

## **Potential Deviations from FRA Part 231 Permitted by AAR Standard S-2044**

It is the intention of the AAR Safety Appliance Task Force that AAR Standard S-2044 and its appendices, which detail the safety appliance requirements for particular car types, incorporate the FRA requirements of 49 CFR Part 231 to the greatest extent possible. The objective is to restate the requirements in a manner that is less ambiguous when applied to cars of modern construction, but does not change the substance of those requirements. In addition to providing improved clarity, S-2044 incorporates additional requirements that in the opinion of the AAR provide an increased degree of safety beyond that provided by the requirements of FRA Part 231. These improvements are described in a separate listing titled, *Improvements in Safety Provided by AAR Standard S-2044 Compared to FRA Part 231 Safety Appliance Regulations*, dated 8/19/05. Because the requirements of S-2044 are often stated differently than those of Part 231, there are some instances in which the appendices to S-2044 would in a small number of cases permit construction that would deviate from the limits of Part 231. Those instances, and the reasons why the AAR believes that the FRA should permit operation of cars whose construction incorporates those deviations, are described below.

### **1. Centering of End Platform on End of Car vs. Centering Between End Handholds**

Text of CFR Part 231.27(b) End Platforms (3) Location: "One (1) centered on each end of car between inner ends of handholds...."

Text of S-2044, Appendix A, paragraph 6.3.1; Appendix B, paragraph 7.3.1; and Appendix C, paragraph 8.3.1: "The center of the outer mounting holes shall be no more than 7  $\frac{3}{4}$  in. (7.75 in.) from the *Clearance Points* of the nearest end handholds. The transverse center of the end platform mounting brackets shall be at the center of the distance between the end handholds and, where practicable, at the center of the car end."

The cited paragraphs of S-2044 require the end platform to be centered between the end handholds rather than on each end of the car. They also limit the separation of the outer end platform mounting holes from the clearance points of the adjacent end handholds to no more than 7-3/4 inches. When the distance from the mounting hole center to the edge of the platform is considered, the maximum distance from the edge of the platform to the clearance point of the adjacent handhold is less than six inches. On the considerable majority of cars, the end handholds on either side of the end platform are of equal lengths and a platform that is centered between the end handholds will also be centered on the end of the car.

On some cars, however, the end handholds to one side of the platform are longer than those to the other side. Such cars cannot simultaneously comply with FRA requirement that the end platform be centered on the end of the car and the AAR requirement that it be centered between the end handholds. Covered hopper cars whose roof handholds are offset toward the center of the car to avoid infringing on the sloped portion of the clearance diagram represent an example of why this occurs. At one time, most people climbing onto the roof of a covered hopper car did so using the side ladder. With the elimination of side ladders under 231.28, however, they now have to use the end ladders. So as to maintain a reasonable overlap of the roof handhold over the ladder below it, the ladder treads and left side end handholds on such cars are often made longer than would otherwise be the case. If the right

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side end handholds were the same length, there may not be enough room for a 60-inch end platform. If a 60-inch platform centered on the end of the car could be applied with unequal end handholds, the gap between the right end of the platform and the adjacent end handhold would be larger than that to the left and would be likely to exceed 7-3/4 inches.

Attached ARI Drawing 5-W-5396 shows the current end safety appliance arrangement on their 3201 and 3256 cu. ft. covered hopper cars. It can be seen that the ladder and end handholds on the left side of the car are wider than those on the right so as to provide a significant overlap of the roof handhold and the ladder beneath it. The 60-inch end platform is centered on the end of the car, but there is a large gap between the platform and the end handholds to the right. ARI Drawing 5-W-5832 shows a proposed arrangement in which the platform is centered between the end handholds but is not centered on the car. This arrangement has very small gaps on either side of the end platform and provides a safer end platform condition than the arrangement with the platform centered on the end of the car.

It is our understanding that the FRA has granted a deviation in the past for this condition. The AAR believes that limiting the separation between platform and adjacent handholds to 7-3/4 inches and increasing the overlap between the roof handhold and the end ladder provide a greater degree of safety than does centering the platform on the end of the car. The AAR therefore believes that centering the platform on the end of the car rather than between the end handholds is not only unnecessary, but may in some cases be less safe.

### 2. Height of End Platform above Center Sill

Text of CFR Part 231.27(b) End Platforms (3) Location: “....not more than eight (8) inches above top of center sill.”

