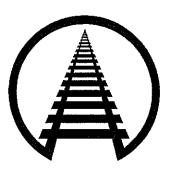
SECTION 9

CIRCULAR NO. 42-K

(Supersedes Circular No. 42-J)

GENERAL RULES COVERING LOADING OF CARLOAD SHIPMENTS OF COMMODITIES IN CLOSED CARS



Issued November 1, 2010

The "General Rules" quoted in AAR Circular No. 42-J, dated January 1, 2001 have been revised as shown herein.

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.

Approved by

DAMAGE PREVENTION AND FREIGHT CLAIM COMMITTEE ASSOCIATION OF AMERICAN RAILROADS

Published by

Transportation Technology Center, Inc. 55500 D.O.T. Road Pueblo, CO 81001

(Printed in U.S.A.) © 2010

Copies of this Circular can be obtained from

Transportation Technology Center, Inc.
A subsidiary of the Association of American Railroads
55500 D.O.T. Road
Pueblo, CO 81001

CIRCULAR NO. 42-K

GENERAL RULES COVERING LOADING OF CARLOAD SHIPMENTS OF COMMODITIES IN CLOSED CARS

The following Rules have been formulated for the purpose of providing SAFE methods of loading closed cars and MUST be observed. Primary purpose of these rules is safe transit of the rail car from origin to destination.

RULE 1. INSPECTION AND SELECTION OF CARS

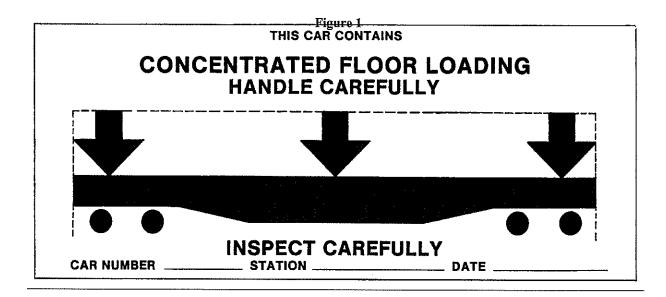
- (A) Cars must be inspected by carrier before placing for loading. Cars must also be inspected by shipper at loading point to see that they are in suitable condition to carry load safely to destination. Cars must have sound roofs, sides, floors and end walls, and operable, snug fitting doors.
- (B) (1) 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 originating carrier (either before they are placed for loading or at loading point), to see that they are in suitable condition to safely carry loads to destination.
 - (2) When ordering box cars for loading concentrated weights of heavy commodities, shippers have the responsibility of notifying serving carriers of this purpose and of not loading any cars not inspected per Rule 1(B)(1).
 - (3) Railroads must inspect box cars furnished for 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, to insure they meet one of the following requirements:
 - a. Car stenciled adjacent to door opening 25K or 50K which indicates floor loading capacity.
 - b. Have wood floor of 2-1/4 inch thickness in sound condition supported by at least three metal floor stringers on each side of center sill full length of car.
 - c. If equipped with sliding sill under frame, have wood floor of 2-1/4 inch thickness in sound condition supported by at least two metal floor stringers on each side of center sill full length of car.
 - d. If equipped with steel floors or special type wooden flooring full length of car provided, the overall strength of the floor is not less than that of a floor with three stringers as specified as in the foregoing.

If in doubt, obtain verification of the floor strength from the Mechanical Department of Car Owner.

Also, such floors and supporting structure must be in good condition when cars are loaded.

The shipper should check the box car to see 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.

(4) Shippers have the responsibility of attaching a Concentrated Floor Loading card, Figure 1, to the routing or placard board on each side of box cars in which metals with densities exceeding 400 lbs. per cubic foot and/or exceeding 800 lbs. per square foot floor bearing area are loaded.



(5) Load, occupying less than total floor space, must be secured so as not to permit movement that would have an accumulative effect of overloading one end or one side of car when loaded in accordance with Rule 4(G).

RULE 2. CLEARANCE AT SIDE BEARING - LOADED CARS

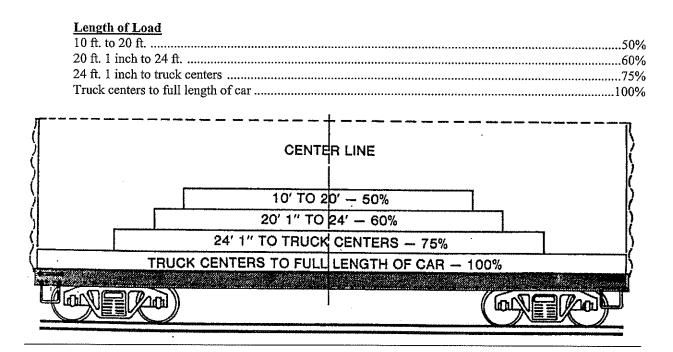
For cars not equipped with constant-contact type side bearings (zero clearance normal) there must be clearance at side bearings to permit free curvature of trucks.

