shipments loaded by the Department of Defense provided the explosives are of such nature that they are not liable to leakage of dust, powder, or vapor that might become the cause of an explosion. (Ref. 49 CFR 174.104 (b)(8))

(f) Trailers or containers equipped with mechanical restraining devices must not be used for shipments of explosives (such as TNT, dynamite, black powder, bulk propellant powders, and similar explosives, except as a component part of ammunition or propelling charges) that are liable to shift or become lodged in the mechanism in the event of container failure.

H. Special Rules for Flammable Liquids and Gases: Flammable liquids and flammable gases must not be loaded into trailers or truck bodies equipped with any type of lighted heater or open-flame device, nor into a railcar equipped with any apparatus or mechanism using an internal combustion engine in its operation. In addition, they also may not be loaded into a truck body or trailer equipped with any automatic heating or refrigerating apparatus, unless it is of the non-sparking or explosion-proof types. There should be no combustion apparatus in the lading space and no connection for return of air from the lading space to any combustion apparatus. No part of the lading may be heated over 129 F (54 C). (Ref. 49 CFR 74.200, 174.300)

I. To ensure that the required placards are visible during the transportation of containers on double-stack car, it is recommended that bottom part of the placard is at least 5 ft. above the bottom rail and at least 5 ft. from the corner posts on the sides.

5. Loading and Securement

A. Secure freight to prevent both lengthwise and crosswise movement by the use of blocking and bracing materials and methods. Rigid, dense, or cylindrical freight requires specific blocking and bracing methods and must be loaded and secured in conformance with the rules and illustrations in this publication and in other applicable AAR commodity loading publications. Vehicle doors are neither designed nor intended to restrain these commodities.

B. Vehicle doors may only be used to secure freight when all of the following requirements are met:

1. The load consists of multi-unit freight such as boxes of food-stuff, tissue, or soft paper products, furniture, appliances, etc., not exceeding 40,000 lb, covering a minimum of 60% of the door area and evenly distributed throughout the vehicle.

2. Freight must be loaded tightly lengthwise and crosswise and flush to the rear doors of the vehicle allowing no room for movement. If any void exists, fill void space with recommended dunnage.

3. The doors of the vehicle must meet AAR container specification M-930 or AAR trailer specification M-931. The doors must fit squarely, the hinges must be tight, and locking bars must be in good condition and function properly.

Note: Container/trailer doors may not be used to secure loads containing hazardous materials. Reference rail carrier specific shipping tariffs for further information.

C. Fill voids and apply blocking and bracing to maintain proper lengthwise and crosswise weight distribution during transit and to prevent freight from damaging doors, nose, and walls or from falling out when doors are opened.

D. Commodities or shipments with a high vertical center of gravity or an unstable narrow base, must be secured to prevent tipping or crosswise movement in transit. Avoid stacking heavier shipping units on top of lighter shipping units.

If the height of load exceeds 90% of the interior container height, or, if heavier freight is loaded on the top of lighter freight, contact your origin rail carrier for assistance.

Example:

The container is 7 ft. 10 in. (94 inches) high inside;

The freight is 7 ft. 4 in. (88 inches) in height.

88 / 94 = 0.94, or 94%.

Contact your origin rail carrier.

E. 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.

F. Do not nail into the walls of containers or trailers. Toe-nailing is not permitted, except as specifically exempted by applicable AAR commodity loading publications.

G. Strapping used for load securement must be of sufficient strength and amount and be properly applied so as to secure the load from crosswise or lengthwise movement. All high-tension straps used for securing the load must meet the specifications published in ASTM specification D3953 and D3950 (latest edition).

H. The combined joint strength of straps used must be equal to the weight of the freight being secured, except as provided in approved loading methods in the *AAR Intermodal Loading Guide for Products in Closed Containers and Trailers*.

I. High-tension bands used for load securement 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 bands manufactured to metric dimensions must be followed by the letter "M" of the same size as the original marking.

  Note: For the latest updates of approved strapping, reference approval tables at http://www.aar.com/standards/OpenTop-approvals.html.