S-2044, Appendix A, paragraph 6.3.3; Appendix B, paragraph 7.3.3; and Appendix C, paragraph 8.3.3 do not directly limit the height of the end platform above the center sill.

S-2044 does not place a limit on the height of the end platform above the center sill, but instead requires that the end platform mounting brackets “.... be no more than 2 in. above nor more than 4 3/8 in. (4.375 in.) below the top surface of the nearest end handhold.” Since end platforms may vary in thickness from 3/8 inch to 2 inches, this requirement in effect states that the top of the end platform may be no more than 4 inches above or below the top of the nearest end handhold. The above requirement makes it impossible in some cases to keep the top of the end platform within eight inches of the center sill.

Consider, for example, a car on which the lowest end handholds are three inches below the top of the center sill. Since the end platform cannot be placed low enough for its mounting brackets to be within two inches of the lowest handhold, the end platform must be aligned with the second lowest end handhold rather than the lowest. If that handhold is 16 inches above the lower one, the top of the platform must be no more than four inches below it and the top of the platform would therefore be at least nine inches above the top of the center sill. Thus there are some handhold locations that do not permit the end platform of a car to simultaneously comply with the FRA eight-inch limit above the center sill and the S-2044 limit on distance from the nearest end handhold. The AAR believes that limiting the difference in

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height between the end platform and the adjacent handholds provides a greater degree of safety than does limiting the height of the platform above the center sill.

### 3. Longitudinal Location of Sill Steps

Text of CFR Part 231.27(c) Sill Steps (3) Location (i): “One (1) near each end of each side of car, so that there shall be no more than eighteen (18) inches from end of car to center of tread of sill step.”

Text of S-2044, Appendices A, B, and C, paragraph 3.3.1: “One sill step shall be applied near each end of each side of the car. The sill steps shall be located in the longitudinal direction such that the inside face of the outboard vertical leg of the sill step is no more than 2 in. inboard of the outboard clearance point of any side handhold. The inside face of the inboard vertical leg of the sill step shall be no less than 10 in. from the outboard clearance point of any side handhold.”

Because of the difficulty in defining the end of the car in some cases, S-2044 locates the sill step differently than does Part 231. The AAR believes that the most important factor in the location of a sill step is its position relative to the handholds above it, so that someone climbing down from the side handholds to the sill step will be able to predict where he should place his foot. S-2044 therefore aligns the outboard end of the sill step with the outboard clearance point of the side handholds. It also requires that the sill step have a minimum tread length of 12 inches, whereas Part 231 permits a 10 inch tread. Because their locations are defined differently in the two documents, S-2044 would permit sill step and handhold configurations in which the center of the sill step is more than 18 inches from the end of the car. On the other hand, Part 231 would permit configurations in which the outboard vertical leg of the sill step is as much as 11 inches inboard of the outboard clearance of the side handholds. The S-2044 requirements are illustrated in the side elevations and View 5 of Figures A1, B1, C1, and C2 of Appendices A, B, and C, respectively. The AAR believes that the sill step requirements of Standard S-2044 provide a greater degree of safety than do the requirements of Part 231.

### 4. Longitudinal Location of Side Handholds

Text of CFR Part 231.27(e) Side Handholds (3) Location: “....Clearance of outer ends of handholds shall be not more than eight (8) inches from end of car.”

Text of S-2044, Appendices A, B, and C, paragraph 4.3.3: “The clearance points of the outboard end of the side handholds shall be not more than 10 in. inboard of, and no farther outboard than, the inside surface of the end handholds.”

Because of the difficulty in defining the ends and sides of some car configurations, S-2044 locates the side handholds from the end handholds. Although this would permit the side handholds to be more than 8 inches from the end of the car in a very small number of cases (such as when the end handholds are recessed between end corrugations), the Task Force believes that locating the side and end handholds relative to each other provides greater

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security when a worker is moving around the corner of a car from the end handholds to the side handholds.

### 5. Transverse Location of End Handholds

Text of CFR Part 231.27(f) End Handholds (3) Location: “....Clearance of outer ends of handholds shall be not more than eight (8) inches from side of car.”

Text of S-2044, Appendices A, B, and C, paragraph 5.3.3: “The clearance points of the outboard end of the end handholds shall be not more than 10 in. from the inside surface of the side handholds.”

