

## Chapter 10

# ***Railroad Safety Appliance Standards Part 231***

### **Introduction**

In 1911, the Interstate Commerce Commission (ICC) created the Division of Safety Appliances and soon issued several “Orders,” which were essentially the same as today’s FRA regulations. Over time, the number, dimensions, location, and manner of application of all safety appliances were written into the “ICC Orders.” After the formation of the FRA in 1967, the Railroad Safety Appliance Standards (49 CFR Part 231) were issued in 1968, using the ICC Orders as a basis for the rule text. FRA last amended the Railroad Safety Appliance Standards in 1976 with the addition of Sections 231.29 and 30.

The following guidelines and interpretations have been developed to aid Federal and State Inspector(s) conducting inspections for compliance with Safety Appliance Standards. It is important that agency interpretations and policies be adhered to by every Inspector when conducting these inspections, so that uniformity of compliance activity is achieved. The procedures and guidance provided in both this manual and the General manual should be observed when assessing the need for appropriate enforcement actions regarding any non-compliance with safety appliance standards. Reports of safety appliance inspections are made on the Motive Power and Equipment Inspection Report, **F6180.96**. Violations are to be submitted on the Violation of Safety Appliance Law Report, **F6180.29**.

Every rail car has very specific and defined Railroad Safety Appliance Standards. Inspectors must be knowledgeable of the common types of rail cars and their unique safety appliance arrangements prior to performing Part 231 inspections. Inspectors also need to familiarize themselves with the many complexities and requirements of the various cars that are categorized as “cars of special construction.” A rail car is required to comply with the Railroad Safety Appliance Standards for the car type that it most closely resembles or to the “nearest approximate type” of car. If there are questions about a particular car type, the Inspector should contact the Regional Specialist for a definitive classification. For consistency, the Regional Specialists will follow the guidance established by Headquarters.

Strict liability applies to the use or haul of equipment with defective safety appliances. If a piece of equipment is discovered with a defective safety appliance and it is not being used or hauled pursuant to the statutory provisions contained in 49 U.S.C. § 20303, appropriate enforcement action must be taken. If a railroad is unaware of the existence of a defective condition, it cannot claim to be hauling the equipment for repairs and is subject to civil penalties. Inspectors are expected to use sound judgment, along with the guidance outlined in both the General Manual and Chapter 3 of this manual, when deciding whether the issuance of a violation report is appropriate.

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In order to establish a violation, FRA must prove that the equipment was “used or hauled” in defective condition. Thus, evidence of an actual “haul” of the defective equipment in a train is always sufficient to support a violation. In addition, FRA will consider a piece of equipment “in use” as long as the railroad has or should have completed its required inspections and the equipment is deemed ready for service, prior to any movement or the actual departure. Defects found at this time are subject to potential civil penalties. Thus, FRA is not required to wait for a car with a defective safety appliance to depart or engage in an actual “haul” in order to assess a violation. If Inspectors rely on the above interpretation, the violation report must establish that the railroad had completed all necessary inspections capable of discovering the defective condition. Therefore, evidence must be included in the violation report which establishes the Inspector’s basis for this finding. Be as specific as possible, include names, if available. Remember this is added enforcement flexibility and may not be the best or appropriate approach in certain situations. In many circumstances the best approach is still to establish actual use or movement of the equipment.

The statutory provisions contained in 49 USC § 20303 (previously 45 USC Section 13) govern the movement of equipment with defective or insecure safety appliances. This only allows the railroad to move the defective equipment from the place where the defect is first discovered to the nearest location where the necessary repairs can be made. This movement can either be on the railroad where first discovered or at the option of the connecting railroad, on the line of the connecting railroad if the move is no farther than the location on the line where the defect was first discovered. Thus in order to properly move a car for repairs, the railroad must know the defect exists. There are no tagging requirements for safety appliance defects. At interchange, a railroad can refuse to accept a defective car. Until the receiving railroad accepts the car by moving it or otherwise exercising control over it, it is not liable for civil penalties nor is it required to make any repairs. It should be noted, however, that the delivering railroad remains liable for each defective car it tenders in interchange.

The statutory provision contained in 49 U.S.C. §203030 is an affirmative defense to be established by the railroad. There are seven elements which must be established:

1. The car was properly equipped with safety appliances in the beginning.
2. The car became defective while being used by railroad on its line.
3. The railroad discovered the defect prior to movement.
4. The movement was from the place where the defect was first discovered.
5. Repairs could not be made at the location where the defect was first discovered.
6. Movement was necessary to make the necessary repairs.
7. The car moved only to the nearest available point where the necessary repairs could be made.

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The final rule on freight power brakes contains guidelines to be considered by FRA Inspectors and railroads in determining what constitutes the nearest location where necessary repairs can be performed. See 49 CFR § 232.15(f). The guidelines are equally applicable to determining such locations for all safety appliance defects. The guidelines must be applied on a case-by-case basis to determine if the railroad acted in good faith in moving defect equipment. The following locations should be considered when applying the guidelines discussed in detail below:

- Locations where a mobile repair truck is used on regular basis;
- Locations where a mobile repair truck originates or is permanently stationed;
- Locations with an operative repair track or repair shop; and
- Locations where railroad performs mechanical repairs other than safety appliance repairs.

In determining whether a location, noted above, is capable of making a particular repair the following factors must be considered:

- ▶ The accessibility of the location to persons responsible for making repairs;
- ▶ The presence of hazardous conditions that affect the ability to safely make repairs of the type needed at the location;
- ▶ The nature of the repair necessary to bring the car into compliance;
- ▶ The need for railroads to have in place an effective means to ensure the safe and timely repair of equipment;
- ▶ The relevant weather conditions at the location that affect accessibility or create hazardous conditions;
- ▶ A location need not have the ability to effectuate every type of safety appliance repair in order to be considered a location where some safety appliance repairs can be made;
- ▶ A location need not be staffed continuously in order to be considered a location where safety appliance repairs can be performed;
- ▶ The congestion of work at a location shall not be considered.

In addition to considering the factors noted above, the following factors must be considered in determining whether the location is the nearest location where the necessary repairs can be made:

- Distance to the location -- although this is a key factor it should not be the determining factor. This must be considered in conjunction with all the factors previously noted as well as the following safety considerations:
  - ▶ The safety of the employees responsible for getting the equipment to or from a particular location, and
  - ▶ The safety hazards involved in moving the equipment in the direction of travel necessary to get it to a particular location.

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### **Inspection Guidance**

Although the regulations are precise as to the dimensions, location, and manner of application for the various car types, interpretations and guidance have been developed over the years by the FRA. The following written guidance is provided to help the Inspector conduct inspections for compliance with the Safety Appliance Standards. There is a matrix available in Appendix C that identifies safety appliance arrangements on the various cars.

### **Errors in US DOT Safety Appliance Standards Booklet Published 1977**(MP&E 98-7)

Many Inspectors use the September 1977 reprint of the Safety Appliances and Power Brake Requirements (orange) Booklet when conducting safety appliance inspections. Please note there are two textual errors in this book. The first is in the “Note” to 231.1 on page 9, lines 12 to 23. The correct text should read as follows, with the portions associated with the error underlined:

Note: After December 31, 1976, cars of this type built on or before April 1, 1966 or under construction prior to that date and placed in service before October 1, 1966 must be equipped as nearly as possible with the same complement of safety appliances, depending upon type, as specified in § 231.27 for box and other house cars without roof hatches, **or** in §231.28 for box and other house cars with roof hatches. Cars built after April 1, 1966 or under construction prior thereto and placed in service after October 1, 1966, must be equipped, depending upon type as specified in §231.27 for box and other house cars without roof hatches, **or** in §231.28 for box and other house cars with roof hatches.

The second textual error involves the omission of two lines after line 12, page 64 in §231.30(a)(2). The two lines omitted should read as follows:

...1977, seventy percent (70 percent) by October 1, 1978 and all such locomotives by October 1, 1979.

### **Judgment in the Enforcement of the Safety Appliance Standards** (MP&E 98-36)

In the past, FRA Inspectors have taken exception to minimal deviations from the measurements specified in the Safety Appliance Standards on cars that have been in service with the condition for a long period of time without any known incident or casualty. Although these civil penalty citations are valid from a strictly technical and legal point of view, from a common sense point of view the cars operated safely for years, so these minimal deviations did not materially reduce safety.

