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.

Designation: F2956 – 22

Standard Test Methods for Anchor Systems Used for Detention Hollow Metal Systems[1]

This standard is issued under the fixed designation F2956; 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 These test methods cover anchor systems used for the installation of fixed detention hollow metal vision systems and door assemblies of various materials and types of construction. These anchor systems are used to install fixed hollow metal vision systems and door assemblies in wall openings in detention and correctional institutions designed to incarcerate inmates.

1.2 Anchor systems individual components investigated under these test methods include detention security hollow metal frames, frame anchoring, security glazing, panels, and removable glazing stops.

1.3 These test methods are designed to test the capability of anchor systems used to install a fixed detention hollow metal vision system or door assembly to prevent, delay, and frustrate escape; to limit or control access to unauthorized or secured areas; and prevent passage of contraband.

1.4 These test methods apply primarily to anchor systems used to install detention hollow metal vision systems or door assemblies between secure areas generally found inside a detention/correctional facility such as: day rooms, control rooms, cells, and sally ports. These test methods are applicable to anchor systems used to install vision systems and door assemblies other than hollow metal, provided testing and reporting procedures are followed.

1.5 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 *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 determine the applicability of regulatory limitations prior to use.*

1.7 *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]

A36 Specification for Carbon Structural Steel

A615 Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

C90 Specification for Loadbearing Concrete Masonry Units

F1450 Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities

F1592 Test Methods for Detention Hollow Metal Vision Systems

F1577 Test Methods for Detention Locks for Swinging Doors

F1643 Test Methods for Detention Sliding Door Locking Device Assembly

F1758 Test Methods for Detention Hinges Used on Detention-Grade Swinging Doors

F1915 Test Methods for Glazing for Detention Facilities

2.2 *ANSI/NAAMM/HMMA Standard:*[3]

ANSI/NAAMM HMMA 863 Guide Specifications for Detention Security Hollow Metal Doors and Frames

2.3 *NFPA Standard:*[4]

NFPA 252 Standard Methods of Fire Tests of Door Assemblies

2.4 *UL Standards:*[5]

UL-10 (C) Standard for Positive Pressure Fire Tests of Door Assemblies

UL-752 Standard for Bullet-Resisting Equipment

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

[1] These test methods are under the jurisdiction of ASTM Committee F33 on Detention and Correctional Facilities and is the direct responsibility of Subcommittee F33.02 on Physical Barriers.

Current edition approved June 1, 2022. Published August 2022. Originally approved in 2016. Last previous edition approved in 2016 as F2956 – 16. DOI: 10.1520/F2956-22.

[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 Hollow Metal Manufacturer's Association, A Division of NAAMM, 800 Roosevelt Road, Building C, Suite 312, Glen Ellyn, IL 60137.

[4] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269, http://www.nfpa.org.

[5] Available from Underwriters Laboratories (UL), 2600 N.W. Lake Rd., Camas, WA 98607-8542, http://www.ul.com.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States

Documents
Document Sharing Hub
Full document details: ASTM F2956-22

3.1.1 *anchor system, n*—assembly of components between a detention hollow metal vision system or door assembly and surrounding structure or substructure that supports and secures the fixed hollow metal vision system or door assembly vertically and laterally during its intended service life.

3.1.2 *borrowed light, n*—fixed window frame for use in an interior partition.

3.1.2.1 *Discussion*—This term is derived from the concept of borrowing light from one room or space to help illuminate another.

3.1.3 *butt joint, n*—corner or mullion joint of a frame in which the stop of either member is notched to fit the other, resulting in a perpendicular joint.

3.1.4 *component, n*—subassembly, as distinguished from a part, that combines with other components to make up a total frame assembly.

3.1.4.1 *Discussion*—The prime components of a fixed vision system assembly are frame, wall, glazing, and panels.

3.1.5 *contraband breach, n*—any through opening created such that a 0.060-in. diameter wire can be passed completely through the assembly at any location constitutes a contraband breach.

3.1.6 *detention security, n*—assurance of the restriction of mobility of inmates to designated areas within a correctional or detention facility.

3.1.7 *door assembly, n*—unit composed of a group of parts or components that make up an opening barrier for a passageway through a wall.

3.1.8 *forcible egress, n*—ability to pass a 5 by 8 by 8-in. rigid rectangular box through an opening in the test sample created by destructive testing procedures using no more than 10 lbf (44.5 NM).

3.1.9 *glazing stop, n*—formed metal section used to secure glazing or panel in a frame either by application to the glazing material or as an integral part of the frame.

