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Standard Test Method for Security Glazing Materials And Systems[1]

This standard is issued under the fixed designation F 1233; 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 test method sets forth procedures whose purpose is limited to the evaluation of the resistance of security glazing materials and systems against the following threats:

1.1.1 *Ballistic Impact,*

1.1.2 *Blunt Tool Impacts,*

1.1.3 *Sharp Tool Impacts,*

1.1.4 *Thermal Stress*, and

1.1.5 *Chemical Deterioration.*

NOTE 1—Specifically exempted from this test method are the use of power (motor or engine-driven) tools or devices, explosives, military ordinance (excepting small arms) and tools, processes or devices requiring more than two persons to transport and operate.

1.2 The values stated in inch-pounds are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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 a specific warning statement, see Warning in ~~9.1.1.6.~~ 10.1.1.6.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 36/A 36M Specification for Carbon Structural Steel

A 53/A 53M Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

A 574 Specification for Alloy Steel Socket-Head Cap Screws

F 1029 Guide for Selection of Physical Security Measures for a Facility

2.2 *Other Documents:*

Sporting Arms and Ammunition Manufacturer's Institute (SAAMI)—Ammunition[3]

United States Military Ammunition Specifications—Ammunition[4]

Federal Specification GGG-313U—Cold Chisel[5]

American Iron and Steel Institute M-1020—Structural Steel[6]

UL 10BC—Fire Extinguisher[7]

3. Terminology

3.1 *Definitions:*

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

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[1] This test method is under the jurisdiction of Committee F12 on Security Systems and Equipment and is the direct responsibility of Subcommittee F12.10 on Systems Products and Services.

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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 Sporting Arms and Ammunition Manufacturers' Association (SAAMI), Box 1075, Riverside, CT 06878.

[4] Available from Standardization Documents Order Desk, ~~DODSSP,~~ Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098~~4~~, Attn: NPODS.

[5] Available from General Services Adm., 7th and D Sts. SW, Washington, DC 20407.

~~[6] Available from American Iron and Steel Institute (AISI), 1101 17th St., NW, Suite 1300, Washington, DC 20036.~~

[6] Available from American Iron and Steel Institute, 1000 16th St. NW, Washington, DC 20036.

[7] Available from Underwriters ~~Laboratories (UL), Corporate Progress,~~Laboratories, Inc., 333 Pfingsten Rd., Northbrook, IL 60062.

4. ~~Summary of Test Method~~

~~4.1Forced entry shall be determined by resistance of the glazing material or system to the following:~~

~~4.1.1Ballistics attack only.~~

~~4.1.2Physical attack only to include blunt tool impacts, sharp tool impacts, thermal stress, and chemical deterioration.~~

~~4.1.3Ballistics attack followed by, and in combination with, physical attack.~~ Class

4.1 *Ballistic Class*—Ballistic tests and test results from this standard shall be classified by the following (see also Table 1):