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Inspectors tend to view the Safety Appliance Standards as requiring the issuance of civil penalty citations if strict adherence to each clearance, size, or placement dimension is not maintained (*i.e.*, either the clearance, placement, or size of each safety appliance is within the exact dimensions required by the regulation, or it is not). Our world has changed and is no longer that simple. The railroad operating environment has drastically changed. Crews are smaller, flat switching is rare and the number of run-through trains is much greater—all decreasing the use of safety appliances. In addition, the limited resources available to both FRA and the railroads require that care be taken to avoid the frivolous use of these resources pursuing minor infractions that do not materially reduce safety.

Most of the Safety Appliance Standards were developed nearly 100 years ago in a time when almost all cars were of a standard design. Application of the regulations to these cars was simple and required little if any judgment on the part of the Inspector. Today most new cars are "Cars of special construction." See 49 CFR §231.18. The Safety Appliance Standards for such cars must be determined from the "nearest approximate type" of a standard car. Id. As a result, the Safety Appliance Standards cannot be applied directly to these cars without exercising good judgment.

Today, Inspectors must exercise this judgment, not just take measurements and file exceptions for minimal deviations. An exception should be taken when the condition of the safety appliance materially reduces safety. For example, a safety appliance with a slight looseness that is still firmly fastened with all of the securing bolts in place, or a safety appliance with a slightly reduced clearance that is still more than adequate for its intended use does not materially reduce safety. However, one court found that a handhold moving as little as ½ inch was not "firmly fastened." See Roe v. Port Terminal R.R. Ass'n, 620 S.W. 2d. 870 (Tex. Civ. App. 1981). Therefore, exactly what materially reduces safety is not always clear—it is a judgment call often dependent on the unique set of conditions governing the operation at the time.

Some general guidance for exercising judgment in the enforcement of the Safety Appliance Standards is as follows:

1. Do not take exception to a non-complying design feature of a type of car that has a long and continuous, safe service history. However, if individual cars of that type or class have another non-complying condition, an exception may be taken.
2. If exertion of a significant force (a force greater than that which would be encountered in the normal use or operation of the appliance) is required to move a safety appliance, exception should generally not be taken.
3. On the other hand, if the safety appliance moves easily to the touch, exception certainly should be taken.

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Although safety appliances remain an extremely important part of railroad safety and the standards pertaining to these appliances must continue to be enforced, the enforcement of the Standards needs to be determined through the exercise of good judgment so that scarce FRA and railroad resources are not consumed pursuing minor infractions that do not materially reduce safety.

A thorough sample-car inspection—performed in accordance with the procedures described on pages 2-8 through 2-11 of the Motive Power and Equipment Compliance Manual—is the proper time to enforce the Safety Appliance Standards strictly. An excellent sample-car inspection will ensure safety appliance compliance before that type of car is placed in service.

### Locomotive Applications & Guidance

Although safety appliances for other than steam locomotives are not addressed in Part 231, with the exception of 231.29, “Road locomotives with corner stairways” and 231.30 “Locomotives used in switching service,” this does not mean that non-steam locomotives are not required to have proper safety appliances. It is FRA’s position that other than steam locomotives must have proper safety appliances and are addressed as cars of special construction. This requires that all locomotives, other than steam, have as nearly as possible the same complement of safety appliances as contained in the categories governing steam locomotives.

#### Locomotives Used in Switching Service - Location End Handholds (MP&E 98-68)

There are constant questions regarding the placement of horizontal end handholds relative to the side of locomotive as referenced in 49 CFR 231.30(g)(1)(ii).

When the switching step regulation was developed, some handholds were installed by measuring from the side of the locomotive and some from the side of the end plate. The preponderance of end handholds is measured from the side of the end plate. Electro-Motive and General Electric have been and are presently applying subject handholds in relation to the side of the end plate.

FRA will not take exception, if application of horizontal end handhold placement is measured from either the side of the locomotive or side of the end plate.

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### Securement of Handrail to the Locomotive Carbody North American Cab Structure (MP&E 98-48)

Some locomotives having the wide body North American cab configuration have the upper end of the front vertical handrail not properly secured to the carbody. § 231.30(e) (1) (I) states in part that each vertical handhold... be securely fastened to the locomotive with one-half (½) inch or larger bolts or rivets....

Some locomotives have the upper end of the front vertical handhold bolted to a bracket, that is welded to that section of the carbody that comprises the outside of the front sand reservoir. Although there appears to be adequate strength in the welded bracket, this is not permitted because the regulation specifically requires that the handhold be securely fastened with a bolt or rivet.

However, FRA has permitted welding of some permanent fixtures on locomotives to which safety appliances are mechanically fastened. The welding was made under quality controlled conditions with a full enclosure penetration weld of the fixture to the locomotive, using modern shop welding practices which provide 100 percent full strength requirements of the joint.

This condition, if found, is not to be taken as a defective condition, but should be brought to the railroad's attention for corrective action.

### Burro Crane Requirements (MP&E 98-25)

The following interpretations of the Federal regulations regarding the operation of burro cranes should be used for consistent compliance and enforcement guidelines:

1. Chapter 203SSafety Appliances, §20302. General requirements (a)(4), which requires power driving-wheel brakes on locomotives, applies to a Burro Crane being used to pull or push cars on tracks that are part of the general rail system.
2. Railroad Power Brakes and Drawbars, 49CFR Part 232, states that power brakes are not required to be installed on "locomotive cranes" built prior to September 21, 1945. By implication, power brakes are required on all locomotive cranes, including Burro Cranes, built on or after September 21, 1945.
3. Chapter 203SSafety Appliances, §20302. General requirements (a)(1)(A) which requires automatic couplers; (a)(1)(B) secure sill steps and hand brakes; and (a)(2) grab irons or handholds; all of which apply to a Burro Crane.

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4. If the Burro Crane is used as a road locomotive, §231.29 of the Safety Appliance Standards, a road locomotive with corner stairways apply.
5. If the Burro Crane is used as a locomotive in switching operations as defined in §231.30(b)(2), the requirements of §231.30 of the Safety Appliance Standards apply.
6. Other sections of the Safety Appliance Standards do not appear to apply.
7. Despite the fact that the Burro Crane is excluded from the definition of “locomotive” under §229.5 of the Locomotive Safety Standards, the Burro Crane is nevertheless subject to the statutory requirements of the Locomotive Inspection Act, in particular, the requirement that it be safe. In the preamble to the final locomotive rule, FRA explicitly recognizes the applicability of the Act by stating that “FRA will continue to implement the basic statutory safety requirements with respect to such work equipment by using the Special Notice For Repair when appropriate.” 45 FR 21093.

### **Self-Propelled Vehicles Considered to Be Locomotives** (MP&E 98-71)

The following are requirements for self-propelled vehicles used to haul revenue freight on the main line. Self-propelled vehicles are used in a variety of railroad functions. These vehicles include those built by Trackmobile Inc., Shuttle Wagon, Mitchell Equipment Corporation and Brandt Roadrailer.

When a self-propelled vehicle is used to move freight over the railroad, it will be considered a locomotive and must comply with applicable regulations. Even though these vehicles do not resemble a standard locomotive, the purpose for which they are being used requires compliance with 49 CFR Sections 223, 229, 231 and 232.

The self-propelled vehicles are unique in construction, appearance and use. Many of these vehicles currently being used have already been modified by the manufacturers (as closely as construction would permit) to bring them into compliance with Federal regulations. FRA acknowledges that this equipment has a place in a well-rounded rail transportation system. In an effort to recognize the unique characteristics of these vehicles, FRA Inspectors should exercise enforcement discretion and good judgment in analyzing an operation where self-propelled vehicles are used for train movements.

The following specifications should be used by Inspectors for enforcement guidance:

1. Switching steps as defined in Section 231.30.
2. Four horizontal handholds secured to the back and front ends of the vehicle, secured by bolts or other acceptable mechanical fastener. Section 231.30.

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3. Vertical handholds painted in contrasting colors and secured by bolts or other acceptable fasteners, Section 231.30.
4. Must be equipped with automatic couplers, to prevent the necessity of someone going between the vehicle and car for the purpose of coupling or uncoupling, §231.30.