RULE 3. MAXIMUM LOAD WEIGHT

- (A) The weight of load in the car must not exceed the load limit stenciled on the car.
- (B) The weight of load on one truck must not exceed one-half of the load limit stenciled on the car.

RULE 4. DISTRIBUTION OF WEIGHT LENGTHWISE IN CARS

(A) For all box cars except staggered double-door cars built prior to 1966, the percentages of stenciled load limits, as shown below, 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.



(B) For staggered double-door box cars built prior to 1966, the percentages listed in Rule 4(A) will be as shown below:

Length of	Inside	Length
Load_	of (<u>Car</u>
	40 ft.	50 ft.
10 ft. to 20 ft	40%	35%
20 ft. 1 inch to 24 ft.	45%	40%
24 ft. 1 inch to truck centers	75%	75%
Truck centers to full length of car	100%	100%

Further, if the maximum load is 40% of stenciled load limit, the provisions of Rule 3(A) and (B) would not apply.

- (C) Weight of material loaded in either end between truck centers and end of car must not exceed 15% of stenciled load limit for box cars built prior to January 1, 1966, and 25% for cars built subsequent January 1, 1966.
- (D) When crosswise bearing pieces are used, the distance between the outside bearing pieces (center to center) must exceed the minimum distances specified in above Rules 4(A) and 4(B) for that percentage of the stenciled load limit being loaded and be in sufficient number to assure uniform distribution of lading on car floor.
- (E) Bearing pieces lengthwise of car, extending beyond the lading may be used in order to spread weight distribution over a greater area. In such cases, "length of bearing pieces" is substituted for "length of load" in above Rules 4(A) and 4(B). Bearing pieces must be of suitable strength in relation to percentages stated and continuous and in sufficient number to assure uniform distribution of lading on car floor.

(F) When length of load is less than the distance between truck centers, and load is not located in center of car, the center of load weight must not be nearer to either truck center than shown below:

Load Weight as % of Load Limit

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 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 are to 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 loaded with high density material to gross rail load and less than 60 percent of available volume, car owner must be contacted for approval.
- (I) Covered hopper cars, if subjected to stopover unloading, may have the compartments listed below partially or completely unloaded:
 - (1) 2 compartment car not permitted.
 - (2) 3 compartment car both end compartments or the center compartment.
 - (3) 4 compartment car both center or both end compartments.

Consignee must inspect car before releasing to ensure that remaining load is equally distributed and meets the provisions of Rule 5.

RULE 5. 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 is of such a character that it cannot be placed so as to obtain equal distribution of weight, crosswise of car, suitable ballast, properly secured, must be used to equalize the weight.
- (C) In box cars lading must be secured to prevent tipping or moving towards car's sides where the vacant space across car exceeds the following:
 - (1) An aggregate of 18 inches crosswise of car.

- (2) Vacant crosswise space of less than 18 inches as may be specified in pamphlets covering methods for loading, bracing and blocking carload shipments of individual commodities.
- (D) Partial unloading of covered hopper cars crosswise of car or complete unloading of any compartment along one side, in cars with longitudinal partition sheets, is prohibited.

RULE 6. LOADING, BLOCKING AND BRACING - BOX CARS

- (A) Lading must be loaded and secured so as to permit unloading from either side of rail car.
- (B) All lumber used for blocking and bracing must be of sound material, free of defects which impair its strength or interfere with proper nailing.
- (C) Machines and other items, having high center of gravity or narrow base, must be secured to prevent them from tipping over in transit.
- (D) When car floor is not satisfactory for use of material handling equipment in loading and/or unloading operation, suitable steel plates or other adequate material must be placed in car to facilitate use of equipment and prevent equipment from breaking through door.
- (E) The threads on rods or bolts used as bracing or blocking, or in connection therewith, must be chisel checked immediately behind single or double nuts to insure nuts remaining in original position. Two or more threads must extend beyond nuts. Not required when nut lock or lock nuts are used and properly seated and torqued to manufacturer's recommended minimum ft.-lb. value.
 NOTE: Lock washers are not acceptable substitutes.
- (F) All high-tension bands used for securing the load must meet the specifications published in ASTM Specification D3953 (latest edition).
- (G) High-tension bands or wires securing the load must be machine tensioned and sealed or twist tied, respectively.
- (H) Metal protectors, such as corner guards or plates, sufficient to provide a suitable radius must be used to protect bands and wires at all points on lading having sharp edges. Apply so as to prevent displacement.
- (I) The manner of attaching metal ties to car walls must be in accordance with the methods prescribed for the individual commodities which reduces the possibility of anchor plates pulling loose or metal ties shearing.