4.1.1 *HG1 Handgun - Low*—Ammunition conforming to SAAMI specifications for caliber .38 Special, 158 grain (10.2 g), soft point, producing velocities of 875 (±25) ft/s (266 (±7) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.2 *HG2 Handgun - Medium Soft Point*— Ammunition conforming to SAAMI specifications for caliber .357 Magnum, 158 grain (10.2 g), jacketed soft point, producing velocities of 1400 (±50) ft/s (427 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.3 *HG3 Handgun - Medium Jacketed*— Ammunition conforming to SAAMI specifications for caliber 9 mm, 124 grain (8.0 g), full metal casing, producing velocities of 1250 (±50) ft/s (381 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.4 *HG4 Handgun - High*—Ammunition conforming to SAAMI specifications for caliber .44 Magnum, 240 grain, lead gas check producing velocities of 1450 (±50) ft/s (442 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.5 *SMG Submachine Gun*—Ammunition conforming to SAAMI specifications for caliber 9 mm, 124 grain (8.0 g), full metal casing producing velocities of 1400 (±50) ft/s (427 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.6 *R1 Rifle - Light*—Ammunition conforming to U.S. Military specifications for caliber .223 (5.56 mm) NATO, M193 ball producing velocities of 3250 (±50) ft/s (991 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.7 *R2 Rifle - Heavy Soft Point*—Ammunition conforming to SAAMI specifications for caliber .30-'06, 180 grain (11.7 g) soft point producing velocities of 2925 (±75) ft/s (991 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.8 *R3 Rifle - Heavy Jacketed*—Ammunition conforming to SAAMI specifications for caliber .308 Winchester (7.62 mm), 147 grain (9.5 g), M80 Ball, full metal casing producing velocities of 2800 (±50) ft/s (853 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.9 *R4-AP - Armor Piercing*—Ammunition conforming to U.S. Military specifications for caliber .30–'06, M2AP producing velocities of 2775 (±50) ft/s (846 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.1.10 *R5 - Ball Jacketed*—Ammunition conforming to U.S. Military specifications for caliber .50 M2 Ball, full metal casing producing velocities of 2810 (±50) ft/s (856 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

TABLE 1 Ballistic Criteria

Class~~Level~~	Weapon Description	Caliber	Bullet Mass[A]/Type[B]	Velocity[C], ft/s (m/s)	Minimum No. of Impacts[D]
HG1	Handgun - Low	.38 Special	158 gr (10.2 g), lead	850–900 (259–274)	3
HG2	Handgun - Medium, Soft Point	.357 Magnum	158 gr (10.2 g), ~~JSP~~ JSP	1350–1450 ~~(381–411)~~ (411–442)	3
HG3	Handgun - Medium, Jacketed	9 mm	124 gr (8.0 g), FMC	1200–1300 (365–396)	3
~~HG4~~	~~Handgun - High~~	~~.44 Magnum~~	~~240 gr (15.6 g),~~	~~1400–1450~~	~~3~~
HG4	Handgun - High	.44 Magnum	240 gr (15.6 g), LGC	1400–1500 (427–442)	3
~~SMG~~	~~Submachine-gun~~	~~9 mm~~	~~124 gr (8.0 g), FMC~~	~~1400–1500~~	~~3~~
SMG	Submachine-gun	9 mm	124 gr (8.0 g), FMC	1350–1450 ~~(426–457)~~ (411–442)	3
R1	Rifle - Light	.223 (5.56 mm)	55 gr (3.6 g), M193 Ball, FMC	3200–3300 (975–1006)	3
R2	Rifle - Heavy, Soft Point	.30-'06	180 gr (11.7 g), SP	2850–3000 (867–914)	3
R3	Rifle - Heavy, Jacketed	.308 Winchester (7.62 mm)	147 gr (9.5 g), M80 Ball, FMC	2700–2800 (823–853)	3
~~R4-AP~~	~~Rifle - Armor Piercing~~	~~.30-'06~~	~~164 gr (10.6 g),~~	~~2750–2850~~	~~1~~
R4-AP	Rifle - Armor Piercing	.30-'06	166 gr (10.8 g), ~~M2-AP~~ M2-AP	2715–2850 ~~(838–867)~~ (828–867)	1
R5	Rifle - Jacketed	.50	709.5 gr (45.9 g) Ball, FMC	2760–2860 (841–867)	1
SH1[E]	Shotgun - Buckshot	12 gage, 3 in. Magnum	00 buckshot, 15 pellets	1150–1250 (350–381)	1[F]
SH2	Shotgun - Slug	12 gage	1 oz. (437.5 gr, 28.3 g) rifled slug	1600–1700 (487–518)	3

[A] gr denotes grain as a unit of mass: 1 gr = 1.429×10^{-4} lb (0.0647981 g)

[B] FMC = Full Metal Casing, JSP = Jacketed Soft Point, LGC = Lead Gas-Check, and SP = Soft Point.