Items deemed to be safety-related, that cannot meet specified requirements, will have to be addressed through the waiver process.

### Steam locomotives used in road service - 231.15

The vast majority of, if not all, steam locomotives in use today are used in tourist and excursion road service. The focus of safety appliance inspection on steam locomotives should be directed at whether or not the appliance is structurally sound, securely fastened and located, provides proper clearance, is unobstructed, and is safe to use.

### Specifications common to all steam locomotives - 231.15

Steam locomotives with Vanderbilt-type tenders require additional handrails, running boards and handholds that vary from other tenders.

### Steam locomotives used in switching service - 231.16

The regulations pertaining to steam locomotives in switching service require footboards. However, inspectors **should not** take exception to steam locomotives that have had the footboards removed. Conversely, many steam locomotive owners/operators have elected not to remove the footboards from their locomotives for historical purposes, but may prohibit railroad personnel from occupying the footboard while the locomotive is moving. In either case, the focus of safety appliance inspection on steam locomotives should be directed at whether or not the appliance is structurally sound, securely fastened and located, provides proper clearance, is unobstructed, and is safe to use.

### Locomotives used in switching service - 231.30

Locomotives used in switching service regardless of built date must be in full compliance with 49 CFR Part 231.30. However, some relaxation of the regulations is allowed with respect to switching step height and width for six-axle locomotives in switching service, built prior to April 1, 1977.

It should be noted that this section specifically allows for the fastening of the switching step to the switching step bracket by weld, provided the weld is at least twice the strength of a bolted attachment. Since this issue can obviously be subjective and open to interpretation, inspectors should exercise discretion. Generally speaking, most welds applied during manufacture are as strong or stronger than any mechanical fastener made. Welding by the manufacturer is typically

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performed under controlled circumstances and in accordance with strict Weld Procedure Specification (WPS). The problems associated with welding occur when no WPS exists, as is the case in most railroad locomotive shops. When inspecting switching steps that have been applied by weld, carefully inspect the weld for discontinuities such as incomplete fusion, undercut, overlap, porosity or inclusions. If any of these defects exist in the weld, the integrity of the weld should be questioned.

The outer edge of the bottom switching step must be illuminated on all locomotives built after March 31, 1977. Locomotives built prior to March 31, 1977 may be illuminated, or have the outer edge of the switching step painted a contrasting color. If multiple locomotives (two or more) are used in switching service, only the front switching steps of the leading locomotive and the rear switching steps of the trailing locomotive must be illuminated or painted a contrasting color, depending on built date. Vertical handholds must also be painted a contrasting color. In addition, a minimum of 2½ inches must be maintained the entire length of the vertical handhold.

### Road locomotives with corner stairways - 231.29

Road locomotives without corner stairways may not be used in switching service after September 30, 1979, except for passenger cars switching service at passenger stations, (*see 231.30 (a)(3)*).

### Freight & Passenger Car Applications & Guidance

#### Safety Appliance Fasteners - (MP&E 98-14)

The Railroad Safety Appliance Standards, 49 CFR, Part 231, require that safety appliances and their brackets be secured by ½-inch bolts with nuts outside (when possible) and riveted over, or with not less than ½-inch rivets. Additionally, in order to comply with the Safety Appliance Regulations, there must be a deformation of the threads to prevent the fastener from becoming insecure. This can be accomplished by one of the following methods:

1. Rivet the fastener;
2. Check the threaded portion of the bolt nearest the fastener with a chisel to ⅜-inch depth at two locations; or
3. Apply weld to the threaded portion of the threads, so as to deform them.



*Typical two-part mechanical fastener*

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Additional approved safety appliance securement fasteners are: one-and-two piece rivets, bolts, Huck bolts, Unilock, Disclock, and Nordlock fasteners when properly applied.

Part 231 is explicit in requiring that handholds be securely fastened. By definition, secure means free from danger or risk of loss; free from fear or doubt; and not likely to fail or give way. FRA's longstanding policy concerning the securement of all safety appliances requires that safety appliances or supports for safety appliances must be mechanically fastened. Brackets or supports that are applied to a car structure (other than a tank car tank) solely for the securement of safety appliances are to be mechanically fastened to the car structure.

Many years of railroading experience has shown that welds are not uniform and are subject to failure, despite improvements in welding procedures. Cracks and breaks in welds are difficult to detect during inspections. Therefore, welding is not considered to meet the definition of secure. This is particularly evident at repair facilities, where quality of workmanship is not always assured.

Safety appliances for other than steam locomotives are not addressed in Part 231, with the exception of 231.29, "Road locomotives with corner stairways" and 231.30 "Locomotives used in switching service." This does not mean that non-steam locomotives are not required to have proper safety appliances. It is FRA's position that other than steam locomotives must have proper safety appliances and are covered as cars of special construction.

This requires that locomotives other than steam have as nearly as possible the same complement of safety appliances as contained in the categories governing steam locomotives.

However, the FRA has not enforced the deformation of threads of bolts used to secure safety appliances on locomotives. These appliances are usually secured by self locking nuts and/or lock washers, and to our knowledge have not presented a safety problem.

Exception should only be taken when the safety appliances on other than steam locomotives are insecure or presenting a potential safety hazard to railroad employees.

### **Adjustable Handhold/Ladder Tread - (MP&E 98-22)**

The adjustable handhold/ladder tread is 3/4-inch in diameter. Its length may be adjusted as needed, by the application of a 1/4-inch roll pin into the desired hole. The remaining portion is to be cut off, leaving a smooth surface.

In 1988 the Federal Railroad Administration (FRA) ruled that this adjustable safety appliance meets the specified requirements, if properly applied. However, FRA expressed concern of the

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possibility of improper application, such as the substitution of the roll pin, improper securement, etc.

If any deficiency is found concerning this safety appliance, such as substitution of the roll pin, improper securement, etc., it should be reported to the regional MP&E Specialist with all pertinent information, including photographs. The Specialist is to promptly advise the MP&E Staff Director.

### Dimensions Applicable to Handles of Uncoupling Levers - (MP&E 98-49)

In the past some Inspectors have taken exception to the handles of bottom operated uncoupling levers being more than 6 inches from the side of the car.

Section 231.1(k)(2) states in relevant part: (i) Handles of uncoupling levers, except those shown in Plate B or of similar designs, shall be not more than 6 inches from sides of car. (ii) Uncoupling levers of design shown in Plate B and of similar designs shall conform to the following prescribed limits: (iii) Handles shall be not more than 12, preferably 9, inches from sides of cars. Center lift arms shall be not less than 7 inches long. The top operated uncoupling lever shown in Plate B is similar in design to bottom operated uncoupling levers and are fundamentally the same, as both are operated in the same manner by an upward lift of the uncoupling lever handle to disengage the coupler lock block.

The reference in 231.1(k)(2)(i) to uncoupling levers of other than Plate B design requires that the uncoupling lever handle be not more than 6 inches from side of car. This refers primarily to those uncoupling levers which are operated by a downward motion of the uncoupling lever either by hand or foot. This type of uncoupling lever could be operated from the side ladder while the car was in motion.

Therefore, FRA will not take exception to bottom operated uncoupling levers that are similar in design to that shown in Plate B, unless the uncoupling lever handle is more than 12 inches from the side of the car.

Also for your information, the Association of American Railroad's (AAR) Rule 22 for bottom operated uncoupling levers shows the maximum distance of the uncoupling lever handle to be 12 inches from the side of the car.

### Definition of Left and Right — A and B End - (MP&E 98-51)

As a result of the work of an MP&E Technical Resolution Committee, the following interpretation should be used for determining and reporting the location of non-complying and/or defective railroad car components.

