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Title 49 —Transportation

Subtitle B —Other Regulations Relating to Transportation

Chapter II —Federal Railroad Administration, Department of Transportation

Part 223 Safety Glazing Standards—Locomotives, Passenger Cars and Caboose

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Appendix A to Part 223

Certification of Glazing Materials

PART 223—SAFETY GLAZING STANDARDS—LOCOMOTIVES, PASSENGER CARS AND CABOSES

Authority: 49 U.S.C. 20102-20103, 20133, 20701-20702, 21301-21302, 21304; 28 U.S.C. 2461 note; and 49 CFR 1.89.

Source: 44 FR 77352, Dec. 31, 1979, unless otherwise noted.

Subpart A—General

§ 223.1 Scope.

This part provides minimum requirements for glazing materials in order to protect railroad employees and railroad passengers from injury as a result of objects striking the windows of locomotives, caboose and passenger cars.

[44 FR 77352, Dec. 31, 1979]

§ 223.3 Application.

- (a) This part applies to railroads that operate rolling equipment on standard gauge track that is a part of the general railroad system of transportation.
- (b) This part does not apply to—
 - (1) Locomotives, cabooses, and passenger cars that operate only on track inside an installation that is not part of the general railroad system of transportation.
 - (2) Rapid transit operations in an urban area that are not connected with the general railroad system of transportation.
 - (3) Except as provided in paragraph (c) of this section:
 - (i) Locomotives, cabooses, and passenger cars that are historic or more than 50 years old and, except for incidental freight service, are used only for excursion, educational, recreational, or private transportation purposes; and
 - (ii) Cabooses and passenger cars in a railroad's fleet on April 11, 2016 that are used only for the railroad's private transportation purposes. Each such railroad caboose or car that is equipped with glazing that complies with the glazing requirements contained in appendix A to this part as of February 9, 2016, must remain in compliance with those requirements.
 - (4) Locomotives that are used exclusively in designated service as defined in § 223.5.
 - (5) Locomotives, cabooses, and passenger cars built or rebuilt prior to July 1, 1980, that are operated at speeds not exceeding 30 mph, and used only where the risk of propelled or fouling objects striking the equipment is low. Risk is presumed low, unless the railroad operating the equipment has knowledge, or FRA makes a showing, that specific risk factors exist. Risk factors include reported incidents of propelled or fouling objects striking rail equipment, or infrastructure conditions or other operating environment conditions that have led or are likely to lead to objects striking rail equipment in operation.
- (c) Except as provided in paragraph (b)(3) of this section, this paragraph (c) applies, as specified, to each locomotive, passenger car, and caboose built after 1945 that is more than 50 years old and is used only for excursion, educational, recreational, or private transportation purposes.
 - (1) Each such passenger car must comply with the emergency window requirements contained in § 223.9(c) or § 223.15(c), as appropriate, when it is occupied and operates in an intercity passenger or commuter train subject to part 238 of this chapter. A tool or other instrument may be used to remove or break an emergency window if the tool or other instrument is clearly marked and legible and understandable instructions are provided for its use.
 - (2) Each such locomotive, passenger car, and caboose that is equipped with glazing that complies with the glazing requirements contained in appendix A to this part as of February 9, 2016, must remain in compliance with those requirements.

[44 FR 77352, Dec. 31, 1979, as amended at 53 FR 28600, July 28, 1988; 81 FR 6789, Feb. 9, 2016; 87 FR 68924, Nov. 17, 2022]

§ 223.5 Definitions.

As used in this part—

Administrator means the Administrator of the Federal Railroad Administration or the Administrator's delegate.

Caboose means a car in a freight train intended to provide transportation for crewmembers.

Certified glazing means a glazing material that has been certified by the manufacturer as having met the testing requirements set forth in appendix A of this part and that has been installed in such a manner that it will perform its intended function.

Designated service means exclusive operation of a locomotive under the following conditions:

- (1) The locomotive is not used as an independent unit or the controlling unit is a consist of locomotives except when moving for the purpose of servicing or repair within a single yard area;
- (2) The locomotive is not occupied by operating or deadhead crews outside a single yard area; and
- (3) The locomotive is stenciled “Designated Service—DO NOT OCCUPY”.