Because of the difficulty in defining the ends and sides of some car configurations, S-2044 locates the end handholds from the side handholds. Although this would permit the end handholds to be more than 8 inches from the side of the car in a very small number of cases (such as when the side handholds are recessed behind a side sheet), the AAR believes that locating the side and end handholds relative to each other provides greater security when a worker is moving around the corner of a car from the side handholds to the end handholds.

The same condition can occur with the transverse location of end ladder treads (CFR Part 231.28(b) (3) and S-2044 Appendices B and C, paragraph 6.3.4).

### 6. Number of Side and End Handholds

Text of CFR Part 231.27(e) Side Handholds and (f) End Handholds (1) Number: “Sixteen (16)”

S-2044, Appendix C, paragraphs 4.1 and 5.1: “When the end platforms are aligned with the lowest end handholds, there shall be 16 side (end) handholds, four near each end (side) on each side (end) of the car. When the end platforms are aligned with the second lowest end handholds, there shall be 20 side (end) handholds, five near each end (side) on each side (end) of the car.”

S-2044, Appendix C, paragraph 8.3.3: “The platform-support surface of the mounting brackets shall be no more than 2 in. above nor more than 4 3/8 in. (4.375 in.) below the top surface of the nearest end handhold.”

Unlike FRA Part 231, S-2044 requires that the end platform be vertically aligned with the nearest end handhold. On some bulkhead flat cars and center beam cars, it is not possible to comply with that requirement with only four end handholds at each corner. This occurs primarily on cars with deep side sills, but could occur on any car having a side sill whose bottom flange is more than 15 inches below the top of the center sill. Because this condition is unlikely to occur on box cars and covered hopper cars, Appendices A and B, like CFR Parts 231.27 and 231.28, do not permit more than four side and end handholds at each corner. As shown on the sketch titled *Necessity for Fifth End Handhold* and dated July 8,

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2005, the end platform cannot be aligned with the lowest end handhold on such cars, but must be aligned with the second handhold from the bottom. That in turn requires a fifth end handhold if the end handhold is to comply with the requirement that it be at least 50 inches above the end platform mounting brackets. To ensure that a person can safely move from the end platform to the side of the car on cars with five end handholds without stepping down to the lowest end handhold, S-2044 requires that there be a side handhold aligned with each end handhold and that the side and end handholds aligned with the end platform be equipped with foot guards. While four end and side handholds could be employed if the end platform were not required to be aligned with one of the end handholds, the AAR believes that this alignment makes the end handhold arrangement safer.

### 7. Length of End-Platform Handholds

Text of CFR Part 231.27(g) Horizontal End-Platform Handholds (2) Dimensions (iii):  
“Minimum clear length sixty (60) inches....”

S-2044, Appendix A, paragraph 7.2; Appendix B, paragraph 8.2; and Appendix C, paragraph 9.2 have no minimum length requirement, but do state, “It is preferred that the clear length of the end-platform handholds be no less than sixty (60) inches.”

Since S-2044 requires the use of end platforms no less than 60 inches long, the end platform handholds must be at least 60 inches between their outer supports. Based on the AAR’s understanding of how the FRA defines the clear length of handholds, it believes that the end platform handhold of any car with a platform at least 60 inches long would be considered by the FRA to comply with Part 231.27(g)(2)(iii). However, because of the way that S-2044 defines the clear length of handholds in Section 4.4 and Figure 1 of the base standard, handholds that are bent up or down at their ends might not be considered to have a clear length of 60 inches. This condition is shown on the attached sketch titled *Horizontal End-Platform Handhold Justification* and dated August 26, 2005. Paragraph 7.3.1 of Appendix A, paragraph 8.3.1 of Appendix B, and paragraph 9.2 of Appendix C retain the requirement of Part 231.27(g) (3) (i) that the clearance points of the end-platform handholds be no more than 6 inches from the clearance points of the nearest end handholds. This enables a worker to easily move his hand from the end handhold to the end-platform handhold or vice versa regardless of the length of the end-platform handhold. While S-2044 permits the use of end-platform handholds shorter than 60 inches based on its definition of clear length, the 6 inch limit and 60 inch minimum platform length will prevent their use except on a very small number of cars.

Since Technical Bulletin MP&E 98-19 permits the use of end-platform handholds shorter than 60 inches on specific cars, the AAR requests that this permission be extended to any car that complies with the requirements of S-2044.

### 8. Amount of Reflectorized Paint Applied to Cars Higher than 16 Feet, 10 Inches above Rail

Text of CFR Part 231.27(j) Painting and Marking (1): “That portion of each end of the car which is more than fifteen (15) feet above top of rail shall be painted with contrasting

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reflectorized paint and bear the words “excess height car” in lettering not less than three (3) inches high....”