3.1.10 *head or header, n*—horizontal member that forms the top of a frame.

3.1.11 *hollow metal, n*—term used in reference to such items as doors, frames, partitions, enclosures, and other items that are fabricated from metal sheet, usually carbon steel.

3.1.11.1 *Discussion*—These products are usually internally reinforced but hollow, hence the term hollow metal. In doors and partitions, the voids are normally filled with insulation. In frames, the jambs and sometimes heads are grouted where installed in masonry walls, or of such construction that they may be left hollow[6] (see ANSI/NAAMM HMMA 863).

3.1.12 *jamb, n*—vertical member forming the side of a frame.

3.1.13 *miter joint, n*—corner joint of a head and jamb in which the trim faces, and sometimes the stops, meet at an angle (usually 45°).

3.1.13.1 *Discussion*—The miter joint can be either punched in the flat form or sawed after the members are formed.

3.1.14 *mullion, n*—vertical or horizontal member within a frame, separating either doors, a door and a sidelight, glazed areas, or panels.

3.1.15 *multi-light, n*—two or more fixed lights or glazing, located adjacent to each other, horizontally, vertically, or both within the same frame, either located in an interior partition or in an exterior wall.

3.1.16 *panel, n*—for the purposes of these test methods, the panel is a steel plate at least 0.375 in. thick, installed to transfer impact energy to the glazing stops and the assembly, and serve as a uniform testing medium that substitutes for actual field glazing materials.

3.1.17 *performance characteristic, n*—response of the assembly or its components to any one of the tests described herein.

3.1.18 *sidelight, n*—fixed light of glazing located adjacent to a door or doors within the same frame.

3.1.19 *sill, n*—bottom horizontal member of a frame.

3.1.20 *tamper-resistant security screw, n*—screw that is designed to be removed only by special tools kept by detention/correctional facility maintenance personnel.

3.1.21 *test completion, n*—conduct of one test sequence for each of the frame assemblies.

3.1.22 *testing laboratory, n*—independent materials testing laboratory not associated with the manufacturer.

3.1.23 *vision system, n*—hollow metal frame with glazing, glazing stops, and panels in place ready for service.

3.1.23.1 *Discussion*—A vision system may be a borrowed light or sidelight.

3.1.24 *vision system frame, n*—assembly of members surrounding and supporting glazing panels, steel panels, or combinations thereof, located either in an interior partition or exterior wall.

3.1.24.1 *Discussion*—If an exterior application is desired, other standards that address cutting and deflection may be applicable.

4. Significance and Use

4.1 A major concern for corrections administration officials is the resistance of security barriers used in detention/correctional facilities to certain types of physical attack that it is reasonable to expect in the field. These test methods are designed to aid in identifying a level of physical security for anchor systems used to install fixed detention hollow metal vision systems and door assemblies.

4.2 These test methods are not intended to measure resistance to attack by corrosive agents, high-powered rifles, explosives, sawing, or other such methods. These test methods are intended to evaluate the resistance of a vision system to violent attacks using battering devices such as benches, bunks, fire extinguishers, or tables; hand guns up to and including the .44 magnum; and fires started by using mattresses, books, and similar flammable materials.

[6] See The Hollow Metal Manual-87, available from the Hollow Metal Manufacturer's Association, A Division of NAAMM, 800 Roosevelt Road, Building C, Suite 312, Glen Ellyn, IL 60137.

AVA Documents
Document Sharing Hub

Full document details: ASTM F2956-22

4.3 The primary purpose or result of this standard is to provide detailed test methods that approximate the levels of abuse to which it is possible that vision system and door assembly anchor systems become subjected in the field. The desired result of its use is to give ensurance of protection to the public, to prison administrative personnel, and to the inmates themselves in the event of such attack.

NOTE 1—It is recommended that detention/correctional facility administration provide adequate training, supervision, and preventive maintenance programs to enable hollow metal vision systems to function as intended throughout the expected service life.

5. Sampling

5.1 Sample frame assemblies shall be representative of the types and styles intended for use in the application outlined in 1.4.

5.2 The manufacturer shall permanently mark the test samples and retain them at the manufacturing facility for future reference. As an alternative to retaining test samples, the manufacturer shall contract with the testing laboratory to provide a certified procedure for the construction of tested assemblies with factory follow-up inspection service as an option (see 8.2).

5.3 Test reports shall include complete details of test assemblies, details or photographs of the testing apparatus, or both, and installation instructions including templates for all items of hardware (see 8.3).

5.4 In the event of failure in one or more of the performance tests, the manufacturer shall provide another complete test sample with test wall where applicable.

