

***RAILWAY EQUIPMENT REFLECTORIZATION RULES***

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## 1. Short Title

For ease of reference, these Rules may be referred to as the Reflectorization Rules.

## 2. Purpose, Scope and Requirements

- 2.1 These Rules apply to any company subject to the *Railway Safety Act*.
- 2.2 All railway equipment subject to these Rules must be equipped with retroreflective sheeting conforming to these Rules.
- 2.3 These Rules prescribe the minimum standards governing the specifications; the application; the inspection and maintenance of retroreflective material on railway equipment.

## 3. Definitions

The following terms shall, for the purposes of these rules, have the meanings as indicated below:

- 3.1 **“AAR Rule 66”** means the latest version of Rule 66 Reflective Sheeting in the Field Manual of the Interchange Rules of the Association of American Railroads (AAR).
- 3.2 **“damaged”** means scratched, broken, chipped, peeled, or delaminated to such an extent as to no longer be effective.
- 3.3 **“Department”** means the Department of Transport.
- 3.4 **“freight car”** means a car, designed to carry freight on rail and includes a caboose and a service equipment car.
- 3.5 **“grade crossing”** means a grade crossing as defined under the *Grade Crossings Regulations* (SOR/2014-275).
- 3.6 **“locomotive”** means a rail vehicle, propelled by any energy form, other than steam intended for the propulsion and/or control of freight, or service equipment.
- 3.7 **“obscured”** means concealed or hidden (i.e., covered up, as where a layer of paint or dense chemical residue blocks all incoming light); this term does not refer to ordinary accumulations of dirt, grime, or ice resulting from the normal railway operating environment.
- 3.8 **“railway equipment”** means any locomotive or freight car operated by a company.

- 3.9 “**retroreflective material**” means material as specified by the chromaticity coordinates of the American Society for Testing and Materials (ASTM) Standard D 4956-01a for Type V Sheeting “Standard Specification for Retroreflective Sheeting for Traffic Control”, as amended from time to time, or by an equivalent standard. The words “retroreflective sheeting” and “retroreflective material” are equivalent.
- 3.10 “**service equipment car**” means rolling stock used to house employees at work sites, a material car used for transporting railway maintenance-of-way equipment or for company purposes other than revenue service.

#### **4. Applicability**

- 4.1 These Rules apply to all railway equipment operated over a grade crossing by a company with the exception of railway equipment:
- a) operated over a private grade crossing if the road is opened or maintained by a railway company that is the sole private authority at the grade crossing;
  - b) operated solely on tracks, inside a non-railway installation, that are not part of the general railway system of transportation; or
  - c) used exclusively in passenger service or tourist excursion trains.

#### **5. Harmonization with the Federal Railroad Administration**

- 5.1 All equipment owned or leased by a Non-Canadian railway or private car owner, subject to regulations administered by the Federal Railroad Administration (FRA), may operate in Canada, if the equipment is in compliance with:
- a) the 49 *Code of Federal Regulations* (CFR) part 224, “*Reflectorization of Rail Freight Rolling Stock*”;
  - b) a waiver from part 224 granted in accordance with 49 CFR part 211; or
  - c) an alternative standard providing at least an equivalent level of safety after special approval of the FRA under 49 CFR §224.15.

#### **6. Qualifications of Employees**

- 6.1 A railway company shall ensure that all employees engaged in the application, inspection or maintenance of retroreflective material are fully conversant with the requirements of these Rules and associated company instructions.

## 7. Characteristics of Retroreflective Sheeting

### 7.1 Construction

- a) Retroreflective sheeting shall consist of a smooth, flat, transparent exterior film with micro prismatic retroreflective elements embedded in or suspended beneath the film to form a non-exposed retroreflective optical system.

### 7.2 Colour

- a) Locomotives: retroreflective sheeting must be white or yellow.
- b) Freight Cars:
  - New retroreflective sheeting must be yellow; and
  - Existing white retroreflective sheeting must be replaced with yellow retroreflective sheeting in accordance with AAR Rule 66.

### 7.3 Performance

- a) Retroreflective sheeting applied under these Rules shall meet the minimum photometric performance requirements specified in Table 1.

**Table 1**

**MINIMUM PHOTOMETRIC PERFORMANCE (COEFFICIENT OF RETROREFLECTION (RA) IN CANDELA/LUX/METER<sup>2</sup>) REQUIREMENT FOR WHITE OR YELLOW RETROREFLECTIVE SHEETING**

<b>Entrance Angle (degree)</b>	<b>Observation Angle 0.2 (degree) YELLOW</b>	<b>Observation Angle 0.2 (degree) WHITE</b>	<b>Observation Angle 0.5 (degree) YELLOW</b>	<b>Observation Angle 0.5 (degree) WHITE</b>
-4	400	600	100	160
30	220	350	45	75

### 7.4 Certification

- a) The manufacturer's certification that the sheeting is a retroreflective sheeting and conforms to the requirements of Construction, Colour and Performance of subsections 7.1, 7.2 and 7.3 herein shall appear at least once on the exposed surface of each sheeting in the final application; and
- b) The characters shall be a minimum of 3 mm high, and shall be permanently stamped, etched, molded, or printed within the product and each certification shall be spaced no more than four inches apart.

