



Standard Test Method for Anchorage of Permanent Metal Railing Systems and Rails for Buildings¹

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1. Scope

1.1 This test method describes procedures to be followed in testing the performance of the anchorage of all types of new and existing permanent metal railing systems (guard, stair, and ramp-rail systems), and rails (hand, grab, and transfer rails) installed in and for agricultural, assembly, commercial, educational, industrial, institutional, recreational, and residential buildings.

1.2 This test method is applicable to railing systems and rails having major structural components made of metal and secondary components made of metal or other materials such as wood, plastics, and glass.

1.3 The test method described can be used to determine whether the anchorage of permanent metal railing systems and rails complies with anticipated performance requirements.

1.4 Specifically, this test method covers procedures for determining the static tension, shear, and moment resistance of anchorages for permanent metal railing systems, and rails in structural elements made of concrete, masonry, wood, and metal as well as related products.

1.5 No consideration is given in this test method to any possible deterioration of anchorage systems, resulting from adverse environmental conditions. The performance of special tests covering this aspect may be desirable.

1.6 Should computations make it possible to provide the needed information, testing may be employed for purposes of verification.

1.7 *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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see Section 6.

2. Referenced Documents

2.1 ASTM Standards:

- E 4 Practices for Force Verification of Testing Machines²
- E 488 Test Methods for Strength of Anchors in Concrete and Masonry Elements³
- E 575 Practice for Reporting Data from Structural Tests of Building Constructions, Elements, Connections, and Assemblies³
- E 631 Terminology of Building Constructions³
- E 985 Specification for Permanent Metal Railing Systems and Rails for Buildings³

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, see Terminology E 631 and Specification E 985.

4. Significance and Use

4.1 This test method is intended to provide data from which applicable design data can be derived for a given anchorage.

5. Apparatus

5.1 *Testing Machine*—Any testing machine or loading system capable of imposing forces accurate to within $\pm 1\%$, when calibrated in accordance with Practice E 4, is suitable and may be used, provided the requirements of specified rate of loading and recovery are met. The testing device shall be of sufficient capacity to prevent yielding of its various components and shall ensure that the applied tension load remains parallel to the relevant axis of the anchorage assembly and that the applied shear load remains essentially parallel to the surface of the structural anchorage element or component during testing.

5.1.1 *Tension Test*—Suitable systems for applying tension forces to the anchorage assembly are shown in Fig. 1 for laboratory testing and in Fig. 2 for field testing. The bearing plates shall be of sufficient size to prevent failure of the surrounding structural members or components. The loading device shall be attached to the assembly by means of pins or a

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² *Annual Book of ASTM Standards*, Vol 03.01.

³ *Annual Book of ASTM Standards*, Vol 04.11.