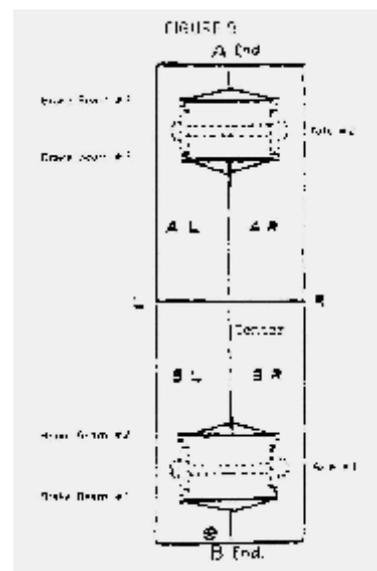
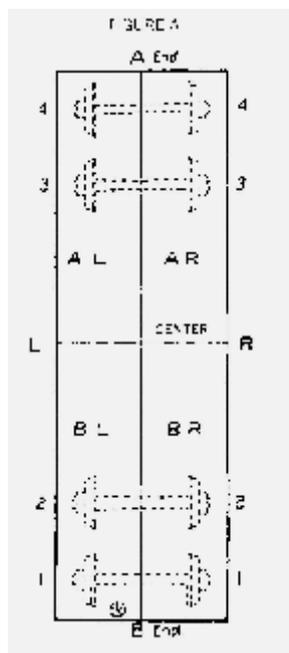
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The definition of “left” and “right” is defined in §231.19 ,

*“Right or Left refers to the side of person when facing end or side of car from ground”*

The railroad industry’s generally established and accepted practice for determining the location of applicable components on rail cars equipped with four, six, or eight wheel trucks is as follows:

- The B end of a car is determined by the location of the hand brake. The end of the car on which the hand brake is located is the B end. The opposite end of the car is known as the A end. On cars equipped with hand brakes on both ends, the “A” and “B” end shall be determined as stenciled.
- When facing the B end of the car, the car is divided into four sections known as BR, BL, AR, and AL. The order of applicable components on the right side of the car shall be known as R1, R2, R3, etc. The order of applicable components on the left side of the car shall be known as L1, L2, L3, etc. See figure A.
- Beginning at the B end of the car, brake beams shall be numbered consecutively. See Figure B.

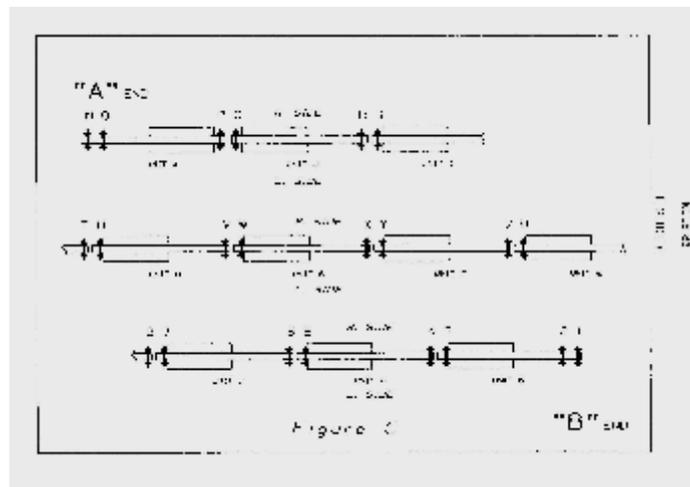


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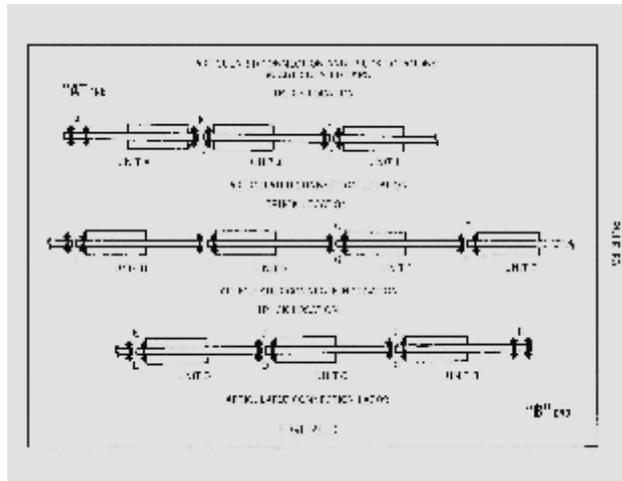
The railroad industry's generally established and accepted practice for determining the location of applicable components on articulated and multi-level cars is as follows:

- The end of the car upon which the hand brake is located and is stenciled "B end" shall be known as the B end of the car. The unit adjacent to the B end shall be known as the C unit. The unit opposite the B unit shall be known as and stenciled "A end." Units will be stenciled consecutively and alphabetically from the B end toward the A end. See Figure C.
- Facing the B end of the car, the right side shall be known as the "R" side and the left side shall be known as the "L" side. Wheel sets and related parts will be numbered consecutively from the B end to the A end, 1 through 9. Wheel sets and related parts higher than 9 will be identified alphabetically in reverse order from Z, (Z, Y, X, W, etc.) until the last wheel set on the A unit is identified. See Figure C.

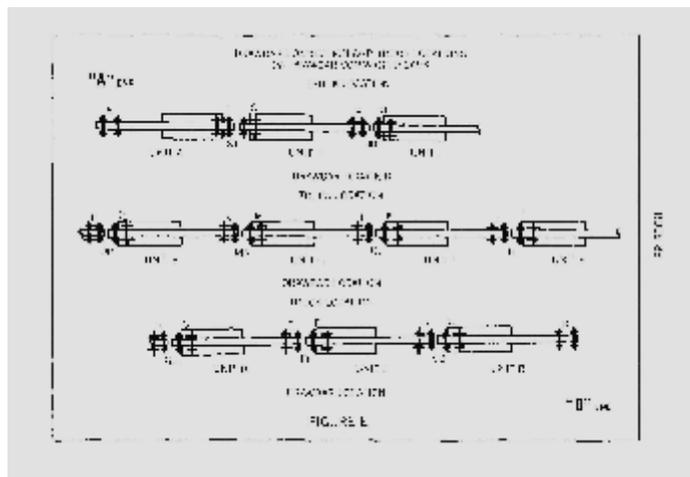


- Facing the B end of the car, the articulated connection locations will be lettered beginning with C and will continue consecutively and alphabetically from the B end toward the A end. See Figure D.
- The end truck on the B end will be location B and the end truck on the A end will be location A. Starting with the first truck inboard from the B end, the truck location will be lettered beginning with C and will continue consecutively and alphabetically from the B end toward the A end. See Figure D.

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- The drawbar connection will be reported as the combination of the locations of the two trucks closest to the drawbar. See Figure E. (i.e. CD, EF,GH, etc.) The end truck on the B end will be location B and the end truck on the A end will be location A. Starting with the first truck inboard from the B end, the truck location will be lettered beginning with C and will continue consecutively and alphabetically from the B end toward the A end. See Figure E.



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### Aluminum Safety Appliances - (MP&E 98-18)

In the past, exception has been taken to various cars equipped with aluminum safety appliances: ladder treads, handholds and sill steps.

FRA's Office of Research and Development has confirmed that the ladder treads, handholds of circular cross-section, 13/16-inch diameter and sill steps, 5/8-inch thick and 2 inches wide, when constructed of 6061-T6 aluminum alloy, exceeds the current Federal Railroad Administration's requirements. Therefore, no exception should be taken to this material.

### Handbrakes

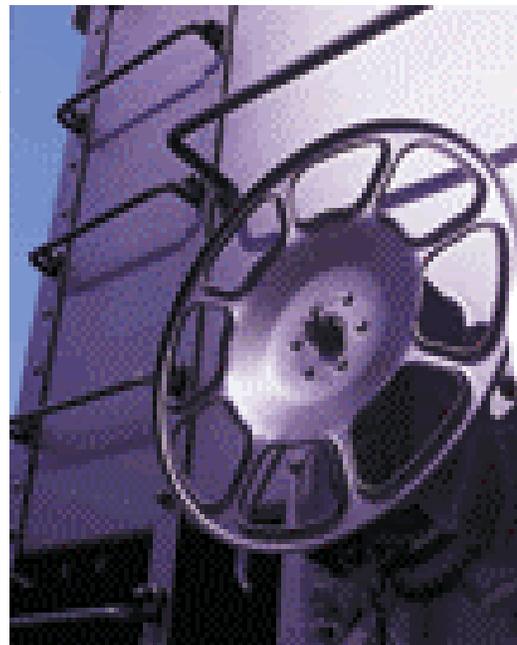
#### Handbrake Chains - (MP&E 98-53)

It has been brought to our attention that freight cars of recent construction are being equipped with handbrake chains that are not in compliance with FRA regulations. Handbrake chains are described in the present Safety Appliance Standard Regulation, Section 231.27(a)(2)(vi), as follows:

*All chains shall be not less than nine-sixteenths (9/16) inch BBB coil chain.*

The Association of American Railroads (AAR) Manual of Standards S-404-74, 2.1.9, has the following requirements for handbrake chains:

*Handbrake power chain shall be 9/16 inch BBB coil chain or meet the minimum specification (working load 5875 lbs., proof test of 11,750 lbs.) of sufficient length so that the distance from center line of lower attaching rivet hole in housing to center line clevis rivet is 21- 9/16 inches.*



*Handbrake wheel and ladder*

It has been determined that both the three-eighths (3/8) inch alloy chain and the 1/2-inch steel alloy chain currently being used by new car manufacturers exceeds the specifications for the 9/16-inch BBB coil chain.