## 7.5 Alternative Technology

- a) A company may use an alternative technology provided that it files notice with the Department at least 60 days prior to implementation. The filing must demonstrate, through a comprehensive scientific analysis, that the alternative technology meets or exceeds an equivalent level of safety to the Rules and include a risk assessment;
- b) Such alternative technology will result in conspicuity and durability at least equal to retroreflective sheeting described in Construction, Colour and Performance of subsections 7.1, 7.2 and 7.3 herein; and
- c) Such alternative technology will be applied in accordance with these Rules so that it will present a recognizable visual target that is suitably consistent with retroreflective sheeting on railway equipment meeting the technical requirements of these Rules.

## 7.6 Quantity

- a) The minimum amount of retroreflective sheeting to be applied to each side of a freight car, including each unit of multi-unit cars, and each side of a locomotive must be as specified in Table 2.
- b) For the purposes of these Rules, the length of a freight car or locomotive is measured from end sill to end sill.

**Table 2**

### **RETROREFLECTIVE SURFACE AREA PER SIDE**

<b>Length of Freight Car, Service Car or Locomotive (Ft)</b>	<b>Minimum Area of YELLOW Retroreflective Sheeting Required (Sq Ft)</b>	<b>Equivalent Number of 4 x 18 in. Reflectors</b>	<b>Minimum Area of WHITE Retroreflective Sheeting Required (Sq Ft)</b>	<b>Equivalent Number of 4 x 18 in. Reflectors</b>
Less than 50	3.5	7	4.0	8
50 to 60	4.0	8	5.0	10
60 to 70	4.5	9	5.5	11
70 to 80	5.0	10	6.0	12
80 to 90	5.5	11	7.0	14
90 to 100	6.0	12	7.5	15
Over 100	½ sq ft for each additional 10 ft of length		½ sq ft for each additional 10 ft of length	

## **7.7 Size and Location**

- a) Unless otherwise specified in AAR Rule 66, retroreflective sheeting shall be applied in either a vertical or horizontal pattern along the length of the sides with its bottom edge as close as practicable to 42 inches above the top of the rail; and in strips of 4 inches wide and 18 or 36 inches long;
- b) Retroreflective sheeting must be located clear of appurtenances and devices such as ladders and other safety appliances, pipes, or other attachments that may obscure its visibility;
- c) 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 sides of the railway equipment;
- d) Retroreflective sheeting need not be applied over existing or required stencils and markings; and
- e) If necessary to avoid appurtenances, discontinuous surfaces, or existing or required markings or stencils, a 4 by 18 inch strip of retroreflective sheeting may be separated into two 4 by 9 inch strips, or a 4 by 36 inch strip may be separated into four 4 by 9 inch strips, and applied on either side of the appurtenance, discontinuous surface, or markings or stencils.

## **8. Freight Cars**

### **8.1 Application**

- a) The application of retroreflective sheeting must be in accordance with AAR Standard S-910 and AAR Rule 66.

### **8.2 Inspection and Replacement**

- a) A company shall ensure that retroreflective sheeting is inspected for presence and condition at the time of Single Car Air Brake Test (SCABT). The requirement to perform a SCABT is as per the Field Manual of the Interchange Rules of the Association of American Railroads (AAR) - Rule 3. This inspection must be performed in accordance with the AAR Rule 66.
- b) If an inspection conducted in accordance with paragraph 8.2 a) determines that retroreflective sheeting must be repaired or replaced, the company shall repair or replace the damaged or missing material in accordance with the AAR Rule 66.
- c) If at any other time a designated company employee determines that more than 20 percent of the minimum amount of sheeting required on either side of a car is damaged, obscured or missing, that sheeting shall be repaired or replaced within nine (9) months.

## **9. Locomotives**

### **9.1 Application**

- a) The application of retroreflective sheeting must be in accordance with AAR Standard S-910 and AAR Rule 66.

### **9.2 Inspection and Replacement**

- a) A company shall ensure that retroreflective sheeting is inspected for presence and condition at least once every twelve months.
- b) If more than 20 percent of the minimum amount of retroreflective sheeting required on either side of a locomotive is damaged, obscured or missing, the company shall repair or replace the damaged or missing material. If conditions at the time of inspection are such that replacement material cannot be applied, such application must be completed no later than when the identified equipment is taken out of service for repairs or other maintenance.
- c) If an inspection conducted in accordance with AAR Rule 66 determines that retroreflective sheeting must be repaired or replaced, the company shall repair or replace the sheeting in accordance with AAR Rule 66.
- d) A company shall renew retroreflective material no later than ten (10) years after its application, unless an inspection conducted in accordance with AAR Rule 66 determines that replacement is not required.
- e) The company shall retain, for at least twelve (12) months from the date of the inspection, a record of the inspection and shall make this record available to a Railway Safety Inspector upon request.