- (J) Where high-tension bands or high-tension wires are specified in the detailed rules, they may be substituted for each other, if of equal load strength, provided all the other items used to secure the load are equal in number and strength.
- (K) Unless otherwise specified in the loading pamphlets, the number of bands or wire for rigid braced loads must have the combined joint strength in each longitudinal impact direction equal the weight of the lading being secured.
- (L) The proper combination of steel bands or wire, seals and sealing tools must be used to provide the minimum joint strength for sizes listed in Tables 1 and 3.
- (M) Non-metallic strap may be used for load securement only when specified in applicable commodity loading publications.

TABLE 1 HIGH-TENSION BANDS

				Recommended Minimum No. of Pairs of Notches on	Recommended N Pairs of Crin		
		Minimum	Minimum	Joint - All	Surface Fini	sh - Bands	
Width & Thickness Inches	Width & Thickness Millimeters	Breaking Strength - Pounds	Joint Strength - Pounds	Surface Finishes	Uncoated, Dry	Coated, Not Waxed	Waxed
1¼ x .029	31.75 x .750	4,750	3,565	2	3	3	4
1¼ x .031	31.75 x .790	4,750	3,565	2	3	3	4
1¼ x .035	31.75 x .890	4,750	3,565	2	3	3	4
1½ x .044	31.75 x 1.12	6,750	5,065	4	4	4	4
1¼ x .050	31.75 x 1.27	6,750	5,065	4	4	4	4
2 x .044	50.80 x 1.12	10,600	7,950	4	4	4	4*
2 x .050	50.80 x 1.27	10,600	7,950	4	4	4	4*
2 x .065	50.80 x 1.65	13,800	10,350	4	4	4	4*

^{*} Grit Seals Only. 6 Pairs Required for Non-grit Seals.

Note - A sufficient number of seals must be applied to accommodate the recommended number of pairs of notches or crimps.

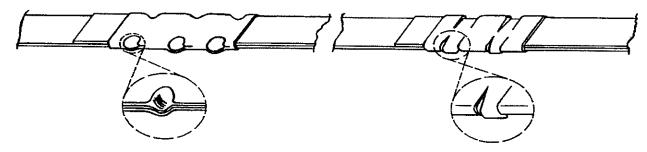
The above recommended minimum number of notches or crimps is based on current general recommendations of high-tension banding manufacturers on the basis of tensioning and sealing tools being in proper operating condition. A lesser number of notches or crimps may be used provided the shipper can demonstrate that the joint has the minimum strength shown in the table under column "Minimum Joint Strength - Pounds".

In all cases, a sufficient number of notches or crimps must be used to achieve the minimum joint strength - pounds, as shown in the column headed "Minimum Joint Strength - Pounds".

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

Following are illustrations of crimp and notch types of seal joints:

CRIMP-TYPE JOINT THREE PAIR SHOWN NOTCH-TYPE JOINT TWO PAIR SHOWN



CRIMP-TYPE JOINT

NOTCH-TYPE JOINT

THREE PAIR SHOWN
High-tension band sizes 1 1/4" and 2" used for load securements are to be marked to indicate manufacturer's or supplier's name and the letters "AAR".

Markings shall consist of the letters "AAR", the manufacturer's or distributor's name, or abbreviated name, or registered trademark, or symbol, or AAR code consisting of two digits. Markings shall be in characters not less than 1/8" high for steel die imprint and not less than 1/4" high for paint, ink surface printing or embossing, spaced at not more than 5 foot 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.

The following methods of marking for purpose of identification have been assigned to manufacturers and suppliers whose products have been tested by the AAR and found to meet the requirements of this Rule.

