

(e) *Alternative standards.* Upon petition by a freight rolling stock owner or railroad under § 224.15, the Associate Administrator may approve an alternative technology as providing equivalent safety. Any such petition shall provide data and analysis sufficient to establish that the technology will result in conspicuity and durability at least equal to sheeting described in paragraphs (a) through (c) applied in accordance with this part and will present a recognizable visual target that is suitably consistent with freight rolling stock equipped with retroreflective sheeting meeting the technical requirements of this part to provide the intended warning to motorists.

**§ 224.105 Sheeting dimensions and quantity.**

Retroreflective sheeting shall be applied along the length of each railroad freight car and locomotive side as described in § 224.106. Unless otherwise specified, retroreflective sheeting applied under this part shall be applied in

strips 4 inches wide and 18 or 36 inches long, as practicable. The amount of retroreflective sheeting to be applied to each car or locomotive subject to this part is dependent on the length of the car or locomotive and the color of the sheeting. For purposes of this part, the length of a railroad freight car or locomotive is measured from endsill to endsill, exclusive of the coupler and draft gear. Each side of a railroad freight car subject to this part, including each unit of multi-unit cars, and each side of a locomotive subject to this part must be equipped with at least the minimum amount of retroreflective sheeting specified in Table 2 of this subpart.

TABLE 2 OF SUBPART B TO PART 224—  
MINIMUM QUANTITY REQUIREMENT  
FOR RETROREFLECTIVE SHEETING ON  
FREIGHT ROLLING STOCK

Freight car or locomotive length	Minimum area of retroreflective sheeting required (per car/locomotive side)—yellow sheeting (ft <sup>2</sup> )	Minimum area of retroreflective sheeting required (per car/locomotive side)—white sheeting (ft <sup>2</sup> )
Less than 50 ft.	3.5	4.0
Over 50 ft. to 60 ft.	4.0	5.0
Over 60 ft. to 70 ft.	4.5	5.5
Over 70 ft. to 80 ft.	5.0	6.0
Over 80 ft. to 90 ft.	5.5	7.0
Over 90 ft. to 100 ft. <sup>1</sup> .....	6.0	7.5

<sup>1</sup> Freight cars or locomotives over 100 ft. in length must be equipped with an additional one-half a square foot of sheeting on each side for every additional 10 feet of length.

**§ 224.106 Location of retroreflective sheeting.**

(a) *Railroad freight cars.* The retroreflective sheeting shall be applied along the length of each railroad freight car side in the manner provided by a uniform industry standard accepted by the Associate Administrator that provides for distribution of material along the length of each car and as close as practicable to 42 inches above the top of rail. In the event such a standard is not proffered by industry or accepted by the Associate Administrator, the criteria set forth in this subpart shall apply. Retroreflective sheeting applied under this part must be located clear of appurtenances and devices such as ladders and other safety appliances, pipes, or other attachments that may obscure its visibility. Retroreflective sheeting need not be applied to discontinuous surfaces such

as bolts, rivets, door hinges, or other irregularly shaped areas that may prevent the sheeting from adhering to the car sides. In addition, retroreflective sheeting need not be applied over existing or required car stencils and markings. If necessary to avoid appurtenances, discontinuous surfaces, or existing or required car markings or stencils, 4x18 and 4x36 inch strips of retroreflective material may be divided into 4x9 inch strips and applied on either side of the appurtenance, discontinuous surface, or car markings or stencils, as practicable. Unless otherwise specified, retroreflective sheeting shall be applied along the sides of freight rolling stock at intervals not to exceed every 12 feet, as practicable. If it is not practicable to apply retroreflective sheeting every 12 feet because of existing stencils, appurtenances, or discontinuous surfaces,

**§ 224.106**

**49 CFR Ch. II (10–1–10 Edition)**

the sheeting shall be applied at the next smallest interval practicable.

(1) *General rule.* On railroad freight cars other than flat cars and tank cars, retroreflective sheeting shall be applied in either a vertical or horizontal pattern along the length of the car sides, with the bottom edge of the sheeting as close as practicable to 42 inches above the top of rail. Retroreflective sheeting shall not be applied below the side sill.