6. Special Equipment

A. Some containers and trailers are equipped with special interior fixtures. Properly fasten and lock such equipment in place. Properly secure all special equipment in containers and trailers when empty. The use of any type of material handling equipment to unlock and raise or lower and lock special equipment is prohibited.

7. Weight Distribution for Concentrated Weight

Note: Individual carrier approval must be obtained when shipping products of concentrated weight greater than 3,500 lbs. Information below is for planning purposes and must be confirmed by the carriers in the routing.

A. Coiled steel and other dense products may have concentrated weight when exceeding 3,500 lbs. per every 13.32 ft² of floor area. See Table 2 for weight and floor area information. Commodities with concentrated weight must be loaded to distribute the weight evenly across the container or trailer floor. See Figure 2.

B. A minimum of three runners each 2.7 ft. long, based on 4 ft. lateral runner spacing (measured from the center of the left-most runner to the center of the right-most runner) are required for each skid or pallet for steel coils and similar products of concentrated weight weighing up to 3,500 lbs. Depending on the pallet or skid design, size, and runner spacing, the pallet or skid may be able to provide the needed weight distribution. If not, longer runners will need to be added under the shipping item. See Figure 3.

C. The following table may be used as a guideline when shipping dense products greater than 3,500 lbs. (See Table 2 and Figure 2). Load no more than 25,000 lbs. uniformly distributed from side-to-side in any 10 lengthwise ft. in a container or trailer loaded for intermodal service. This example is reflected in the bottom-right value in Table 2.