Emergency window means the segment of a side-facing glazing panel that has been designed to permit rapid and easy removal from inside a passenger car in an emergency situation.

End facing glazing location means any exterior location where a line perpendicular to the plane of the glazing material makes a horizontal angle of 50 degrees or less with the centerline of the locomotive, caboose, or passenger car, including a dome or observation car, except for: The coupled ends of multiple-unit (MU) locomotives or other equipment that is semi-permanently connected to each other in a train consist; and end doors of passenger cars at locations other than the cab end of a cab car or MU locomotive. Any location which, due to curvature of the glazing material, can meet the criteria for either an end facing location or a side facing location shall be considered an end facing location.

FRA means the Federal Railroad Administration.

Incidental freight service means the occasional and irregular use of a locomotive in freight service that is more than 50 years old and used primarily for excursion, educational, recreational, or private transportation purposes.

Locomotive means a self-propelled unit of equipment designed primarily for moving other equipment. It does not include self-propelled passenger cars.

Locomotive cab means that portion of the superstructure designed to be occupied by the crew while operating the locomotive.

Passenger car means a unit of rail rolling equipment intended to provide transportation for members of the general public and includes self-propelled cars designed to carry baggage, mail, express or passengers. This term includes a passenger coach, cab car, and an MU locomotive.

Person includes all categories of entities covered under 1 U.S.C. 1, including, but not limited to, a railroad; any manager, supervisor, official, or other employee or agent of a railroad; any owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; any passenger, any trespasser or nontrespasser; any independent contractor providing goods or services to a railroad; and any employee of such owner, manufacturer, lessor, lessee, or independent contractor.

Railroad means:

- (1) Any form of non-highway ground transportation that runs on rails or electromagnetic guideways, including

- (i) Commuter or other short-haul rail passenger service in a metropolitan or suburban area and commuter railroad service that was operated by the Consolidated Rail Corporation on January 1, 1979, and
 - (ii) High speed ground transportation systems that connect metropolitan areas, without regard to whether those systems use new technologies not associated with traditional railroads, but does not include rapid transit operations in an urban area that are not connected to the general railroad system of transportation and
- (2) A person that provides railroad transportation, whether directly or by contracting out operation of the railroad to another person.

Rebuilt locomotive, caboose or passenger car means a locomotive, caboose or passenger car that has undergone overhaul which has been identified by the railroad as a capital expense under Surface Transportation Board accounting standards.

Side facing glazing location means any location where a line perpendicular to any plane of the glazing material makes an angle of more than 50 degrees with the centerline of the locomotive, caboose or passenger car. A side facing glazing location also means a location at the coupled ends of MU locomotives or other equipment that is semi-permanently connected to each other in a train consist, and a location at end doors other than at the cab end of a cab car or MU locomotive.

Windshield means the combination of individual units of glazing material of the locomotive, passenger car, or caboose that are positioned in an end facing glazing location.

Yard is a system of auxiliary tracks used exclusively for the classification of passenger or freight cars according to commodity or destination; assembling of cars for train movement; storage of cars; or repair of equipment.

Yard caboose means a caboose that is used exclusively in a single yard area.

Yard locomotive means a locomotive that is operated only to perform switching functions within a single yard area.

[63 FR 24675, May 4, 1998; 63 FR 36376, July 6, 1998, as amended at 73 FR 6399, Feb. 1, 2008; 81 FR 6789, Feb. 9, 2016]

§ 223.7 Responsibility.

Any person (an entity of any type covered under 1 U.S.C. 1, including but not limited to the following: a railroad; a manager, supervisor, official, or other employee or agent of a railroad; any owner, manufacturer, lessor, or lessee of railroad equipment, track, or facilities; any independent contractor providing goods or services to a railroad; and any employee of such owner, manufacturer, lessor, lessee, or independent contractor) who violates any requirement of this part or causes the violation of any such requirement is subject to a civil penalty of at least \$1,114 and not more than \$36,439 per violation, except that: Penalties may be assessed against individuals only for willful violations, and, where a grossly negligent violation or a pattern of repeated violations has created an imminent hazard of death or injury to persons, or has caused death or injury, a penalty not to exceed \$145,754 per violation may be assessed. Each day a violation continues shall constitute a separate offense. See FRA's website at www.fra.dot.gov for a statement of agency civil penalty policy.