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Therefore, in accordance with 49 CFR 231.27 (a), *exception should not be taken* to handbrake chains that provide the same degree of safety, or a greater degree of safety, as the 9/16-inch BBB coil chain. The 9/16-inch BBB coil chain is no longer being used by handbrake manufacturers.

### Handbrakes - Articulated Cars (MP&E 98-26)

Handbrake performance requirements as specified in Title 49 CFR Part 231 include the following:

- Must be an efficient design;
- Must operate in harmony with the power brake;
- Must provide equal or greater total force on the brake shoes as the brake cylinder with 50 psi air pressure;
- One handbrake per car.

The Association of American Railroads (AAR) is more specific in their requirements in that a minimum braking ratio of 11 percent must be achieved at the brake shoes with a specified force output at the handbrake (equivalent to 125 pounds on the rim of the wheel). Further, the handbrake force must act on one-half of the axles including the "B" end truck. If these requirements cannot be met with a single handbrake, a second handbrake must be applied with appropriate stenciling at each handbrake location.

On some articulated multi-platform cars, it is not feasible to apply the handbrake force to half the axles with one handbrake and a second handbrake has been applied at the opposite end ("A" end) of car.

FRA takes no exception to this practice if the following conditions are met:

- Stencils must be placed adjacent to each handbrake advising that the car is equipped with two handbrakes.
- Each handbrake shall be so located that it can be safely operated while car is in motion.
- The handbrake force should comply with AAR Standards.

### Multi-Unit Articulated Flat Cars- Crossover Platforms (MP&E 98-35)

TTAX five-unit All Purpose Spine Cars are equipped with handbrakes which face outward at each end of the five-unit consist. The handbrake arrangement is designed so that it can be operated while standing on the sill step or from the ground.

When a 48-foot container is placed on the "A" end unit, the end "crossover" platform is partially

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covered by the container and has only 10 inches exposed. The "crossover" platforms on these TTAX cars and/or platform extensions on other multi-unit articulated flat cars is not a requirement of the current safety appliance standards. Additionally, they are not used for the proper operation of the handbrakes.

Therefore, the FRA will not take exception to these TTAX five-unit All Purpose Spine Cars when loaded on the A and B units with 48-foot containers that partially cover the end "crossover" platforms.

However, FRA requires that safety appliances or supports for safety appliances must be mechanically fastened. Brackets that are applied to a car structure other than a tank car, solely for the securement of safety appliances, are to be mechanically fastened to the car structure.

### Standard Level and Low Level Auto Rack Cars (MP&E 98-5)

Since the origination of the radial door and its application to auto rack cars, many clearance problems have developed. Because of the nature of these problems, the **vertical** relationship of the side ladders and sill steps has been altered in such a manner that there are variations of misalignment from 5 to 13 inches. FRA feels that this has created a potential safety hazard and that FRA needs to establish guidelines to implement improvement in this area. FRA and the Car Manufacturers determined that the following dimensions be adopted:

<u>Standard Level Cars</u>	<u>Relationship of Sill Step to Side Ladder</u>
All cars	2-3/16 inch maximum
<u>Low Level Cars</u>	
Built 1978 & prior	5-inch maximum
Built after 1978	4-inch maximum

### Flat Cars

#### DODX 40000 Series Flat Cars (MP&E 98-16)

Questions are often raised as to whether DODX 40000 series flat cars are in compliance with 49 CFR 231.6(a)(3)(i), which requires that "Each handbrake shall be so located that it can be safely operated while the car is in motion."

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These cars are designed to have a 2½ by 8-inch slot in the car floor near each corner. These slots are considered by the FRA as “grab holes,” so that the handbrake can be safely operated using this “grab hole” when the car is in motion. These cars were built primarily to haul M-1 tanks, which are 12 feet wide. The car floor is only 10-feet 8-inches wide. The handbrake is located so that the tanks can be loaded or unloaded.

Also, it has been reported that these cars have a missing bottom rod safety support.

These cars are equipped with Buckeye six-wheel trucks with truck-mounted brakes. Because of the truck mounted brakes, bottom rods requiring safety supports are found only on the handbrake truck. There are two bottom rods. One is equipped with two safety supports, while the other has only one. The truck, as designed, lacks a bracket or other location to which an effective fourth safety support can be attached. The brake rod in question measures 35 inches between pivot points. The loss of a connecting pin at the unsupported end of the rod would cause the rod to drop ½-inch over a distance of 7-inches before it encountered the existing safety support. The minimum clearance above the rail would still be more than 2½- inches.

Inspectors should take no exception to cars so equipped.

### **Safety Appliance Arrangements on Flat Cars (MP&E 98-69)**

Section 231.6 specifies the minimum requirements for safety appliances on flat cars. However, over the years, other arrangements have been agreed upon without being incorporated into the standards. Therefore, new and reassigned employees, as well as new car builders, may not be aware of such agreements.

One revised arrangement of horizontal side handholds occurred when the Trailer Train Company decided to eliminate the vertical handhold on long bridge plates. This side handhold arrangement follows:

#### **Side Handholds:**

1. Dimensions: Same as specified for flat cars, except length not less than 18-inches, and diameter not less than 1-inch when legs are extra long.
2. Manner of Application: Same as specified for “Box and Other House Cars.”
3. Location: One (1) over each sill step on top of rub rail projecting upward, not less than twenty-seven (27) nor more than thirty-four (34) inches above tread of sill step. Clearance at outer end

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should not be more than eight (8) inches from end of car.

All other safety appliances on piggy-back cars should conform to those specified for flat cars. Also, additional handholds provided to facilitate use of handbrakes, including handholds on stub bridge plates, should be retained.

Any flat car that has a low-mounted side handbrake, should be equipped with a second handhold at the hand brake corner fifteen (15) to sixteen (16) inches above the handhold described previously. The tread of the sill step at this location should be widened to not less than four (4) inches and be provided with an anti-skid surface. When possible the length of such sill step should be increased to not less than fourteen (14) inches.

The additional handholds and wider sill step to facilitate the use of the low-mounted side handbrake were agreed upon because of the requirement in §231.6(a)(3)(i), "Each handbrake shall be so located that it can be safely operated while the car is in motion." The Inspector should become familiar with these arrangements.

### Covered Hopper Cars

#### Covered Hopper Cars - Running Board Extensions (MP&E 98-23)

FRA has determined that a running board end extension is not required if the end of the longitudinal running board is at least 6 inches from the vertical plane and the longitudinal running board extends at least the entire length of the roof. In other words, if the longitudinal roof running board does not extend at least the entire length of the roof, a running board extension is required.

#### Roof Hatch/Walkway Blockage

FRA does not believe open hatch covers on top of cars to be a significant safety issue due to prohibitions of individuals on the top of cars and the ease with which the obstruction can be rectified. If an Inspector finds a significant number of instances of open hatch covers, he/she should contact the Regional Specialist and/or Headquarters prior to issuing any violations.

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## Cars of Special Construction

### Bulkhead Flat Cars (MP&E 98-17)

Although the Safety Appliance Standards do not specifically address bulkhead flatcars, these cars would be considered a car of special construction. Section 231.18 states that cars of special construction must have as nearly as possible, the same complement of handholds, sill steps, ladders, handbrakes, and running boards that are required for cars of the nearest approximate type.

FRA is of the opinion that this car, with fixed ends above the floor, most closely resembles cars described in § 231.27, “House and other box cars without hatch covers built or put in service after October 1, 1966.”