(i) *Vertical application.* If retroreflective sheeting is applied in a vertical pattern, at least one 4x36 inch strip or two 4x18 inch strips, one above the other, shall be applied as close to each end of the car as practicable. Between these two vertical end strips, a minimum of one 4x18 inch strip shall be applied at least every 12 feet, as practicable. *See* Figures 1, 2 and 3.

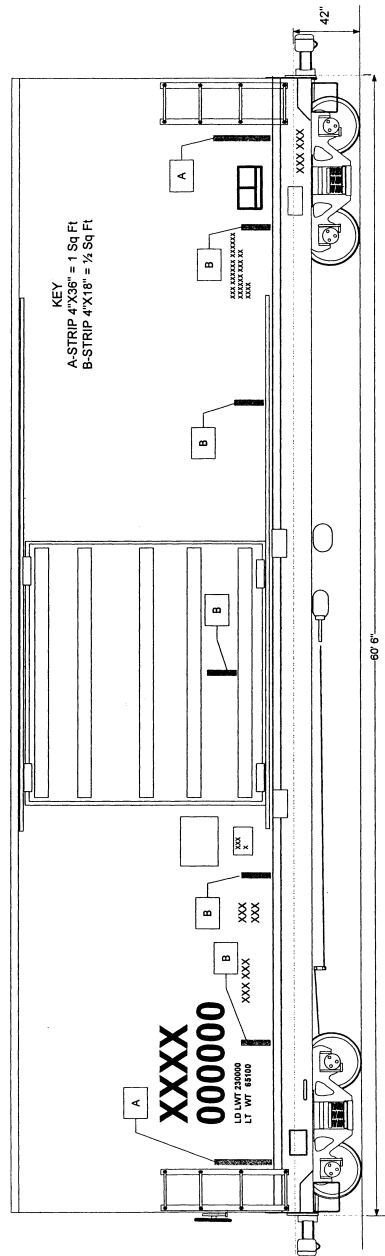


Figure 1  
 Yellow vertical reflective sheeting (4.5 sq. ft.) pattern applied to a typical 60' 6" Box Car (additional sheeting required per 49 CFR 224.105 if white sheeting is applied in lieu of yellow)



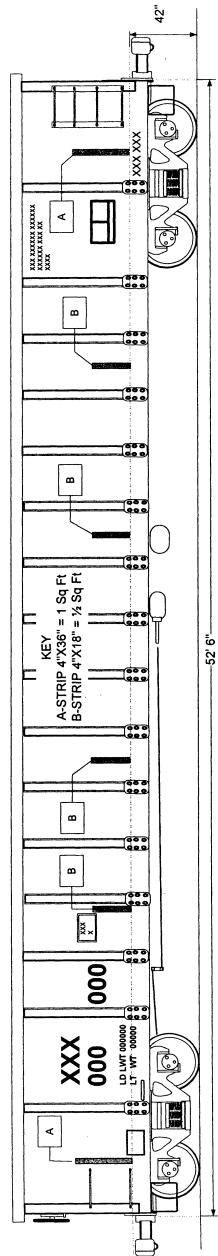


Figure 3  
Yellow vertical reflective sheeting (4.0 sq. ft.) pattern applied to a typical 52' Gondola Car (additional sheeting required per 49 CFR 224.105 if white sheeting is applied in lieu of yellow)

(ii) *Horizontal application.* If retroreflective sheeting is applied in a horizontal pattern, at least one 4x36 inch strip, or two 4x18 inch strips, one

above or next to the other, shall be applied as close to each end of the car as practicable. Between these end strips, a minimum of one 4x18 inch strip shall be

§ 224.106

49 CFR Ch. II (10-1-10 Edition)

applied at least every 12 feet, as practicable. See Figures 4, 5, and 6.