[C] Velocity measured at a distance of 10 ft (3 m) from the strike face of the sample. Muzzle of the barrel is positioned at a distance of 25 ft (7.6 m) from the strike face of the sample.

[D] Minimum number of shots required on glazed features plus additional shots to examine other features of the assembly. Prior to testing the intended impact location(s) shall be marked in the approximate center of the target area. Where 3 impacts are specified, they are to be located at the corners of a 5 in. (127 mm) equilateral triangle. The minimum spacing between impact locations is 4 in. (102 mm).

[E] This ammunition is to be used as an adjunct to the primary test to further evaluate the ability of designed assembly details to resist fragmentary threats.

[F] The shot pattern of the pellets shall be such that they all impact within an 8 in. (203 mm) diameter circle at a distance of 25 ft (7.62 m) from the muzzle of the weapon.

4.1.11 *SH1 - Shotgun - Buckshot*—Ammunition conforming to SAAMI specifications for Shotshell 12-gage, 3 in. Magnum, 00 Buckshot producing velocities of 1315 (±50) ft/s (400 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

NOTE 2—The 12-gage ballistic threat is to be used as a confirmatory test of assemblies. Glazing materials are not to be tested or rated against this threat.

4.1.12 *SH2 - Shotgun - Slug*—Ammunition conforming to SAAMI specifications for Shotshell 12-gage, 1 oz. (437.5 g) rifled slug producing velocities of 1650 (±50) ft/s (503 (±15) m/s) at 15 ft (4.5 m) from the muzzle.

4.2 *Forced Entry Class*—See Table 2.

5. Summary of Test Method

5.1 Forced entry shall be determined by resistance of the glazing material or system to the following:

5.1.1 Ballistics attack only.

5.1.2 Physical attack only to include blunt tool impacts, sharp tool impacts, thermal stress, and chemical deterioration.

5.1.3 Ballistics attack followed by, and in combination with, physical attack.

6. Significance and Use

~~5.1This~~6.1 This test method is based on field experience rather than laboratory analysis. It provides a basis for the comparative evaluation of ballistic/forced entry/containment resistance of security glazings and systems and should not be used to establish or confirm the absolute prevention of forcible entries or forced exits. This test method defines three factors which determine the success or failure of any attempt to forcefully enter (or exit) the glazing or system. They are: (*1*) the tools employed, (*2*) the techniques and methods used by the attackers, and (*3*) the total time available to effect the entry or exit. This test method defines two of the three factors (tools and techniques) and allows the third (duration) to vary in order to establish levels of forced entry or exit resistance.

~~**6.Apparatus (Ballistics)**~~

~~6.1~~

7. Apparatus (Ballistics)

7.1 *Ballistic Firing Devices*—Firearms or test barrels suitable for use with the following calibers of ammunition producing minimum velocities as required:

~~6.1.1~~

7.1.1 *.38 Special*, 158 grain (10.2 g), lead,

~~6.1.2~~

7.1.2 *.357 Magnum*, 158 grain (10.2 g), jacketed soft point,

~~6.1.3~~

7.1.3 *9 mm*, 124 grain (8.0 g), full metal casing,

~~6.1.4~~

7.1.4 *.44 Magnum*, 240 grain (15.6 g), lead gas check,

~~6.1.5~~

7.1.5 *.223 (5.56 mm, M193 Ball)*, 55 grain (3.6 g), full metal casing,

~~6.1.6~~

7.1.6 *.30–'06*, 180 grain (11.7 g), soft point,

~~6.1.7~~

7.1.7 *.308 Winchester (7.62 mm, M80 Ball)*, 147 grain ~~(9.5g),~~(10.5 g), full metal casing,

~~6.1.8~~7.1.8 *.30–'06*~~, 164 grain (10.6g), M2-AP (armor piercing),~~

~~6.1.9~~*, 165 grain (10.6 g), M2-AP (armor piercing),*

7.1.9 *.50 caliber, 710 grain (46 g), M2-FMC Ball,*

7.1.10 *12 gage, 3 in. Magnum*, 00 Buckshot, 15 pellets, and

~~6.1.10~~

7.1.11 *12 gage*, 1 oz. (437.5 grain, 28.3 g), rifled slug.