Therefore, bulkhead flat cars built or placed in service after October 1, 1966 should comply as nearly as possible with all the requirements of this section.

### “Differential” 100 -Ton Covered Hopper Cars Built by the Thrall Car Co.(MP&E 98-19)

On “pressure differential” 100-Ton Covered Hopper Cars, built by the Thrall Car Manufacturing Company, the end platform and end platform handholds are less than 60 inches long because of structural considerations.

Structural justification for the design is to place supports on the flat end sheet, at locations that will prevent over-stressing the sheet when the car is pressurized.

A letter was sent to the Thrall Car Manufacturing Company, General Electric, and Rail Car Services with the following information:

Concerning the safety appliance arrangement on “Differential” 100-ton covered hopper cars. Specifically, the end platforms and horizontal end platform handholds having a length of less than 60 inches.

Please be advised that due to the structural design of these cars (curved-sided), the FRA will not take exception to the end platforms and horizontal end platform handholds having a length of less than 60 inches. FRA will consider these cars to be of special construction and conform to those requirements as specified in Section 231.18.

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### Coil Steel Cars

Over the past several years numerous concerns have been raised regarding the classification of Coil Steel Cars under the Safety Appliance Standards contained in 49 CFR Part 231. Because Coil Steel Cars do not conform to any of the car types specifically identified in Part 231, these cars must be considered **cars of special construction** pursuant to 49 CFR 231.18, which states:

*Cars of construction not covered specifically in the foregoing sections in this part, relative to handholds, sill steps, ladders, handbrakes and running boards may be considered as of special construction, but shall have, as nearly as possible, the same complement of handholds, sill steps, ladders, handbrakes, and running boards as are required for cars of the nearest approximate type.*

Historically, the determination of what type of car specifically identified in Part 231 is the “nearest approximate type” to a Coil Steel Car has differed depending on the manufacturer, railroad, and/or FRA personnel involved in making the decision. For the most part, the differing views are the result of the reality that all Coil Steel Cars are not designed or manufactured in an identical fashion. Thus, although this type of car is universally referred to as a “Coil Steel Car,” the cars have unique designs and are constructed differently depending on the manufacturer of the car and/or the date on which the car was built. These variations in the design and construction of Coil Steel Cars have resulted in a number of different interpretations relating to what constitutes the car of “nearest approximate type” under § 231.18.

To date, FRA has generally determined that nearest approximate type of car specifically identified in Part 231 to a Coil Steel Car is either a flat car or a low-sided gondola car. See 49 CFR 231.6 and 231.5. FRA considers either of these applications to be appropriate and acceptable. Thus, if a Coil Steel Car conforms to the requirements related to either of the above noted car types, then no exception should be taken. When inspecting Coil Steel Cars, FRA Inspectors must base their determination of what constitutes the “nearest approximate type” of car under Part 231 on previous FRA sample car inspections, if one was performed, and upon the historical application of the regulations to that particular car.

Furthermore, historically, FRA has not taken exception to covers on coil steel cars as to the location and fastening of handholds, railings, or covers that are mixed on a different car than the original design except, if a cover handhold or railing does not have proper clearance, is broken or included as part of the handbrake arrangement to support the operation of a handbrake while the car is in motion.

In situations where an FRA Inspector cannot determine the “nearest approximate type” of car, the following procedures shall be applied:

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- The Inspector should request from the operating railroad the letter issued by FRA, relating to the sample car inspection performed on that series of cars, indicating the sample car inspection “car type” as determined by FRA headquarters. If the car conforms to the requirements related to “car type” indicated by the sample car inspection, then no exception should be taken.
- If the operating railroad cannot produce the above-described document or a sample car inspection was not performed, the “nearest approximate type” of car will be determined by the FRA inspector and the inspector will document all non-complying conditions on Form 6180.4 a to include photos.
- FRA’s Inspector should also request an UMLER or AAR report that indicates the “car type” as determined by the industry from the operating railroad.
- The above-noted information should be sent to the regional MP&E Specialist, who will then submit all of the above information to headquarters with a request for guidance.

### Tank Car Applications & Guidance

#### Safety Chains on Tank Cars (MP&E 98-31)

Operating platforms on tank cars without underframes are addressed in 49 CFR Part 231.21(j)(3) which states:

(3) *Location.* (i) Operating platform to be of sufficient length to provide access to all operating fittings. Ladder to be located on sides of car at center.

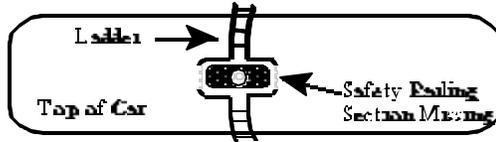
(ii) The safety railing shall enclose the operating platform, manway and fittings used in the loading and unloading of the tank. Railing shall be open only at the ladders where it shall extend in a vertical direction down to, and be securely attached to the platform. Maximum width of opening, twenty-four inches.

Additionally, there are tank cars constructed with top-operating platforms which have end ladders at each end of the tank car, rather than side ladders, in accordance with Section 231.18, Cars of special construction.

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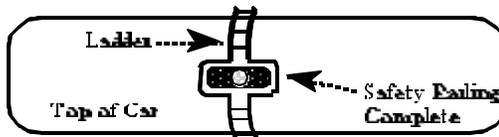
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Therefore, openings in the operating platform allowing access to the ladders do not require safety railing (safety chain) enclosure. All other openings of the operating platform require enclosure.



Not in Compliance

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In Compliance

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### Manufacture and Repair of Operating Platforms and Operating Platform Safety Railings On Tank Cars Without Underframes (MP&E 00-06)

Section 231.21(j) of Title 49, Code of Federal Regulations specifies the minimum requirements for operating platforms on tank cars without underframes. However, many variations in the manufacture and repair of these platforms and the platform safety railings have been in use for a number of years, causing confusion among FRA Inspectors and manufacturers as to which methods comply with Federal regulations.

In order to establish consistency within the industry, FRA hosted a committee comprised of representatives from FRA, the Association of American Railroads, Railway Progress Institute, and several major tank car manufacturers. Based on the information provided at the committee meetings and FRA's prior enforcement of the requirements pertaining to operating platforms on these tank cars, this technical bulletin and its attachments provide guidance regarding the various methods of manufacture and repair of operating platforms and operating platform safety railings on these tank cars that are acceptable to FRA.

Section 231.21(j) requires the operating platforms and related safety railings on tank cars without

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underframes to be “securely attached” or “securely fastened.” FRA has a longstanding interpretation of these phrases which requires that the safety appliances be mechanically fastened. See MP&E Technical Bulletin 98-14. However, FRA believes it is necessary and consistent with both safety and FRA’s previous enforcement of part 231 to exercise its enforcement discretion and continue to allow the weldment of certain portions of the safety appliances on these operating platforms. Tank cars have been manufactured for numerous years with operating platforms that have handrails welded to stanchions and stanchions welded to car body brackets. Tank cars built in this manner have operated for decades without creating any known safety hazard. Thus, FRA will not take exception to existing equipment with these types of safety appliance arrangements, but will require mechanical attachment of such appliances on all tank cars with operating platforms built after January 1, 2000 and when repairs are required on equipment built prior to that date. See Exhibit G, Figures 17 and 18.