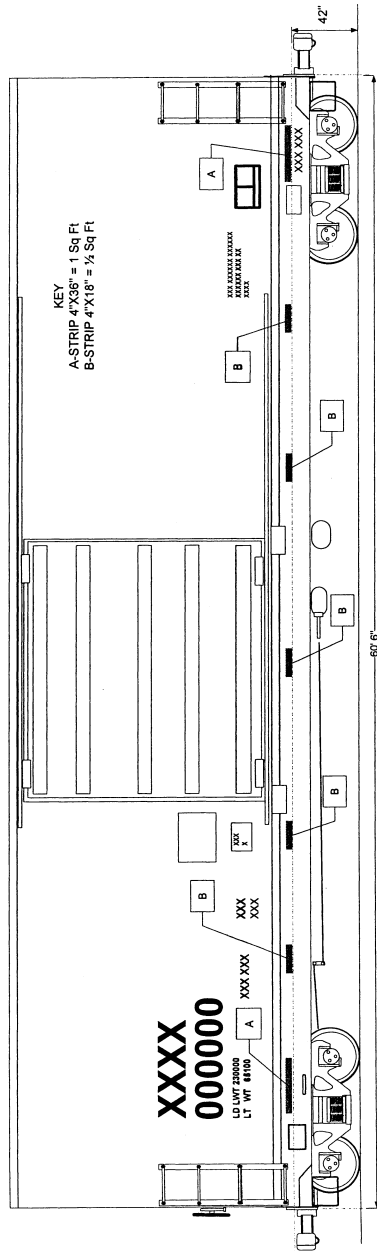


Figure 4  
Alternate Pattern  
Yellow horizontal reflective sheeting (4.5 sq. ft.) pattern applied to a typical 60' 6" Box Car (additional sheeting required per 49 CFR 224.105 if white sheeting is applied in lieu of yellow)



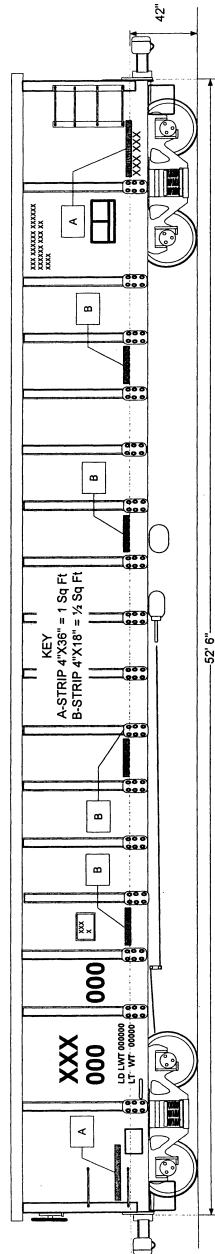


Figure 6  
Alternate Pattern  
Yellow horizontal reflective sheeting (4.0 sq. ft.) pattern applied to a typical 50' cylindrical tank car shall conform to the alternate sheeting specified per 49 CFR 224.105 (white sheeting is applied in lieu of yellow)

(2) *Tank cars.* On tank cars, retroreflective sheeting shall be applied vertically to each car side and centered on the horizontal centerline

of the tank, or as near as practicable. If it is not practicable to safely apply the sheeting centered vertically about the horizontal centerline of the tank,



**Federal Railroad Administration, DOT**

**§ 224.106**

the sheeting may be applied vertically with its top edge no lower than the horizontal centerline of the tank. A minimum of either one 4x36 inch strip or two 4x18 inch strips, one above the other, shall be applied as close to each end of the car as practicable. Between these two end strips, a minimum of one

4x18 inch strip shall be applied at least every 12 feet, as practicable. Retroreflective sheeting applied under this part shall not be located in the spillage area directly beneath the manway used to load and unload the tank. *See* Figures 7 and 8.

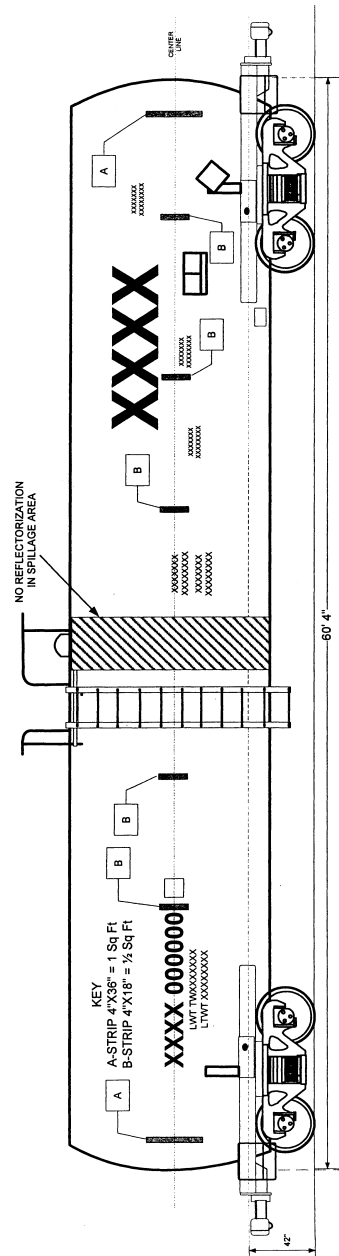


Figure 7  
 Yellow vertical reflective sheeting (4.5 sq. ft.) pattern applied to a typical Tank Car between 60' and 70' (additional sheeting required per 49 CFR 224.105 if white sheeting is applied in lieu of yellow)