Text of S-2044, Appendix A, paragraph 10.2; Appendix B, paragraph 14.2; and Appendix C, paragraph 12.2: “No less than 80% of that portion of each end of the car that is more than 15 ft above the top of rail shall be painted with reflectorized paint of contrasting color, or other material providing reflectivity equal to or greater than reflectorized paint, and shall bear the words ‘EXCESS HEIGHT CAR’ in letters no less than 3 in. high.”

It has become increasingly difficult to obtain reflectorized paint, which also experiences more rapid loss of reflective properties over time, especially when wet, compared to other reflectorized materials now available. The AAR therefore requests that no exception be taken to the use of other materials providing equal or greater reflectivity. Since it is difficult to apply some reflectorized materials over irregularly shaped surfaces, such as fasteners, door operating rods, etc., the appendices to S-2044 permit the reflective material to be applied to somewhat less than the entire surface above 15 feet.

### 9. Color of Border around “Excess Height” Stencil on Sides of Cars

Text of CFR Part 231.27(j) Painting and Marking (2): “On each side sill near each end corner there shall be painted or otherwise displayed a yellow rectangular area with a three-fourths (3/4) inch black border containing the words “this car excess height” in lettering not less than one and one-half (1 1/2) inches high.”

Text of S-2044, Appendix A, paragraph 10.3; Appendix B, paragraph 14.3; and Appendix C, paragraph 12.3: “On each side sill, or as close to the side sill as practicable, near each lower end corner there shall be painted or otherwise displayed a yellow rectangular area with a 3/4 in. (0.75 in.) border of contrasting color containing the words ‘THIS CAR EXCESS HEIGHT’ in lettering no less than 1 1/2 in. (1.5 in.) high.”

Instead of the black border required in Part 231, S-2044 calls for a border of contrasting color. Many cars are painted black or other dark colors against which a black border would not be visible. Requiring a border of contrasting color insures that the border and the marking will stand out as intended.

### 10. Location of Running Boards on Sides of Roof

Text of CFR Part 231.1(c) Running boards (3) Location: “Full length of car, center of roof.....“

Text of S-2044, Appendix B, paragraph 10.1.2: Cars with roof hatches located at the center of the roof shall have two longitudinal running boards, one on each side of the roof hatches.”

Since it is not possible to apply running boards on the center of the roof on cars having roof hatches on the car center, S-2044 calls for such cars to be equipped with two running boards, one on each side of the roof hatches. Since the widespread adoption in the 1960’s of

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covered hopper cars with center roof hatches, literally hundreds of thousands of cars have operated safely with running boards on each side of centered roof hatches.

### 11. Securement of Roof Running Boards

Text of CFR Part 231.1(c) Running boards (4) Manner of application (iii): Running board shall be securely fastened to car....” This wording does not directly state that safety appliance mounting brackets must be attached to the car with mechanical fasteners. Technical Bulletin MP&E 98-14, however, states, “Brackets or supports that are attached 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.”

Text of S-2044, Appendix B, paragraph 10.4: “The running boards shall be mechanically fastened to the car with not less than 3/8 in. (0.375 in.) fasteners. Bolts and lock nuts are acceptable securement. Components to which running boards are fastened may be welded to the roof.”

For many years the roof components to which running boards are fastened have been welded to the roofs of covered hopper cars because of product contamination that would occur due to leakage around mechanical fasteners and the problems that fasteners create with interior lining materials. The reliability of these welded roof components has been excellent on the hundreds of thousands of cars to which they have been applied. The fact that running boards are typically supported by many such components also ensures that, even if the attachment of one such component were to fail, the remaining components would continue to support the running board.

### Summary

With the exception of Items 10 and 11, the above conditions in which cars that comply with AAR Standard S-2044 and its appendices might deviate from the requirements of CFR Part 231 will occur on a very small number of cars. The conditions described in Items 10 and 11 already occur on a large portion of the covered hopper cars in service today. It is the AAR’s belief that many of the benefits provided by S-2044 and described in the separate listing *Improvements in Safety Provided by AAR Standard S-2044 Compared to FRA Part 231 Safety Appliance Regulations* are the result of the different ways by which the locations of safety appliances are defined in the appendices of S-2044 and that those benefits justify the conditions described above.

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