



Designation: F2781 – 15 (Reapproved 2021)

Standard Practice for Testing Forced Entry, Ballistic and Low Impact Resistance of Security Fence Systems¹

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1. Scope

1.1 The forced entry resistance of fence systems is evaluated relative to three levels of forced entry threat using the limited hand tool inventory outlined in [Table 1](#). It also establishes a system for rating the forced entry resistance of those systems (see [Table 2](#)). The tools specified to be used for testing at each threat level are those that are known to have a maximum destructive effect on structures and their sub-assemblies and are readily available to aggressors categorized as posing that level of threat.

1.1.1 *Low Threat Level (L)*—Specifically exempted from the inventory of available tools for the low (L) threat level category are power tools (gasoline, electric or hydraulic), and devices requiring more than one person to transport and operate.

1.1.2 *Medium Threat Level (M)*—Specifically exempted from the inventory of available tools for the medium (M) threat level category are power tools requiring an outside power source or self contained gasoline or battery driven tools and devices requiring more than two persons to transport and operate.

1.1.3 *Aggressive Threat Level (A)*—Specifically exempted from the inventory of available tools for the high (H) threat level category are devices requiring more than two persons to transport and operate.

1.2 The ability of a fence system to offer protection from bullets fired from a rifle or handgun would be beneficial particularly in Border Fence areas where security personnel can be targets during patrol activities. Accordingly, a limited test using a .38 Special handgun and a 7.62-mm rifle is performed to determine if any level of protection is provided by the fence system.

1.3 The ability of a fence system to provide impact resistance from a 4000 pound mass vehicle moving at a velocity of

20 MPH at a modest cost will provide relative guidance as to the strength of a security fence system in resisting low impact situations.

1.4 *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

[F1233 Test Method for Security Glazing Materials And Systems](#)

2.2 *SAE Standard:*³

[SAE J972 Moving Rigid Barrier Collision Tests](#)

2.3 *U.S. Military Standards:*⁴

[MIL-STD-662F Department of Defense Test Method Standard V50 Ballistic Test for Armor](#)

2.4 *U.S. Dept. of Justice:*⁵

[NIJ Standard 0108.01 National Institute of Justice Ballistic Resistant Protective Materials](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *test director*—the individual identified by the independent testing laboratory as being responsible to complete the specified tests and to document the results.

3.1.2 *forced entry*—creating a four square feet opening.

4. Summary of Practice

4.1 For each rating a structured portion and a discretionary portion as described in [4.2](#) and [4.3](#) is required.

¹ This practice is under the jurisdiction of ASTM Committee F14 on Fences and is the direct responsibility of Subcommittee F14.50 on High Security Fences and Perimeter Barriers.

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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 SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, <http://www.sae.org>.

⁴ Available from National Institute of Standards and Technology (NIST), 100 Bureau Dr., Stop 1070, Gaithersburg, MD 20899-1070, <http://www.nist.gov>.

⁵ Available from National Institute of Justice (NIJ), 810 7th St., NW, Washington, DC 20531, <http://nij.gov>.

4.2 The structured portion of the test provides for a zero to five minute test with specific tools selected as the most debilitating from the tool list in **Table 1**, regardless of the fence system being tested.

4.3 Following the structured portion of the test, the discretionary portion of the test provides up to 55 minutes of testing, optimizing forced entry efforts by selecting any (or all) tools from the applicable category of the list (low (A), medium (B), or aggressive (C)). Selection of tools is based on the perception of the test director as to which tools will most effectively result in a forced entry.

4.4 Testing of security fence systems in accordance with the requirements of this test method shall result in a rating reflecting the severity of the threat and the cumulative penetration resistance time (see **Table 2**).

4.5 The times used to establish the protection ratings of **Table 2** range from 0–60 minutes and are intended to reflect the elapsed time of forced entry resistance necessary for a response force to arrive and counter the threat with additional defensive personnel and equipment. It is important to recognize that the lowest threat level time will establish the maximum time limit for a greater threat level.

4.6 The ballistic is intended to provide the probability of a person standing behind the secure fence side from being hit with a bullet fired by a 38-caliber hand gun or a .30-06 rifle.

4.7 The impact test is intended to provide relative guidance as to the strength of a fence system to absorb 53.5 K-ft-lbs of kinetic energy.

5. Significance and Use

5.1 The success or failure of any attempt to forcefully penetrate a fence system is dependent upon three primary factors that collectively define the threat—the tools and devices employed, the number of aggressors, and their level of sophistication.

5.2 Normally, a test procedure of this scope would be supported by years of laboratory testing intended to qualify and accurately reproduce the destructive effects of a variety of tools, implements, and devices. However, rapidly changing social conditions have created an immediate need for building components resistant to evolving forced entry techniques. Accordingly, the procedures presented herein are based more on field experience than laboratory analysis. They are more representative than inclusive, are intended to provide a basis for the comparative evaluation of different fence systems using forced penetration procedures, ballistic tests and impact testing, and are not primarily intended to be used to establish or confirm the absolute prevention of forced entries.

TABLE 1 Schedule of Testing—All Levels of Threat Severity
(See Sections 8 and 14 for unabridged tool list.)

Tool(s)	Time of Application (minutes)					
	Structured Testing			Discretionary Testing		
	L	M	A	L	M	A
Crowbar 5 lb by 28 in. (2)	3-5	3-5	3-5	0-55	0-55	0-55
Cold Chisels and Hammer (2)	3-5	3-5	3-5	0-55	0-55	0-55
Hacksaw and Two HSS Blades	3-5	3-5	3-5	0-55	0-55	0-55
Sledgehammer 16 in. by 6 lb	3-5	3-5	3-5	0-55	0-55	0-55
Fire Axe 36 in. by 6 lb	3-5	3-5	3-5	0-55	0-55	0-55
Bolt Cutter (2)	3-5	3-5	3-5	-	0-55	0-55
Fire Axe 36 in. by 10 lb	-	3-5	3-5	-	0-55	0-55
Hole Saw 2 in. (1) and Jigsaw	-	0-5	0-5	-	0-55	0-55
Pry Bar 30 in. Steel (2)	-	0-5	0-5	-	0-55	0-55
Sledgehammer 30 in. by 12 lb	-	0-5	0-5	-	0-55	0-55
Steel Wedge 6 in. long (2) and Plate Shears	-	0-5	0-5	-	0-55	0-55
Circular Saw 8 in., 1100 W, and 3 Blades (1)	-	0-5	0-5	-	-	0-55
Disc Grinder 5 in., 1100 W, and 3 Blades (1)	-	0-5	0-5	-	-	0-55
Rotary and Hammer Drill 750 W and 5 Drill Bits, ½ in. (1)	-	-	0-5	-	-	0-55