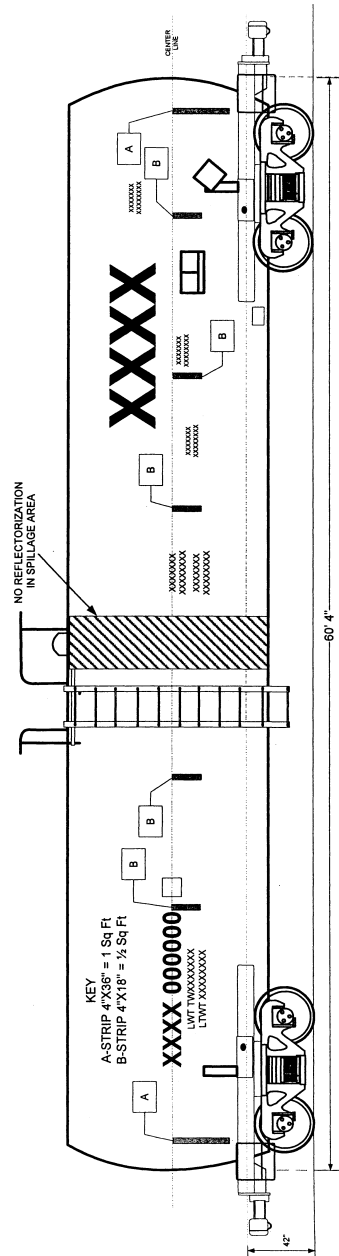


Figure 6  
Yellow vertical reflective sheeting (4.5 sq. ft.) pattern applied to a typical Tank Car does not require additional sheeting required per 49 CFR 224.106 (white sheeting is applied in lieu of yellow)

(3) *Flat cars.* On flat cars, retroreflective sheeting shall be applied in a horizontal pattern along the length of the side sill with the bottom

edge of the sheeting no lower than the bottom of the side sill and the top edge of the sheeting no higher than the top of the car deck or floor. At least two

**§ 224.106**

**49 CFR Ch. II (10–1–10 Edition)**

4x18 inch strips, one above the other, shall be applied as close to each end of the car as practicable. If the side sill is less than 8 inches wide, one 4x36 inch strip, or two 4x18 inch strips may be applied one next to the other, dividing the strips into nine inch segments as necessary in accordance with paragraph (a) of this section. Between the two end strips, a minimum of one 4x18 inch strip shall be applied at least

every 12 feet, as practicable. *See* Figure 9. If a car has a separate rack structure, retroreflective sheeting may be applied to the flat car portion only in accordance with the requirements of this section. For cars without continuous side sills, retroreflective sheeting may be applied to other surfaces inboard of the sides, such as the center sill, provided that the sheeting is not obscured by other components.

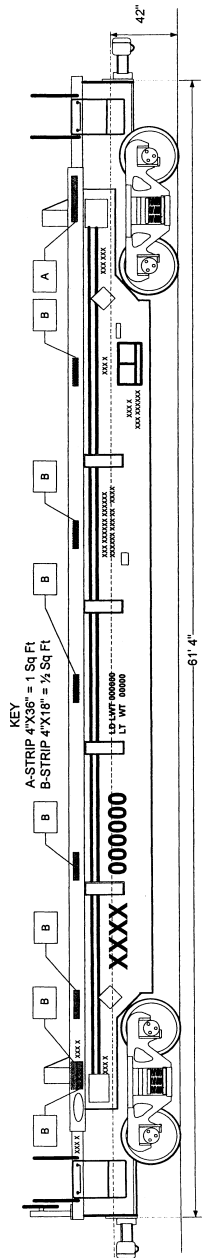


Figure 9  
Yellow horizontal reflective sheeting (4.5 sq. ft.) pattern applied to a typical Flat Car (additional sheeting required per 49 CFR 224.105 if white sheeting is applied in lieu of yellow)

(4) *Cars of special construction.* This paragraph applies to any car the design of which is not compatible with the patterns of application otherwise pro-

vided in this section. Retroreflective sheeting shall conform as closely as practicable to the requirements of paragraphs (a)(1) through (a)(3) of this

**§ 224.107**

section and shall have the minimum amount of sheeting described in § 224.105 distributed along the length of each car side.