~~6.2*Ammunition/Standard Specification Ballistic Protection Levels*—All ammunition used in conducting tests within this test method shall be manufactured in compliance with current configurations and standards established by the Sporting Arms and Ammunition Manufacturer's Institute (SAAMI) or United States Military Specifications as applicable, except as may be noted within this test method. This test method shall be defined by the following ballistic threat levels:~~

~~6.2.1*Caliber 9 mm Parabellum/Submachine Gun*—Ammunition conforming to U.S. Military specifications for caliber 9 mm NATO 124 grain copper jacket producing velocities of 1400 (±50) ft per s (425 (±15) m pers) at 15 ft (4.5 m) from the muzzle.~~

~~6.2.2*Caliber .44 Magnum/Handgun*—Ammunition conforming to SAAMI specifications for caliber .44 Magnum, 240 grain, soft point producing velocities of 1450 (±50) ft per s (425 (±15) m pers) at 15 ft (4.5 m) from the muzzle.~~

~~6.2.3*Caliber .38 Super/Handgun*—Ammunition conforming to SAAMI Specifications for caliber .38 super, 130 grain, metal case producing, velocities of 1280 (±50) ft. per s (390 (±15) m pers) at 15 ft (4.5 m) from the muzzle.~~

TABLE 2 Forced Entry Sequence of Testing

TSest Implquementsce	ClaTesst I-Smplequmenceets	ClassII-Sequenmpacets	Class III-SeqMinutencesClass IV-SeqAmouencetClass V-Sequen Achieved
	Blunt Impacting (Impacts)		
1	Ball Peen Hammer	10	
Sledge Hammer (1.0			
1.0			
25)	A	5	10, 16 19, 22, 27 30, 33, 36, 39
2	Ball Peen Hammer	10	1.1
4-in. (10-cm) Diameter Pipe/Sledge (25)A		A	9 18 29
3	1½-in. (4-cm) Diameter Pipe/Sledge	25	1.2
Ram (10)	A	A	8 17 28
4	Extinguisher, CO_2		1 1.3
	Ball Peen Hammer (10)	25	1.4
5	Sledge Hammer	25	1.4
6	1	2 [A]	A A
6	Propane Torch Flame		5[A] 1.5
	Sharp Tool (Impacts)		
7	Ripping Bar	10	
Ripping Bar (10)			
2.0			
	A	7	12 23 A
8	Ram	10	2.1
Chisel/Hammer (25)	A	A	13 25 35, 40
9	4-in. (10-cm) Diameter Pipe/Sledge	25	2.2
Angle Iron/Sledge (25)	A	A	15 A A
10	Sledge Hammer	25	2.3
1-in. (4-cm) Diameter Pipe/Sledge (25)	A	3 [A]	A A
11	Propane Torch Flame		5[B] 2.4
	Fire Axe (25)	10	2.5
12	Ripping Bar	10	2.5
13	A	A	A 24 32, 38
13	Chisel/Hammer	25	2.6
Wood Splitting Maul (25)	A	A	A 21½ 34, 41
14	Gasoline	4	½ Pint (¼ L) 2.7
	ThermalStress (Minutes)		
15	Angle Iron/Sledge	25	2.8
	Extinguisher, CO_2(1)	A 4	A A3.0
16	Sledge Hammer	25	3.0
17	ARam	10	3.1
17	Ram	10	3.1
	Propane Torch (5)	A	6[B] 11[C] 3.2
18	4-in. (10-cm) Diameter Pipe/Sledge	25	3.2
19	Sledge Hammer	25	3.3
20[C]	31Propane Torch Flame		5[C] 3.4
20	Propane Torch Flame		5[B] 3.4
Chemical Deterioration (Amount)			
21	Wood Splitting Maul	25	3.5
G22	Sledge Hammer	25	3.6
22	Sledge Hammer	25	3.6
23	Ripping Bar	10	3.7
24	Fire Axe	25	3.8
25	Chisoli/Hammer	25	3.9
25	Chisel/Hammer	25	3.9
26	Acetone (		½ Pint) (¼ L) A3.10
26	Acetone		½ Pint (¼ L) 3.10
27	A	14	A 4.0
27	Sledge Hammer	25	4.0
28	Ram	10	4.1
29	4-in. (10-cm) Diameter Pipe/Sledge	25	4.2
30	Sledge Hammer	25	4.3
31	Propane Torch Flame		5[A] 4.4
31	Propane Torch Flame		5[B] 4.4
32	Fire Axe	25	4.5
32	Fire Axe	25	4.5
33	Sledge Hammer	25	4.6
34	Wood Splitting Maul	25	4.7
35	Chisel/Hammer	25	4.8
36	Sledge Hammer	25	4.9
37	Acetone (		½ pint) (¼ L) A4.10
37	Acetone		½ Pint (¼ L) 4.10
38	A	A	26 37
38	Fire Axe	25	4.11
Total Forced Entry Sequences:	1	7	16 27 4.12
39	Sledge Hammer	25	4.12
40	Chisel/Hammer	25	4.13
41	Wood Splitting Maul	25	5.0