6. Specimen Preparation

6.1 *Construction:*

6.1.1 The construction and size of the sample assemblies shall be representative of the application under investigation and shall include the configuration as shown in Figs. 1 and 2. Fig. 1 shows the impact locations for a sidelight door and frame configuration used for testing to Test Methods F1592. Fig. 2 shows the impact locations for a four sided, single light window frame configuration without head and sill anchors. The test samples constructed to meet Figs. 1 and 2 shall be representative of the vision system and anchor configuration being investigated. Hollow metal doors and frame samples shall be manufactured in accordance with ANSI/NAAMM HMMA 863.

6.1.2 The assembly support fixture shall be constructed using structural steel components that meet Specification A36, and shall simulate the rigidity normally provided to a vision system or door assembly in a building by the ceiling, floor, and walls. Figs. 3-10 show an acceptable fixture.

6.1.3 *Description of the Test Wall*—The test fixture for the vision system shall include a vertical masonry wall section constructed suitably to retain the sample throughout the testing procedure. Construct the test wall using Concrete Masonry Unit (CMU) block, reinforcing components, masonry grout, and grouting procedures, that are all typical of those used in detention and correctional facility construction. The test wall CMU block must comply with Specification C90; have a minimum density of 105 lbm/ft^3; and have a minimum compressive strength of 1900 psi. Reinforce every CMU cell vertically using #4 Rebar that complies with Specification A615, and fully grout every cell using masonry grout having a minimum cured compressive strength of 3000 psi. The wall specification shall be included as part of the test report.

6.2 *Mounting for Testing:*

6.2.1 The sample shall be mounted such that the removable glazing stops are mounted on the same side of the glazing or panel as the impact test ram. The test sample shall be installed into the masonry test wall using a frame anchor method as specified in ANSI/NAAMM HMMA 863. Any alternate anchor type, including weld-in embed type anchor methods or arc welding to hollow metal wall panel systems, to be approved shall be investigated similarly in accordance with these standard test methods. The type anchors and anchor spacing used shall be recorded as part of the test report.

6.2.2 Where weld-in embed anchors or hollow metal wall panel arc welded anchors are to be tested, it is acceptable to modify the impact test fixture in Figs. 3-10 to accurately simulate field conditions. Any modifications to the impact test fixture shown in Figs. 3-10 shall be included in the test laboratory's report in accordance with Section 8.

6.2.3 Install components such as frames, glazing or panels, and glazing stops in the component test fixture as described in 6.1. Provide clearances around the test sample and anchoring in accordance with the manufacturer's recommendations. Manufacturer's recommendations and instructions shall be included as part of test reports.

7. Test Methods

7.1 *Anchor System Impact Test:*

7.1.1 *Scope*—This test method is designed to evaluate the capability of an anchor system used to install a hollow metal vision system or door frame assembly including frame, and wall anchoring to resist repetitive impact forces at the designated critical areas.

7.1.2 *Significance and Use:*

7.1.2.1 This test method is intended to closely simulate a sustained battering ram-style attack and provide an evaluation of the capability of the anchoring method and assembly to prevent, delay, and frustrate escape or access to unauthorized areas. The test results have the potential to be used to aid in identifying a level of physical security for various configurations of anchor methods for detention hollow metal vision systems and door assemblies.

7.1.2.2 An impact test of this design performed on a complete assembly evaluates the impact fatigue strength of the anchoring components in a full scale as installed condition as well as quality of fabrication techniques and strengths of materials used for the anchoring systems.

7.1.3 *Apparatus:*

7.1.3.1 *Impact Ram*—The impact ram shall be a pendulum system with a steel weight capable of delivering horizontal impacts of up to 200 ft·lbf (271.2 J). The weight of the ram shall be 80 ± 0.25 lb (36.0 ± 0.10 kg). The [illegible] of the