[53 FR 28601, July 28, 1988]

Editorial Note: For FEDERAL REGISTER citations affecting § 223.7, see the List of CFR Sections Affected, which

appears in the Finding Aids section of the printed volume and at www.govinfo.gov.

Subpart B—Specific Requirements

§ 223.8 Additional requirements for passenger equipment.

In addition to the requirements contained in this part, requirements for emergency window exits and window safety glazing on passenger equipment, as defined in § 238.5 of this chapter, are also found in part 238 of this chapter.

[64 FR 25659, May 12, 1999]

§ 223.9 Requirements for equipment built or rebuilt after June 30, 1980.

- (a) Locomotives, including yard locomotives, built or rebuilt after June 30, 1980, must be equipped with certified glazing in all locomotive cab windows.
- (b) Caboose, including yard caboose, built or rebuilt after June 30, 1980, must be equipped with certified glazing in all windows.
- (c) Passenger cars, including self-propelled passenger cars, built or rebuilt after June 30, 1980, must be equipped with certified glazing in all windows and at least four emergency windows.

[44 FR 77352, Dec. 31, 1979, as amended at 45 FR 49271, July 24, 1980; 63 FR 24675, May 4, 1998; 73 FR 6399, Feb. 1, 2008; 87 FR 68924, Nov. 17, 2022]

§ 223.11 Requirements for locomotives built or rebuilt prior to July 1, 1980.

- (a) Locomotives, other than yard locomotives, built or rebuilt prior to July 1, 1980, which are equipped in the forward and rearward end facing glazing locations of the locomotive cab windshield with a glazing material that meets the criteria for either portion of the impact testing required for a Type I test under the provisions of appendix A of this part, will not require the installation of certified glazing in the windshield location except to replace windshield glazing material that is broken or damaged.
- (b) Locomotives, other than yard locomotives, built or rebuilt prior to July 1, 1980, which are equipped in all locomotive cab side facing glazing locations with a glazing material that meets the criteria for either portion of the impact testing required for a Type II test under the provisions of appendix A of this part, will not require the installation of certified glazing in the sidefacing glazing location except to replace sidefacing glazing material that is broken or damaged.
- (c) Except for yard locomotives and locomotives equipped as described in paragraphs (a) and (b) of this section, locomotives built or rebuilt prior to July 1, 1980, shall be equipped with certified glazing in all locomotive cab windows.
- (d) Except for yard locomotives, each locomotive that has a locomotive cab window that is broken or damaged so that the window fails to permit good visibility shall be—
 - (1) Placed in Designated Service within 48 hours of the time of breakage or damage; or
 - (2) Removed from service until the broken or damaged window is replaced with certified glazing.

(Sec. 209 of the Federal Railroad Safety Act, 94 Stat. 957 (45 U.S.C. 438); sec. 1.49(m) of the regulations of the Office of the Secretary of Transportation, 49 CFR 1.49(m))

[45 FR 49271, July 24, 1980, as amended at 48 FR 24083, May 31, 1983; 48 FR 56956, Dec. 27, 1983; 81 FR 6790, Feb. 9, 2016; 87 FR 68925, Nov. 17, 2022]

§ 223.13 Requirements for cabooses built or rebuilt prior to July 1, 1980.

- (a) Cabooses, other than yard cabooses, built or rebuilt prior to July 1, 1980, which are equipped in the forward and rearward end facing glazing locations of the windshield with a glazing material that meets the criteria for either portion of the impact testing required for a Type I test under the provisions of appendix A of this part, will not require the installation of certified glazing in the windshield location except to replace windshield glazing material that is broken or damaged.
- (b) Cabooses, other than yard cabooses, built or rebuilt prior to July 1, 1980, which are equipped in all side facing glazing locations with a glazing material that meets the criteria for either portion of the impact testing required for a Type II test under the provisions of appendix A of this part, will not require the installation of certified glazing in the sidefacing glazing locations except to replace sidefacing glazing material that is broken or damaged.
- (c) Except for yard cabooses and cabooses equipped as described in paragraphs (a) and (b) of this section, cabooses built or rebuilt prior to July 1, 1980, shall be equipped with certified glazing in all windows.
- (d) Except for yard cabooses, each caboose that has a window that is broken or damaged so that the window fails to permit good visibility shall be removed from service until the broken or damaged window is replaced with certified glazing.