Name	Method of Marking	Markings
ITW/Acme Packaging	Steel Embossed	AAR 11
ITW/Signode	Steel Embossed	AAR 11
Samuel Strapping Systems	Steel Die Imprint, Ink Print	AAR 22,33,47
Gerrard-Ovalstrapping	Ink Print	AAR 52
Garibaldi (Chile)	Steel Die Imprint, Ink Print, Paint Embossed	AAR 20
Hankum Co, LTD.	Ink Print	AAR 26
Maillis Strapping Systems-USA	Ink Print	AAR 57
Dubose Strapping Inc.	Ink Print	AAR 58

IMPORTANT - High-tension bands must be applied to packages and/or loads with markings facing outward.

TABLE 3 HIGH TENSION WIRE

Gage	Diameter Inches	Minimum Joint Strength - Pounds
8	.1620	1700
10	.1350	1700
11 1/2	.1130	1150
12	.1055	1080

(N) The following are the dimensions and breaking strengths of common annealed wire, rods and bolts:

TABLE 4
COMMON ANNEALED WIRE

Gage	Diameter Inches	Minimum Breaking Strength - Pounds
3	.2500	2200
7	.1875	1100
8	.1719	950
9	.1562	800
11	.1250	500

TABLE 5 RODS AND BOLTS

Diameter Inches	Minimum Breaking Strength - Pounds*
1/2	5,200
5/8	8,100
3/4	11,700
7/8	16,200
1	21,100
1 1/8	25,800
1 1/4	32,800
1 3/8	38,600
1 1/2	46,900

^{*} At Root of Thread

RULE 7. DOORWAY PROTECTION

When there is a possibility of lading falling or rolling out of doorway or coming in contact with sliding or plug type side doors, openings must be protected with wood 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.

RULE 8. CENTER OF GRAVITY

- (A) Combined center of gravity of rail car and contents must not exceed 98 inches above top of rail. In closed cars there is no practical possibility of exceeding this center of gravity limitation except in cars which exceed Plate C dimensions.
- (B) Cars exceeding Plate C dimensions may extend to 17 feet above top of rail. Certain ladings, such as rolled paper, when loaded two layers high may result in excessive combined center of gravity dimension. Shippers are to calculate the combined center of gravity of the rail car and contents whenever any part of the load will exceed 11 feet 8 inches (140") 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.

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

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

(E + F)

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

Weight of Load (Pounds)	Spring Deflection
122,000 - 137,000	1.00 inches
138,000 - 164,000	1.25 inches
165,000 - 191,000	1.50 inches
192,000 - 207,000	1.75 inches

EXAMPLE: Roll Paper

- Load: (a) 9 rolls or stacks of rolls @ 13,000 lbs each, 151" wide (tall)
 - (b) 9 rolls or stacks of rolls @ 7,600 lbs each, 76" wide (tall)

NOTE: When the load consists of multiple sections or units having different unit heights and weights such as (a) and (b) above, each section or unit must be taken separately when calculating the CG of the load.

Combined CG =
$$(B \times E) + [D (a) \times F (a)] + [D (b) \times F (b)]$$

 $[E + F (a) + F (b)]$
= $(58 \times 72,800) + (119.5 \times 117,000) + (82 \times 68,400)$
 $(72,800 + 117,000 + 68,400)$
= $4,222,400 + 13,981,500 + 5,608,800 = 23,812,700$
 $258,200$ $258,200$

= 92.23" above top of rail

RULE 9. SPECIAL EQUIPMENT

Load protection devices in specially equipped cars must be used in accordance with carrier instructions. Cross members or other equipped restraining devices must be left in car when empty and properly secured.

RULE 10. OPENING AND CLOSING OF DOORS

Mechanical trucks (forks lifts, etc.) must not be used to open or close freight car doors. If doors can not be opened, the serving railroad should be contacted for assistance.

RULE OF ORDER X

Procedures Governing Evaluation and Acceptance of New Closed Car Loading and Bracing Methods or Materials

Evaluation of Loading and Bracing Methods The following procedures shall govern the evaluation and acceptance of new closed car loading and bracing methods or materials, not currently recognized in AAR publications.

Requests for Evaluation

<u>Section 1.</u> Requests for evaluation shall be in writing to the Director Damage Prevention and Loading Services and may originate with a shipper or supplier, the Chief Prevention Officer of the originating railroad, the Damage Prevention and Freight Claim Committee or any of its subcommittees, or one of the territorial Freight Claim and Damage Prevention Conferences.