AVA Documents
Document Sharing Hub

Full document details: ASTM F2956-22

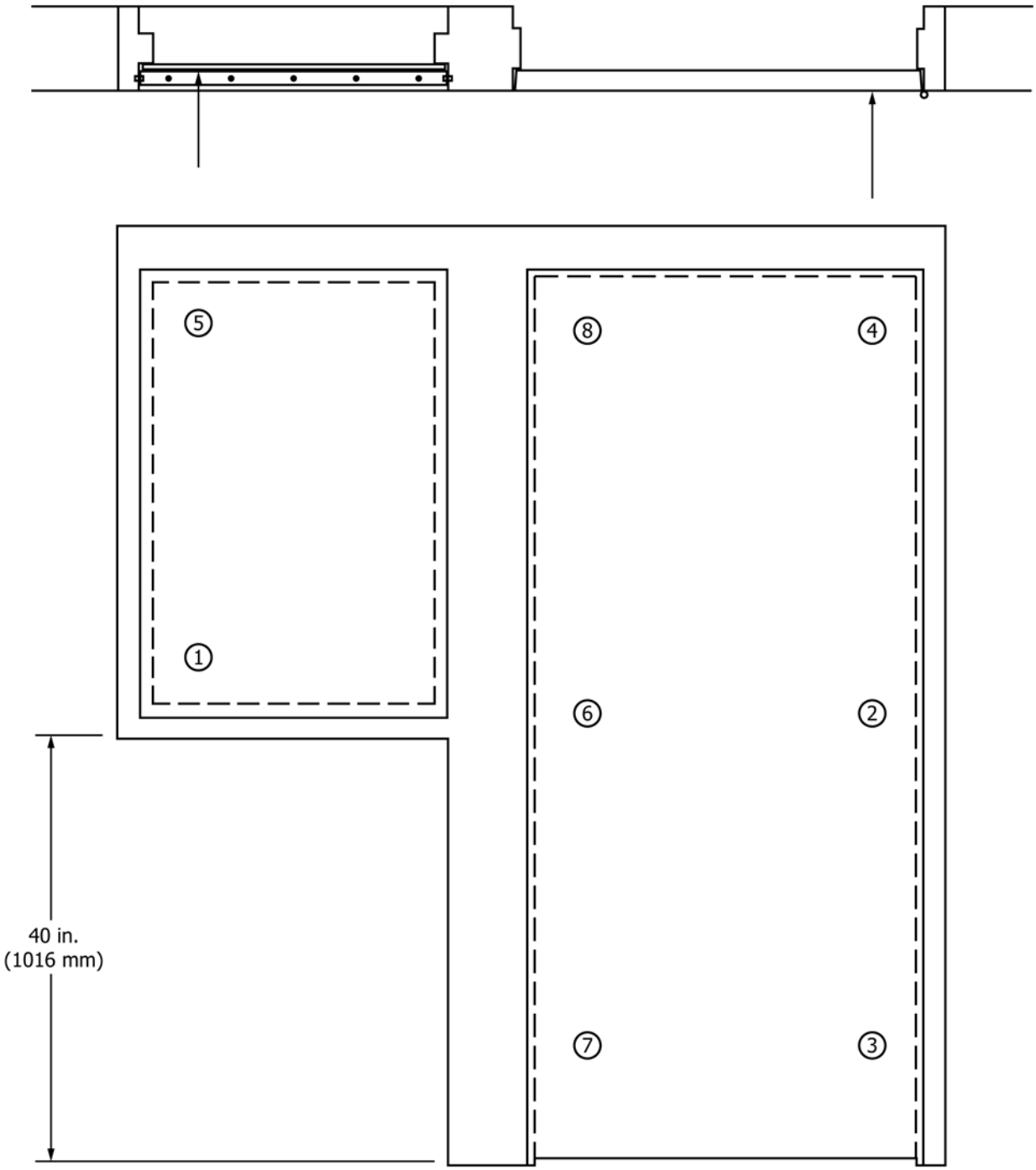

FIG. 1 Detention Hollow Metal Test Assembly (Sidelight Frame) Location of Strike Points Described in Table 1

ram shall be made from C1010-1020 carbon steel, the striking surface area of which shall be 4 ± 0.04 in.^{2} (2580 ± 25.8 mm^2) (see Fig. 11).

7.1.4 *Procedure:*

7.1.4.1 With the test fixture and test apparatus, deliver the series of impacts listed in Table 1 and Table 2 (see Fig. 1 and Fig. 2) to the assembly on the removable glazing stop side of the glazing/test panel.