(Sec. 209 of the Federal Railroad Safety Act, 94 Stat. 957 (45 U.S.C. 438); § 1.49(m) of the regulations of the Office of the Secretary of Transportation, 49 CFR 1.49(m))

[44 FR 77352, Dec. 31, 1979, as amended at 48 FR 24083, May 31, 1983; 48 FR 56956, Dec. 27, 1983; 81 FR 6790, Feb. 9, 2016; 87 FR 68925, Nov. 17, 2022]

§ 223.15 Requirements for passenger cars built or rebuilt prior to July 1, 1980.

- (a) Passenger cars built or rebuilt prior to July 1, 1980, which are equipped in the forward and rearward end facing glazing locations of the windshield with a glazing material that meets the criteria for either portion of the impact testing required for a Type I test under the provisions of appendix A of this part will not require the installation of certified glazing in the windshield location except to replace windshield glazing material that is broken or damaged.
- (b) Passenger cars built or rebuilt prior to July 1, 1980, which are equipped in the sidefacing glazing locations with a glazing material that meets the criteria for either portion of the impact testing required for a Type II test under the provisions of appendix A of this part, will not require the installation of certified glazing except to replace sidefacing glazing material that is broken or damaged.
- (c) Except for passenger cars described in paragraphs (a) and (b) of this section, passenger cars built or rebuilt prior to July 1, 1980, shall be equipped with certified glazing in all windows and a minimum of four emergency windows.
- (d) Each passenger car that has a window that is broken or damaged so that the window fails to permit good visibility shall be removed from service until the broken or damaged window is replaced with certified glazing.

(Sec. 209 of the Federal Railroad Safety Act, 94 Stat. 957 (45 U.S.C. 438); sec. 1.49(m) of the regulations of the Office of the Secretary of Transportation, 49 CFR 1.49(m))

[44 FR 77352, Dec. 31, 1979, as amended at 48 FR 24083, May 31, 1983; 48 FR 56956, Dec. 27, 1983; 81 FR 6790, Feb. 9, 2016; 87 FR 68925, Nov. 17, 2022]

§ 223.17 [Reserved]

Appendix A to Part 223—Certification of Glazing Materials

As provided in this part, certified glazing materials installed in locomotives, passenger cars, or cabooses must be certified by the glazing manufacturer in accordance with the following procedures:

a. General Requirements

- (1) Each manufacturer that provides glazing materials, intended by the manufacturer for use in achieving compliance with the requirements of this part, shall certify that each type of glazing material being supplied for this purpose has been successfully tested in accordance with this appendix and that test verification data is available to a railroad or to FRA upon request.
- (2) The test verification data shall contain all pertinent original data logs and documentation that the selection of material samples, test set-ups, test measuring devices, and test procedures were performed by qualified personnel using recognized and acceptable practices and in accordance with this appendix.

b. Testing Requirements

- (1) The material to be tested (Target Material) shall be a full scale sample of the largest dimension intended to be produced and installed.
- (2) The Target Material shall be representative of production material and shall be selected on a documented random choice basis.
- (3) The Target Material shall be securely and rigidly attached in a fixture so that the fixture's own characteristics will not induce test errors.
- (4) The Target Material so selected and attached shall constitute a Test Specimen.
- (5) The Test Specimen will then be equipped with a Witness Plate that shall be mounted parallel to and at a distance of six inches in back of the Target Material. The Witness Plate shall have at least an area which will cover the full map of the Target Material.
- (6) The Witness Plate shall be an unbacked sheet of maximum 0.006-inch, alloy 1100 temper O, aluminum stretched within the perimeter of a suitable frame to provide a taut surface. If a steel ball is used for Large Object Impact testing, the Witness Plate shall be an unbacked sheet of maximum 0.002-inch, alloy 1145 temper H19 or equivalent, aluminum stretched within the perimeter of a suitable frame to provide a taut surface.
- (7) The Test Specimen will be positioned so that the defined projectile impacts it at an angle of 90 degrees to the Test Specimen surface.
- (8) The point of impact of the defined projectile will be within a radius of 3" of the centroid of the Target Material.