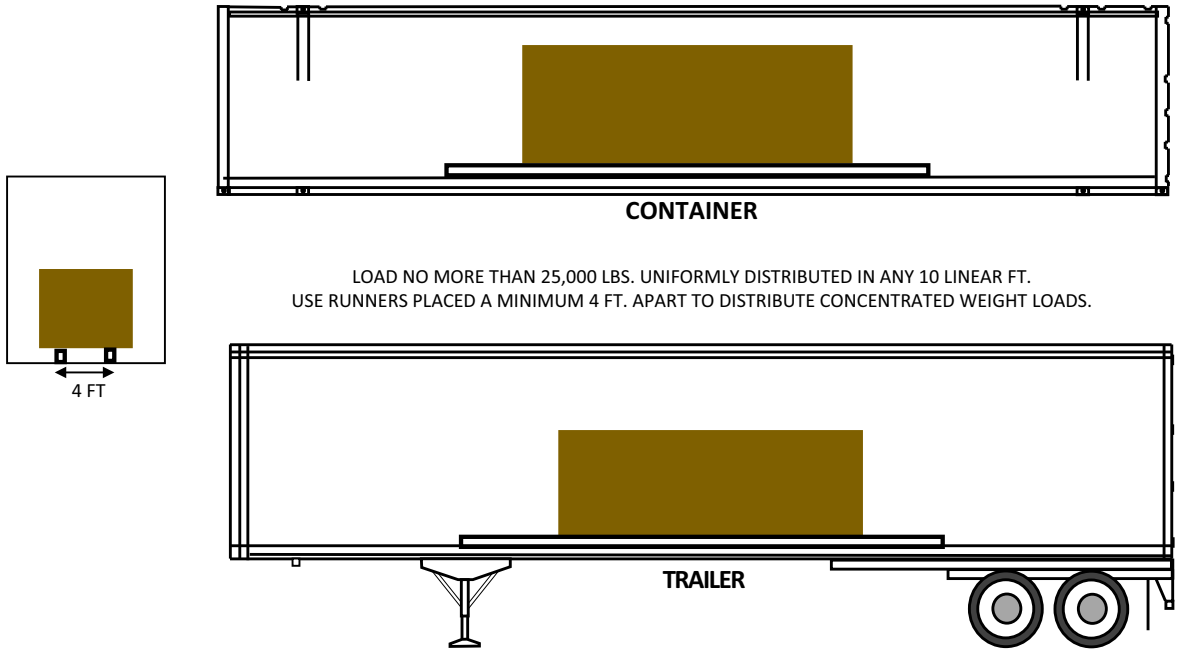

Figure 2: Weight distribution for concentrated weight

Table 2: Guide to the Minimum Required Length of Lengthwise Runners

Guide to the Minimum Required Length of Lengthwise Runners					
	Lateral Spacing of Lengthwise Runners				
Freight Weight (lbs)	4 ft.	5 ft.	6 ft.	7 ft.	8 ft.
3,500 - 4,000	3.3	2.6	2.2	1.9	1.6
5,000	4.1	3.3	2.7	2.3	2.0
6,000	4.9	3.9	3.3	2.8	2.5
7,000	5.7	4.6	3.8	3.3	2.9
8,000	6.5	5.2	4.4	3.7	3.3
9,000	7.4	5.9	4.9	4.2	3.7
10,000	8.2	6.5	5.4	4.7	4.1
11,000	9.0	7.2	6.0	5.1	4.5
12,000	9.8	7.8	6.5	5.6	4.9
13,000	10.6	8.5	7.1	6.1	5.3
14,000	11.4	9.2	7.6	6.5	5.7
15,000	12.3	9.8	8.2	7.0	6.1
16,000	13.1	10.5	8.7	7.5	6.5
17,000	13.9	11.1	9.3	7.9	6.9
18,000	14.7	11.8	9.8	8.4	7.4
19,000	15.5	12.4	10.3	8.9	7.8
20,000	16.3	13.1	10.9	9.3	8.2
21,000	17.2	13.7	11.4	9.8	8.6
22,000	18.0	14.4	12.0	10.3	9.0
23,000	18.8	15.0	12.5	10.7	9.4
24,000	19.6	15.7	13.1	11.2	9.8
25,000	20.4	16.3	13.6	11.7	10.2

D. For the example in Figure 2, a 25,000 lb. piece of freight is loaded on runners laterally spaced 4 ft. apart. Per Table 2, these runners would need to be a minimum of 20.4 ft. in length.

E. For coiled metal products, the lengthwise skid or pallet runner length may equal the coil diameter. If the coil diameter or skid/pallet runner length is less than the minimum runner length required by Table 2, the minimum values in Table 2 will apply and runners of additional length would be required.

Example 1: Coiled product is 6,000 lbs. and 5 ft. in diameter. It is secured to a wooden skid 5 ft. x 5 ft. Per Table 2, a 6,000 lb. pallet with 5 ft. lateral runner spacing needs lengthwise runners with a minimum length of 3.9 ft. No additional length runners would be needed.

Example 2: Coiled product is 10,000 lbs. and 5 ft. in diameter. It is secured to a wooden skid 5 ft. x 5 ft. Per Table 2, a 10,000 lb. commodity with 5 ft. lateral runner spacing needs lengthwise runners with a minimum length of 6.5 ft. Additional lengthwise runners would be needed.

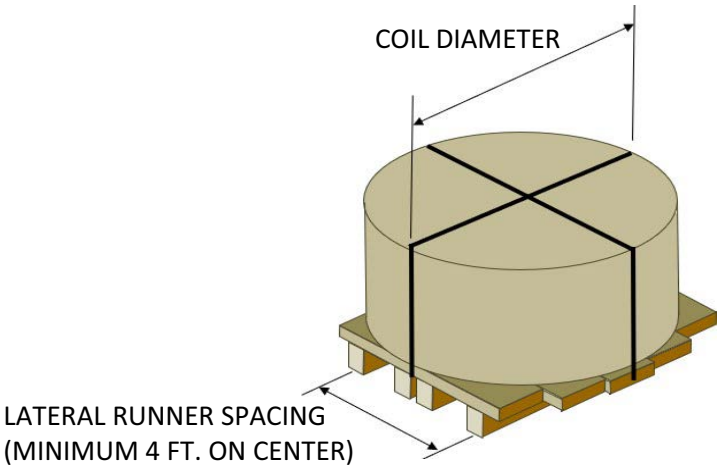

Figure 3: Coil diameter and runner spacing