[A] Not Applicable.

[B] For Class II, the flame shall be extinguished with a fine mist of water immediately after the propane torch application.

[C] For Classes III, IV, and V, if the sample continues to burn after removal of the flame (self-sustaining), it shall be allowed to burn an additional 10 min and then extinguished with a fine mist of water.

6.2.4*Caliber 7.62 mm Steel Jacketed NATO/Rifle*—Ammunition conforming to U.S. Military specifications for caliber 7.62 mm NATO, M80 ball producing velocities of 2800 (±50) ft per s (850 (±15) m per s) at 15 ft (4.5 m) from the muzzle.

6.2.5*Caliber .30–'06 Armor Piercing/Rifle (AP)*—Ammunition conforming to U.S. Military specifications for caliber .30–'06, M2AP producing velocities of 2775 (±50) ft per s (845 (±15) m per s) at 15 ft (4.5 m) from the muzzle.

6.2.6*Shotshell 12-gage 3 in. Magnum/Shotgun*—Ammunition conforming to SAAMI specifications for Shotshell 12-gage, 3 in. Magnum, 00 Buckshot producing velocities of 1315 (±50) ft per s (400 (±15) m per s) at 15 ft (4.5 m) from the muzzle. The 12-gage ballistic threat is to be used as a confirmatory test of assemblies. Glazing materials are not to be tested or rated against this threat.

6.3

7.2 *Ammunition Class*— All ammunition used in conducting tests within this test method shall be manufactured in compliance with current configurations and standards established by the Sporting Arms and Ammunition Manufacturer's Institute (SAAMI) or United States Military Specifications, as applicable, except as may be noted within this test method.

7.3 *Witness Material*:

67.3.1 Aluminum foil, kitchen foil, or equivalent, 0.00094 in. (0.024 mm) ± 10 % thick. Alloy may be 8111 or 1100, "0" temper.

6.47.4 *Instrumentation*:

6.4.1

7.4.1 *Photosensitive Triggering Screens* , [8]

6.4.2

7.4.2 *Chronograph*, [8]

6.4.3

7.4.3 *Thermometer*— Temperature ranges from +120 to −30°F (+49 to ~~−16°C).~~ −34°C).