- (9) Velocity screens or other suitable velocity measuring devices will be positioned so as to measure the impact velocity of the defined projectile within a 10% accuracy tolerance, with test modifications made to guarantee that the stipulated minimum velocity requirements are met.
- (10) The Test Specimen for glazing material that is intended for use in end facing glazing locations shall be subjected to a Type I test regimen consisting of the following tests:
 - (i) Ballistic Impact: A standard 22 caliber long rifle lead bullet of 40 grains in weight impacts at a minimum velocity of 960 feet per second.
 - (ii) Large Object Impact:
 - (A) A cinder block weighing a minimum of 24 lbs with dimensions of 8 inches by 8 inches by 16 inches nominally impacts the glazing surface at the corner of the block at a minimum velocity of 44 feet per second. The cinder block must be of composition making it structurally sound, such as referenced in ASTM, International (ASTM) Specification C33 or ASTM C90; or
 - (B) A steel ball (e.g., ball bearing or shot put) weighing a minimum of 12 lbs impacts the glazing surface at a minimum velocity of 62.5 feet per second.
- (11) The Test Specimen for glazing material that is intended for use only in sidefacing glazing locations shall be subjected to a Type II test regimen consisting of the following tests:
 - (i) Ballistic Impact: A standard 22 caliber long rifle lead bullet of 40 grains in weight impacts at a minimum velocity of 960 feet per second.
 - (ii) Large Object Impact:
 - (A) A cinder block weighting a minimum of 24 lbs with dimensions of 8 inches by 8 inches by 16 inches nominally impacts the glazing surface at the corner of the block at a minimum velocity of 12 feet per second. The cinder block must be of composition making it structurally sound, such as referenced in ASTM C33-18 or ASTM C90; or
 - (B) A solid steel ball (e.g., ball bearing or shot put) weighing a minimum of 12 lbs impacts the glazing surface at a minimum velocity of 17 feet per second.
- (12) Three different test specimens must be subjected to the ballistic impact portion of these tests.
- (13) Except as provided in paragraphs b.(10)(ii)(B) and b.(11)(ii)(B) of this appendix, two different test specimens must be subjected to the large object impact portion of the tests. For purposes of paragraphs b.(10)(ii)(B) and b.(11)(ii)(B), four different test specimens shall be subjected to each impact test.
- (14) A material so tested must perform so that:
 - (i) there shall be no penetration of the back surfaces (side closest to Witness Plate) of the Target Material by the projectile. Partial penetration of the impact (front) surface of the Target Material does not constitute a failure; and
 - (ii) there shall be no penetration of particles from the back side of the Target Material through the back side of the prescribed Witness Plate.

- (15) Except as provided in paragraphs b.(10)(ii)(B) and b.(11)(ii)(B) of this appendix, test specimens must consecutively pass the required number of tests at the required minimum velocities. Individual tests resulting in failures at greater than the required minimum velocities may be repeated but a failure of an individual test at less than the minimum velocity shall result in termination of the total test and failure of the material. For purposes of paragraphs b.(10)(ii)(B) and b.(11)(ii)(B), three out of four test specimens must pass the test for the glazing material to be acceptable. Individual tests resulting in a failure at velocities above the prescribed range may be repeated.
- (16) After successful completion of the prescribed set of required consecutive tests, a manufacturer may certify in writing that a particular glazing material meets the requirements of these standards.

c. Material Identification

- (1) Each individual unit of glazing material shall be permanently marked, prior to installation, to indicate that this type of material has been successfully tested as set forth in this appendix and that marking shall be done in such a manner that it is clearly visible after the material has been installed.
- (2) Each individual unit of a glazing material that has successfully passed the Type I testing regimen shall be marked to indicate:
 - (i) **"FRA Type I"** material;
 - (ii) the manufacturer of the material;
 - (iii) the type or brand identification of the material.
- (3) Each individual unit of a glazing material that has successfully passed the Type II testing regimen shall be marked to indicate:
 - (i) **"FRA Type II"** material;
 - (ii) the manufacturer of the material;
 - (iii) the type or brand identification of the material.

[44 FR 77352, Dec. 31, 1979, as amended at 87 FR 68925, Nov. 17, 2022]