Documents
Document Sharing Hub
Full document details: ASTM F2956-22

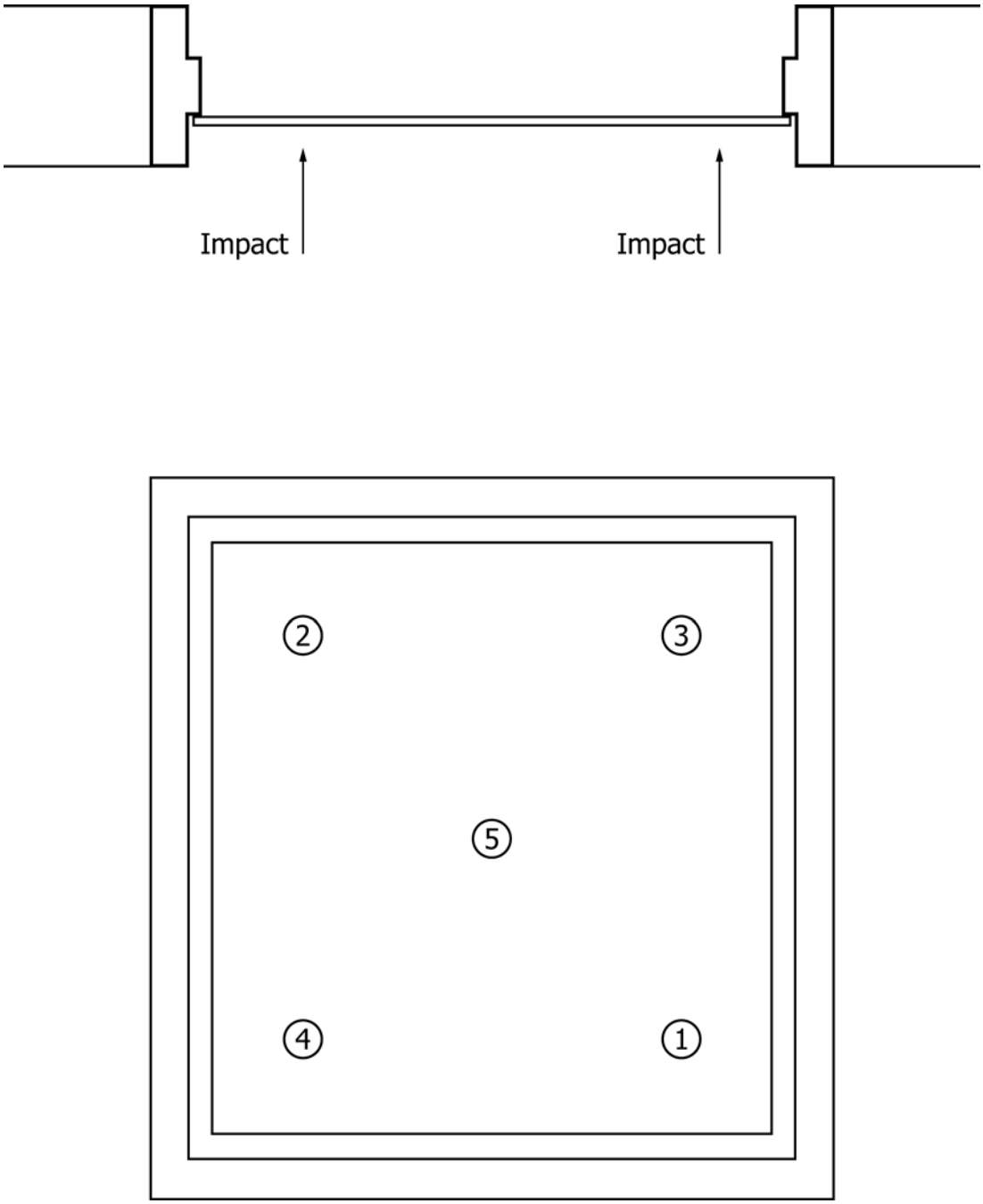

FIG. 2 Detention Hollow Metal Test Assembly (Sidelight Frame) Location of Strike Points Described in Table 2

7.1.4.2 The security glazing and panels shall remain in place and the frame shall meet criteria described in 7.1.4.3 throughout the testing procedure. Glazing, panel, glazing stop, or frame damage, to the extent that forcible egress can be achieved constitutes failure.

7.1.4.3 The wall anchoring shall retain the frame in place throughout the test procedure. If one or more anchors break such that forcible egress can be obtained, the frame will be judged to have failed the impact test.

8. Certification and Reports

8.1 *Certification*—At the manufacturer's option, a manufacturer's certification that the anchor assembly was manufactured and tested in accordance with these test methods, together with a complete test report shall be furnished by the manufacturer.

8.2 *Manufacturer's Procedure*—The manufacturer shall be permitted to contract with a testing laboratory to provide the manufacturer with a certified procedure for the construction of tested assemblies with factory follow-up inspection service as an option.

8.3 *Reports*—Report the following information:

8.3.1 Name and address of laboratory.

8.3.2 Date the laboratory completed tests.

8.3.3 Name and address of vision system assembly manufacturer.

AVA Documents
Document Sharing Hub

Full document details: ASTM F2956-22