6.57.5 *Test Frame and Stand*:

67.5.1 Samples of glazing submitted for testing shall be in sizes that would be encountered during normal use, but in no case smaller than 12 by 12 in. (30 by 30 cm) or larger than 29¾ by 29¾ in. (75 by 75 cm). The size and configuration of each sample will be such that it can be mounted in a structurally sound, rigid test fixture capable of accommodating a variety of sizes of rectangular samples. The framing must be affixed to the glazing sample in a manner which does not enhance or detract from the ballistic resistance of any portion of the sample to be ballistically impacted. For testing of glazing materials only, the mounting method is not subject to any tests herein.

6.67.6 *Test Set-Up*:

6.6.1The7.6.1 The sample shall be mounted rigidly (bolted) to the test fixture to produce a zero degree ~~(±3 degrees (estimated))~~ (±3°) obliquity (ZDO) to the path of the bullet. Photosensitive triggering screens shall be positioned 5 and 15 ft (1.5 and 4.5 m) from the threat side of the sample which, in conjunction with an elapsed time counter or direct reading chronograph, shall be used to determine bullet velocities 10 ft (3 m) from the strike face of the sample. The test weapon shall be rigidly mounted at a distance of 25 ft (7.5 m) from the muzzle to the target area of the test assembly. The test weapon shall be aimed to produce a zero degree obliquity trajectory to the target area within the tolerances of this test method.

6.6.2The7.6.2 The witness material shall be securely positioned parallel to, and no more than 6 in. (15 cm) behind (protected side), the target area of the test assembly. Curvilinear features of the target area shall therefore have the witness contoured to parallel these features. The witness material shall be stretched taut.

67.6.3 Should there be reason to suspect bullet flight stabilities, the test director is obligated to implement a paper witness panel, positioned 3 ft (91 cm) in front of the target area. This witness panel shall be inspected following each test firing as to indication of a yawed projectile. Evidence of a yawed or unstable projectile shall constitute an unfair hit, and shall require retesting.

6.6.4The7.6.4 The number and location of ballistic impacts required of this specification are minimum requirements. Further, the test director shall be obligated to conduct zero degree obliquity or oblique firings (as required by design) into the test specimen features that have design features passing completely or partially through the thickness of the glazing to examine all possible penetration paths. Not only shall the primary weapon/ammunition be used, but the 12-gage shotgun (as defined within this test method as an adjunct to the primary test) as well. The 12-gage ballistic threat is to be used as a confirmatory test of assemblies. Glazing materials are not to be tested or rated against this threat.

67.6.4.1 Due to chronograph/triggering screen accessibility, the test director may elect not to electronically measure muzzle velocities of certain oblique firings.

~~7.~~8. Apparatus (Physical Attack)

7.18.1 *Test Stand*—The test glazing samples will be mounted in a vertical test stand of rigid, 6 in. (15 cm) steel wide flange beams as in Fig. 1. The wide flange beam stand will be anchored in, or rigidly fixed to, a substantial concrete structure at each of its four corners (minimum requirements), and no linear dimension between supports of the test will exceed 8 ft (2.5 m).

[8] The sole source of supply of the apparatus known to the committee at this time is Oehler Research, P.O. Box 9135, Austin, TX 78766. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.

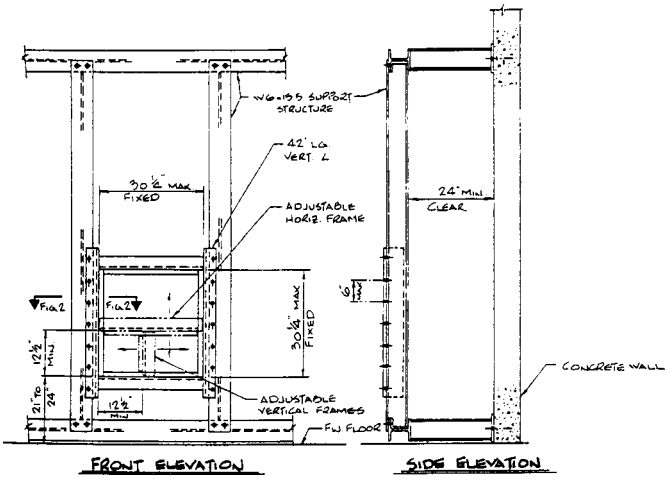

FIG. 1 Test Stand and Frame Assembly

~~7.2~~

8.2 *Test Frame*:

~~7.2.1~~

8.2.1 *Glazing Material Tests*—Unframed glazing samples will be mounted in a test frame detailed in Fig. 2 and Fig. 3, a weldment constructed of structural steel angle iron (conforming to Specification A 36/A 36M for 6 by 3½ by ⅝ in. (15 by 9 by 1.6 cm) which has a 1¼ ~~in. (3.18 cm) square steel bar fixed stop (conforming to Specification A36/A36M~~ in.^{2} (3 cm^2) steel bar fixed stop (conforming to Specification A 36/A 36M for 1¼ in. ~~square (3.18 by 3.18 cm)~~ ^{2} (3 cm^2) which will accept a square test sample of minimum 12 by 12 in. (30 by 30 cm) and maximum 29¾ by 29¾ in. (75 by 75 cm), and will allow ¼-in. (6-mm) clearance on all edges. The fixed stop square bar will be oriented to support the entire periphery of the sample facing the protected side for a maximum distance of 1.0 in. (2.5 cm) from its edge.

~~7~~8.2.1.1 The test sample will rest at the bottom on two neoprene setting blocks (¼ by 4-in. (6 by 100-mm) sample thickness) of 60 to 80 durometer placed at the quarter points. Prior to inserting the glazing sample in the test frame, a 3⁄16-in. (5-mm) glazing tape shall be applied to the fixed stop and adjustable stop where contact is made with the test sample.

~~7~~8.2.1.2 The mounting is completed by bolting the adjustable stop to the test frame with ½-in. (13-mm) socket head cap screws (conforming to Specification A 574) torqued to ~~120 ft. lbs. ± 10 ft. lbs. (16.6 kg. meters ± 1.4 kg. meters)~~ 120 ± 10 ft·lbf (163 ± 14 N·m) each. The center to center location of adjustable stop mounting bolts shall be no greater than 6 in. (15 cm). When the test sample is mounted it will be centered in the test frame and positioned with neoprene shims to result in not more than 1.0-in. (2.5-cm) edge coverage (bite) of the test sample.

~~7~~8.2.1.3 Compression of the glazing tape will be made by the adjustable stop, but not to allow a test sample face to stop clearance of more than ⅛ in. (3 mm). When mounted, the bottom edge of the exposed faces (protected and assaulted) of the sample will be no higher than 24 in. (61 cm) nor lower than 21 in. (53 cm) from the horizontal surface supporting the test (attack) personnel.

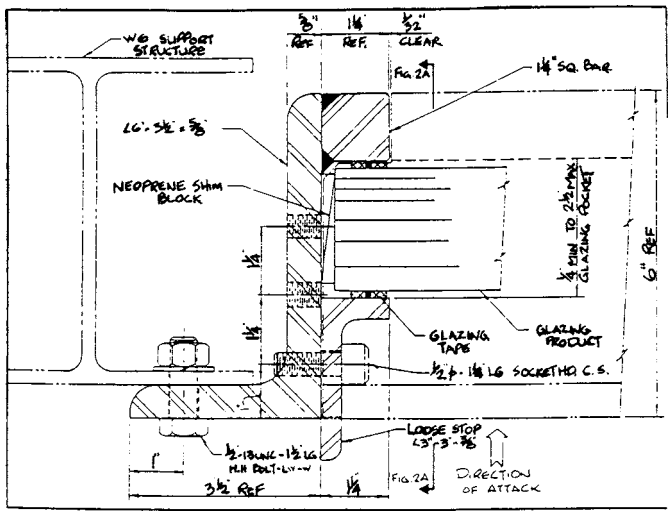

FIG. 2 Glazing Material Test Frame