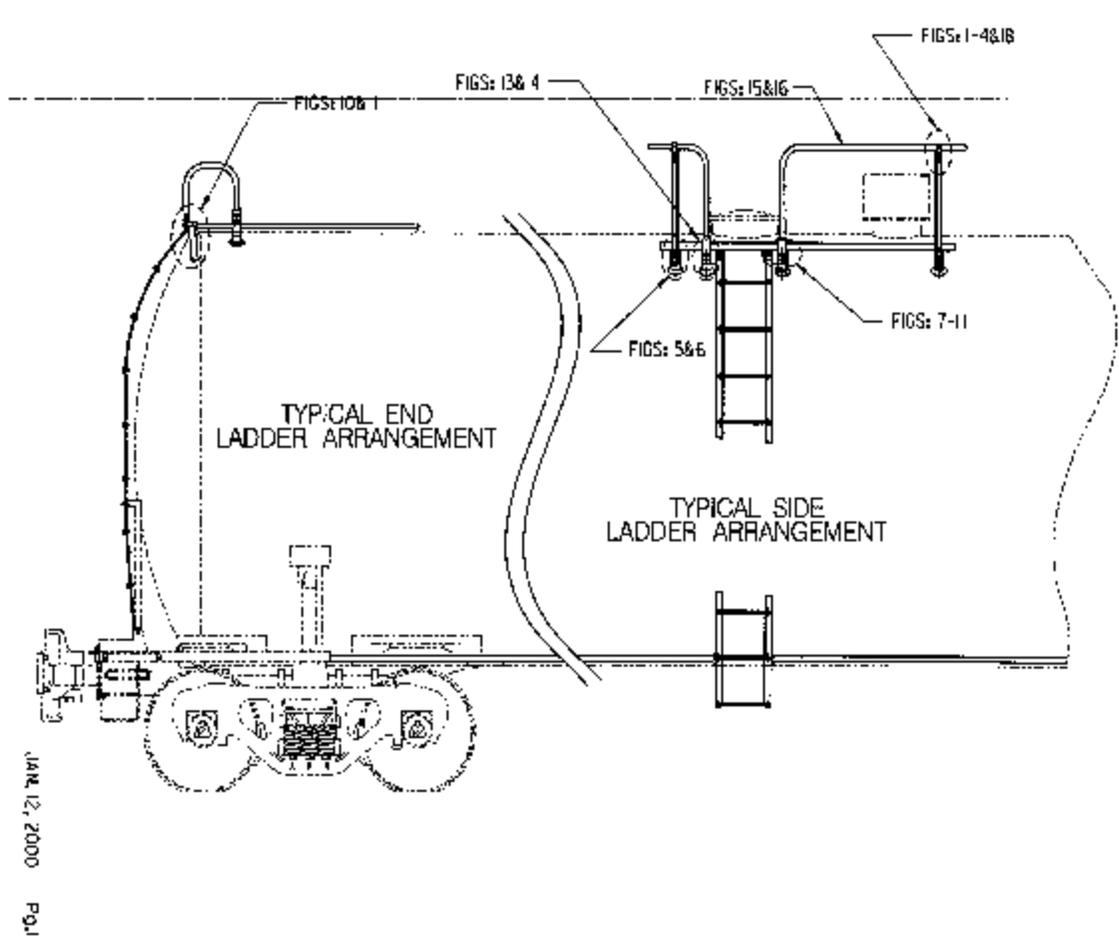
Similarly, FRA has allowed safety railings on operating platforms to be repaired utilizing weldment under certain controlled conditions. Thus, the guidance contained in this bulletin merely acknowledges repair and fabrication requirements for safety railings on operating platforms that are consistent with existing practices to which FRA has not taken exception in the past. FRA believes that the fabrication and repair requirements related to handrails, contained in Exhibits A and F, Figures 13 through 16, do not result in a reduction of the structural integrity of the railings. Furthermore, although weldment is permitted at intermediate points in the railing, the railing is mechanically fastened at the end locations where it is attached to the operating platform or stanchion.

FRA will exercise its enforcement discretion and not take exception to the factory weldment of safety appliance brackets at intermediate locations on the grating of operating platforms. See Exhibits A and D, Figures 7 through 9. There are several reasons for this exercise of discretion. The gratings used on operating platforms have been manufactured for years with these intermediate brackets being directly welded to the gratings, and FRA is not aware of any safety hazards arising from this design. Furthermore, due to the high quality of factory welds, a mechanical fastener would add little or no structural strength to the attachment. In addition, this type of weldment will be permitted only on intermediate brackets, where less stress is being placed on the attachment. All platform attachments at end supports will be required to be mechanically fastened. See Exhibits A and C, Figures 6 and 6A. Moreover, the only field repair that will be permitted on intermediate brackets will be replacement of the grating assembly with a factory-made assembly or application of mechanical fasteners. See Exhibits A and D, Figures 7 through 9.

The guidance contained in this bulletin applies only to operating platforms on tank cars without underframes and is not intended to apply to safety appliances at any other location on a car. See Exhibits: A through I

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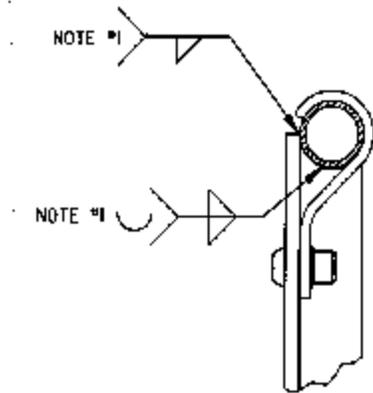
Exhibit A:



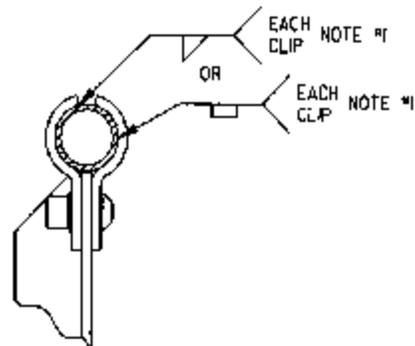
# Motive Power and Equipment Compliance Manual

Exhibit B:

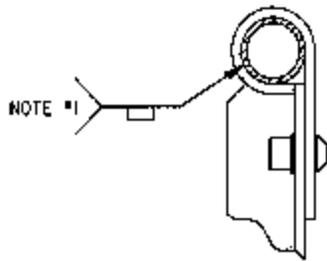
## STANCHION TO RAILING ATTACHMENT OPTIONS



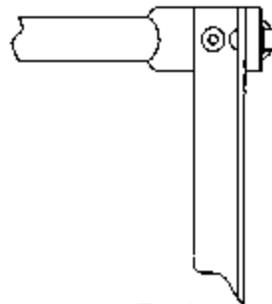
**Fig. 1**  
Fastened Single Clip



**Fig. 2**  
Fastened Double Clip



**Fig. 3**  
Fastened Wrap-around Clip



**Fig. 4**  
Fastened

NOTE #1 Welding in addition to Mechanical Fasteners is acceptable at the option of Industry. Additional fasteners are acceptable.

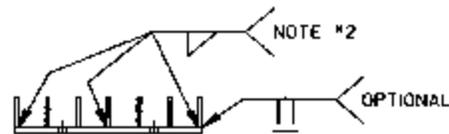
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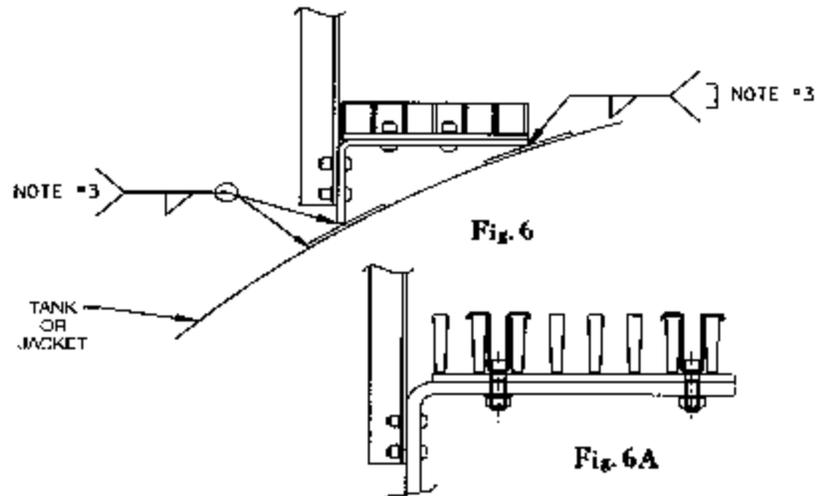
Exhibit C:

