



Designation: E2358 – 24

Standard Specification for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades¹

This standard is issued under the fixed designation E2358; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers glass in permanent railing systems, guards, and balustrades, including components such as rails and swing gates or other forms of required guardrail opening protection installed in agricultural, assembly, commercial, educational, industrial, institutional, recreational, and residential buildings, and other structures such as towers or elevated platforms.

1.2 This specification is intended to be applied to permanent glass or other glazing railing systems for buildings and to such railing systems, rails, guards, and balustrades having major structural components made of glass or other glazing material, or the secondary components such as infill or balusters made of glass or other glazing material.

1.3 This specification considers that the overall outlook is based on the health and safety of all potential users of buildings. The criteria incorporated in this specification provide for normal and anticipated building uses, but not for abuses for which the building and its components are not designed.

1.4 This specification establishes basic minimum requirements and criteria that lead to satisfactory products under normal use conditions and does not give consideration to design criteria for specific field conditions, the establishment of which is the prerogative and responsibility of the designer, specification writer, and regulatory agencies.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the*

responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and to determine the applicability of regulatory limitations prior to use.

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

E631 Terminology of Building Constructions

E1481 Terminology of Railing Systems and Rails for Buildings

E1886 Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials

E1996 Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricanes

E2353 Test Methods for Performance of Glazing in Permanent Railing Systems, Guards, and Balustrades

2.2 ANSI Standard:

ANSI Z97.1 Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test³

¹ This specification is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.56 on Performance of Railing Systems and Glass for Floors and Stairs.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

3. Terminology

3.1 *Definitions*—General terms used in this standard test method are defined in Terminologies E631 and E1481. Terms common to this standard test method and referenced test methods are defined in the respective documents unless defined herein.

4. Design Requirements

4.1 Railing Height:

4.1.1 Guardrail Systems:

4.1.1.1 The fabricated height of a guardrail system, measured from its top surface to the finished floor level, shall be in accordance with the authority having jurisdiction. When variation in the evenness of the finished floor will result in any individual height measurement of the installed guardrail system to be less than minimum height designated by the authority having jurisdiction, the fabricated height of the entire guardrail system shall be increased accordingly.

4.1.1.2 Within an individual dwelling unit, the required railing height shall be permitted to be reduced as allowed by the governing jurisdiction.

(1) Where the vertical distance between adjacent finished floor levels is less than 762 mm (30 in.), the height of the guardrail system shall be at least 914 mm (42 in.) (Fig. 1) unless otherwise specified by the authority having jurisdiction. When variation in the evenness of the finished floor results in any individual height measurement of the installed guardrail system less than minimum, the fabricated height of the entire guardrail system shall be increased accordingly.

4.1.1.3 In public assembly, elementary school, and multiple-family buildings where the vertical distance between stair and adjacent floor levels is more than 6100 mm (20 ft), the required height of the top of the railing above the finished floor including any variation shall be at least 1220 mm (48 in.).

4.1.1.4 For balconies in public-assembly buildings, the required railing height in front of the first row of fixed seats shall be reduced to 660 mm (26 in.) provided adequate safety is established by the design and approved by the authority

having jurisdiction; however, it shall be a minimum of 910 mm (36 in.) at aisle ends and a minimum of 1070 mm (42 in.) where aisle steps are perpendicular to the railing system.

4.1.2 Handrails and Stair-rail Systems:

4.1.2.1 In corridors, ramp, walkways, and enclosed stairways having a slope of at least 1 in 20, the height of the handrail of the stair-rail system, measured from its top surface to the finished floor level or tread-nose line, shall be not less than 860 mm (34 in.) nor more than 970 mm (38 in.). When a stair-rail system is higher than 970 mm (38 in.), a separate handrail shall be installed at a height of not less than 860 mm (34 in.) nor more than 970 mm (38 in.).

4.1.2.2 Where required and in childcare and educational facilities serving children under the age of 12 years, a second separate handrail shall be permitted to be installed at a mounting height of 610 mm to 710 mm (24 in. to 28 in.). The vertical clearance between the handrails shall be at least 230 mm (9 in.).

4.1.3 *Transfer Rails Systems*—where transfer rail systems are to be installed, such as in toilets and bathrooms, the required height, measured from its top surface to the finished floor level, shall not be less than 760 mm (30 in.) nor more than 860 mm (34 in.).

4.2 Railing System Penetration:

4.2.1 Various members of the railing system, such as balusters, screens, wire mesh, or scrolls, shall be arranged in such a way that a sphere, 76 mm (3 in.) in diameter cannot be passed through any opening in the system.

4.2.2 Toe boards shall be provided in areas where tools and other objects could be dislodged and fall on occupants below. The top of the toe board shall not be less than 102 mm (4 in.) and the bottom not more than 12 mm (½ in.) above the average finished level at the line of the vertical supports of the railing system.

4.3 Handrail Design:

4.3.1 Handrails shall be designed to permit continuous sliding of hands. The hardware chosen for attaching handrails

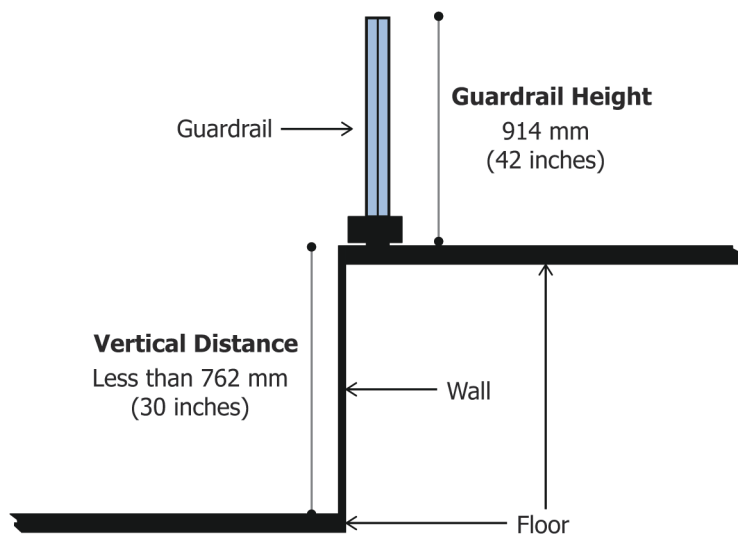


FIG. 1 Guardrail Height for Adjacent Floors