Requests to Fully Define Proposal

Section 2. The written request shall fully define the proposed loading or bracing method or material, including an illustration; a statement of purpose; the approximate lading weight of proposed test shipments; description of the type of commodity to be shipped; type of rail equipment to be used; origin point; origin railroad; routes; and intermediate and destination carriers. Responding to the request, the Director Damage Prevention and Freight Claims shall make recommendations to all involved railroads.

If there is a need for Damage Prevention and Freight Claim Committee consideration, before further progression of the request, the Director Damage Prevention and Loading Services shall so advise the Chairman, Damage Prevention and Freight Claim Committee.

If Test Loads Are Recommended

<u>Section 3.</u> In the event of positive recommendation for test loads, the Director Damage Prevention and Loading Services shall notify the original railroad and the intermediate and delivering railroads that are expected to be actively involved in the majority of routes and seek their consent for the test loads.

Participation by DP&FC Committee

<u>Section 4.</u> If there is an appropriate Damage Prevention and Freight Claim Committee subcommittee, it shall be given opportunity to participate in the test.

Inspection Forms for Test Shipments

<u>Section 5.</u> Prior to commencing the test, the Director Damage Prevention and Freight Claims will supply the proponent with a numbered envelope for each test shipment. The envelope to contain standard inspection forms to be completed at origin and destination.

Minimum Test Shipments and Reports

Section 6. Sufficient cars or trailers shall be shipped using the proposed method to ensure a minimum of twenty-five (25) reports. Dependent upon the proposal, it may be necessary to obtain comparison data on a minimum of twenty-five (25) cars or trailers, utilizing an approved shipping method. The twenty-five (25) reports must be complete in detail to permit an accurate evaluation of performance. Each of the twenty-five (25) reports to include both origin and destination inspections. The proponent will be responsible for obtaining fifteen (15) reports; the origin and destination carriers five (5) reports; and the Damage Prevention and Freight Claim Section, five (5) reports. The number of test shipments will be limited to those required to produce sufficient data to determine a valid conclusion.

Uniform Preparation of Test Shipments

<u>Section 7.</u> The test shipments shall be prepared as uniformly as possible and be made in types of equipment normally utilized by the ship-

Shipper to Notify **Origin Carrier**

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Section 8. The shipper is required to notify the origin carrier Chief Prevention Officer of test shipments, allowing enough lead time to permit the origin carrier to make an inspection and to notify delivering carriers so destination inspections can be arranged.

Obligation of Origin Carrier Prevention Officer

Section 9. It shall be the obligation of the Chief Prevention Officer. origin railroad, to request outturns on a sufficient number of the test loads to provide a basis for proper evaluation of performance and to supply the Director Damage Prevention and Loading Services with copies of the requests.

nation

Observation at Desti- Section 10. The Director Damage Prevention and Loading Services shall arrange for staff observation at destinations of a sufficient number of test shipments to provide a base for engineering analysis.

Alternative Test Procedures

Section 11. As an alternative to a portion or all of the foregoing test shipments, the Director Damage Prevention and Loading Services may request that proponent follow the "Procedures for Simulation Testing of New Closed Car Loading and Bracing Methods or Materials" as approved by the Damage Prevention and Freight Claim Committee.

Synopsis of Test Reports

Section 12. When a test is concluded, the Director Damage Prevention and Loading Services shall prepare a synopsis of test reports for the Chairman, for Damage Prevention and Freight Claim Committee consideration by that Committee. The Damage Prevention and Freight Claim Committee shall approve, by a two-thirds vote of its members, or disapprove the proposal within a specified period of time.

Proponent to be Furnished Copy of Synopsis

<u>Section 13</u>. Concurrently with the Director's submission of the synopsis to the Chairman, Damage Prevention and Freight Claim Committee, a copy shall be furnished the proponent.

DAMAGE PREVENTION AND LOADING SERVICES REQUEST FOR TESTING



Association of American	Date:
Railroads	
Proponent(s):	
Address(es):	

Description of Loa	nding and Bracing Method: (Attach diagram, list of materials and specification of proposed load- ethod.)
PPArties - Allendaria	
Equipment to be U	sed: TOFC:
	COFC:
	Boxcar:
	Type Draft Gear:
	Car Size:
	Other:
	Describe:
Load Weight:	
	Date (Allow 30 Days):

Note: As set forth in Rule of Order X in the Damage Prevention and Freight Claim Rule Book, we will need approximately 30 days from receipt of this form by Damage Prevention and Loading Services, and the start of the field test to request concurrence and cooperation of the involved carriers.)