(b) *Locomotives.* Locomotives subject to this part shall be equipped with at least the minimum amounts of retroreflective sheeting required by § 224.105 either in strips four inches wide and 18 or 36 inches long and spaced as uniformly as practicable along the length of the locomotive sides, or in one continuous strip, at least four inches wide, along the length of the locomotive. Retroreflective sheeting applied to locomotive sides shall be applied as close as practicable to 42 inches from the top of the rail.

**§ 224.107 Implementation schedule.**

(a) *Railroad freight cars.* All railroad freight cars subject to this part must be equipped with retroreflective sheeting conforming to this part by November 28, 2015. If a car already has reflective material applied that does not meet the standards of this part, it is not necessary to remove the material unless its placement interferes with the placement of the sheeting required by this part.

(1) *New cars.* Retroreflective sheeting conforming to this part must be applied to all cars constructed after January 26, 2006, before the cars are placed in service.

(2) *Existing cars without retroreflective sheeting.* (i) If, as of October 28, 2005, a car subject to this part is not equipped on each side with at least one square foot of retroreflective sheeting as specified in paragraph (a)(3) of this section, retroreflective sheeting conforming to this part must be applied to the car at the earliest of the following two occasions occurring after November 28, 2005 or in accordance with paragraph (a)(2)(ii) of this section:

(A) When the car is repainted or rebuilt; or

(B) Within nine months (270 calendar days) after the car first undergoes a single car air brake test as prescribed by 49 CFR 232.305.

(ii) A freight rolling stock owner may elect not to follow the schedule in paragraph (a)(2)(i) of this section if, not later than January 26, 2006 the freight rolling stock owner submits to FRA a

**49 CFR Ch. II (10–1–10 Edition)**

completed ReflectORIZATION Implementation Compliance Report certifying that the cars in the owner's fleet subject to this part will be equipped with retroreflective sheeting as required by this part in accordance with the schedule specified in Table 3 of this section. See Appendix B of this part for ReflectORIZATION Implementation Compliance Report form.

TABLE 3 OF SUBPART B TO PART 224—  
ALTERNATIVE SCHEDULE FOR APPLICATION OF RETROREFLECTIVE MATERIAL TO FREIGHT CARS PER § 224.107(A)(2)(II)

(A) <sup>1</sup>	(B) (percent)
November 28, 2007 .....	20
November 28, 2008 .....	30
November 28, 2009 .....	40
November 28, 2010 .....	50
November 28, 2011 .....	60
November 28, 2012 .....	70
November 28, 2013 .....	80
November 28, 2014 .....	90
November 28, 2015 .....	100

<sup>1</sup> Column (A) indicates the date by which the minimum percentage of an owner's freight cars specified in column (B) must be equipped with retroreflective sheeting conforming to this part.

Thereafter,

(A) The designated fleet shall be equipped with retroreflective sheeting according to the schedule specified in Table 3 of this section;

(B) No later than January 28, 2008, the freight rolling stock owner shall submit to FRA an updated ReflectORIZATION Implementation Compliance Report showing which cars of the fleet subject to this part were equipped with retroreflective sheeting as required by this part during the initial 24-month implementation period. Thereafter, updated ReflectORIZATION Implementation Compliance Reports shall be submitted annually, no later than December 31 of each year for the duration of the 10-year implementation period. See Appendix B of this part.

(C) If, following the conclusion of the initial 24-month period or any 12-month period thereafter, the percentage requirements of this section have not been met—

(1) The freight rolling stock owner shall be considered in violation of this part;

(2) The freight rolling stock owner shall, within 60 days after the close of the period, report the failure to the Associate Administrator;

(3) The requirements of paragraph (a)(2)(i) shall apply to all railroad freight cars subject to this part in the freight rolling stock owner's fleet; and