## TYPICAL GRATING ASSEMBLY, WELDING



**Fig. 5**

## TYPICAL PLATFORM ATTACHMENT AT END SUPPORTS



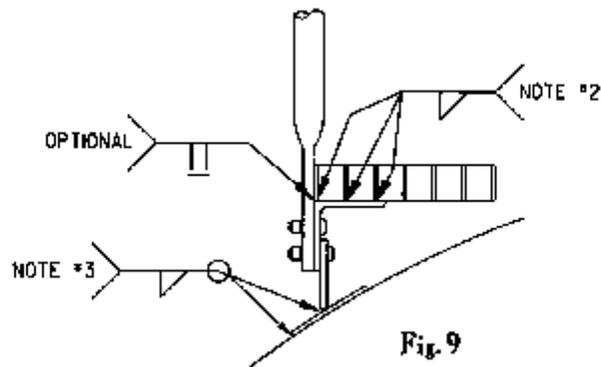
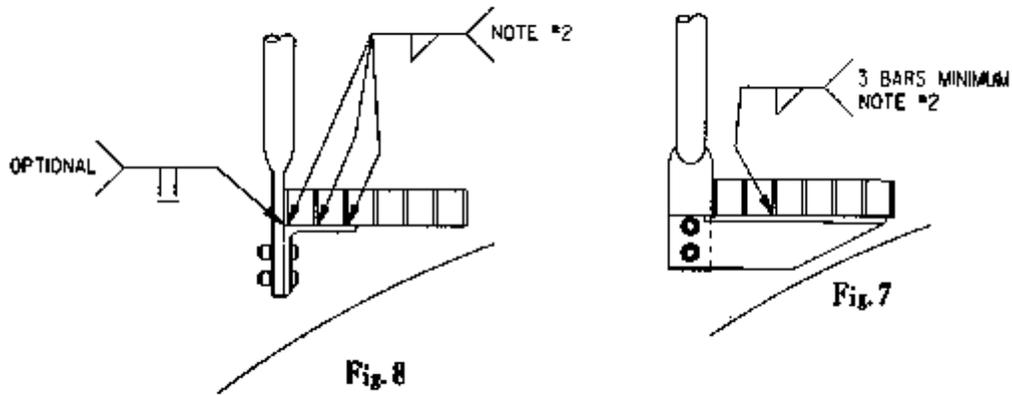
**NOTE #2:** Factory Welds or Mechanical Fasteners are acceptable securement at those locations. Field repairs require Mechanical Fasteners or Factory Made Assemblies.

**NOTE #3:** Field welding acceptable at those locations.

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Exhibit D:

**ATTACHMENT TO GRATING AT INTERMEDIATE LOCATIONS**



NOTE #2: Factory Welds or Mechanical Fasteners are acceptable securement at these locations. Field repairs require Mechanical Fasteners or Factory Assemblies.

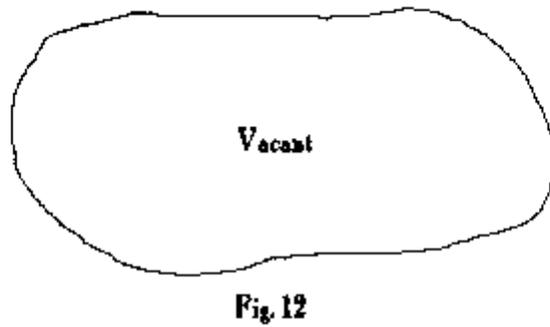
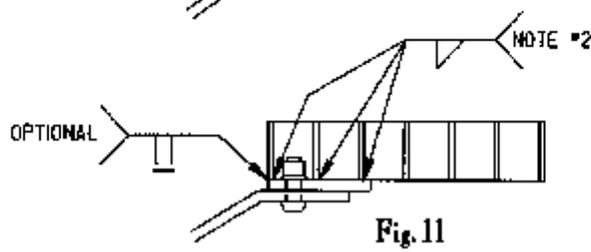
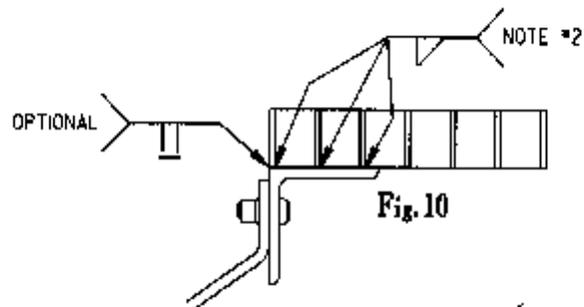
NOTE #3: Field welding acceptable at these locations.

# Federal Railroad Administration

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Exhibit E:

## TYPICAL LADDER TO GRATING ATTACHMENT

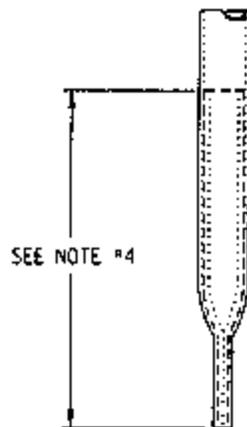


NOTE #2: Factory Welds or Mechanical Fasteners are acceptable securements at these locations. Field repairs require Mechanical Fasteners or Factory Made Assemblies.

## Motive Power and Equipment Compliance Manual

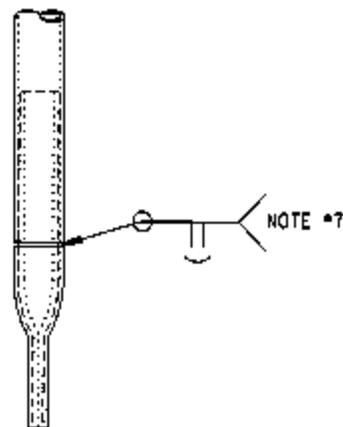
Exhibit F:

### FABRICATION AND REPAIR OF PIPE RAILING



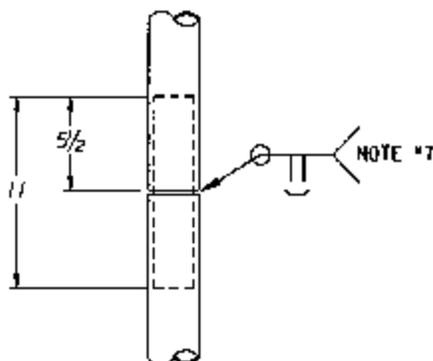
**Fig. 13**

Typical  
Reinforcement Insert  
where Flattened



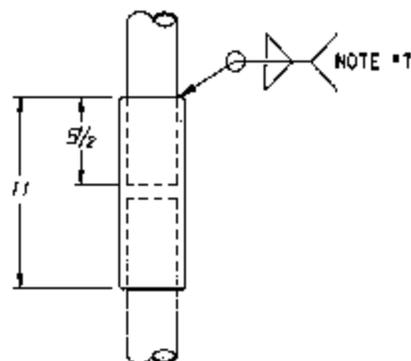
**Fig. 14**

Typical Repair  
See Note 5



**Fig. 15**

See Note 6



**Fig. 16**

**NOTE #4:** When safety railing is 1 1/4 inch pipe and involves flattening, pipe must be reinforced with a steel pipe insert at least 11 inches long or twice the length of the flattened portion, whichever is greater.

**NOTE #5:** Repair in accordance with AAR Interchange Rule 81 Figure 81, 1999 revision, attached.

**NOTE #6:** In Accordance with 6/28/96 FRA Letter to UTC and sketch x-6994.

**NOTE #7:** Break sharp edges

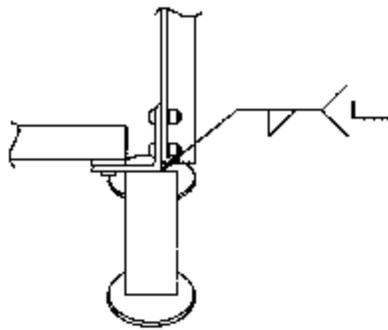
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Exhibit G:

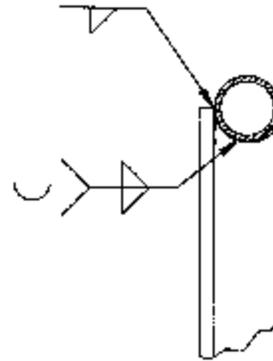
**\*ATTACHMENTS APPROVED ONLY FOR  
EXISTING CARS BUILT PRIOR TO JAN. 01, 2000**



Stanchion to Bracket Attachment\*

**Fig. 17**

See Note 8



Railing to Stanchion Attachment:  
All Welded\*

**Fig. 18**

See Note 9

**NOTE \*8:** Field repairs require mechanical attachment similar to Figure 6.

**NOTE \*9:** Field repairs require mechanical fasteners similar to Figures 1 thru 3.



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Exhibit I:

