



Standard Test Methods for Measuring the Forced Entry Resistance of Sliding Door Assemblies, Excluding Glazing Impact¹

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1. Scope

1.1 These test methods determine the ability of sliding door assemblies to restrain, delay, or frustrate forced entry.

1.2 For purposes of these test methods, sliding door assemblies are classified as described in 1.2.1-1.2.4 and as shown in Fig. 1. Sliding door assemblies with a combination of operable panels and fixed panels (lites) shall be classified and tested separately for each type.

1.2.1 *Type A*—A sliding door assembly which incorporates one or more sliding panels that lock to the jamb.

1.2.2 *Type B*—A sliding door assembly which incorporates one or more sliding panels that lock to an intermediate jamb.

1.2.3 *Type C*—A sliding door assembly which incorporates one or more sliding panels that abut and lock to other panels.

1.2.4 *Type D*—A sliding door assembly which incorporates one or more fixed or stationary panels (lites) that are designed not to operate.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *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 hazard statement, see Section 8.

2. Referenced Documents

2.1 ASTM Standards:

E 631 Terminology of Building Constructions²

2.2 *California Model Building Security Ordinance:*

CMBSO 1-79³

3. Terminology

3.1 *Definitions*—Definitions for standard terminology can be found in Terminology E 631.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *door frame assembly, n*—the combination of a head, sill, and jambs surrounding and supporting fixed and sliding panels.

3.2.2 *fixed jamb stile, n*—vertical members of fixed or stationary panels adjacent to any jamb.

3.2.3 *intermediate jamb, n*—vertical member of a frame other than the outermost vertical members.

3.2.4 *locking device(s) (lock), n*—one or more components of a sliding door assembly intended to resist opening of the sliding door panel from the exterior.

3.2.5 *sliding door assembly, n*—a combination of one or more sliding door panels with or without one or more fixed panels within a common frame.

4. Summary of Test Method

4.1 The procedure consists of mounting a sliding door specimen into a test assembly fixture which in turn is mounted to a wall support fixture, and, after removing all exterior fasteners and loose component items, specified loads and forces are applied to the sliding door test specimen in a prescribed sequence. Following removal of all loads, a determination is made as to whether or not entry can be gained through the sliding door test specimen from the exterior.

5. Significance and Use

5.1 These test methods are intended to establish a measure of resistance for sliding door assemblies subjected to attacks (other than impacting glazing materials) by unskilled or opportunistic burglars. Resistance to higher levels of force generated by skilled burglary attack requires methods, such as

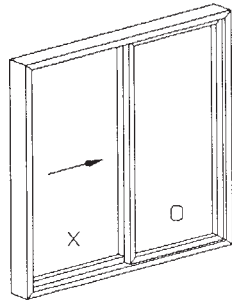
¹ These test methods are under the jurisdiction of ASTM Committee E06 on Performance of Buildings and are the direct responsibility of Subcommittee E06.51 on Component Performance of Windows, Curtain Walls, and Doors.

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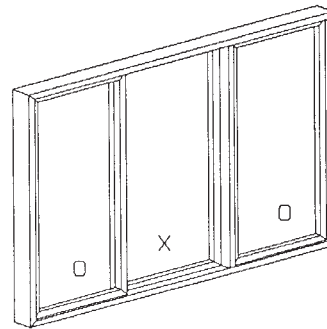
² *Annual Book of ASTM Standards*, Vol 04.11.

³ Available from California Crime Prevention Bureau, Chapter 15.52, 1107 N. Batavia, Orange, CA 92867.

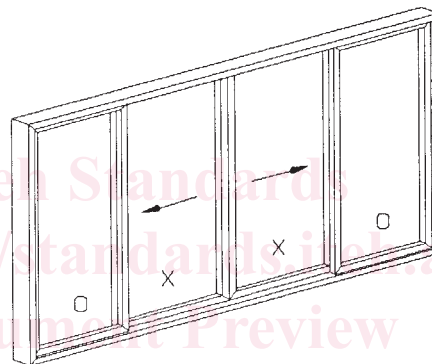
TYPE A



TYPE B



TYPE C



O - NON-OPERATING DOOR PANEL
X - OPERATING DOOR PANEL

FIG. 1 Typical Horizontal Sliding Door Assembly Types (viewed from the exterior)

alarms, communication or apprehension systems, or special security glazing materials more sophisticated than those evaluated by these test methods.

5.2 Acceptance criteria for performance levels are a matter for authorities having specific jurisdiction to establish. Suggested guidelines are found in the Annex.

6. Test Criteria

6.1 *Sliding Door Test Specimen*—The same sliding door assembly shall be used for all testing and shall contain panels of the greatest height and width for which approval is sought. Each locking condition for which approval is sought shall be tested. (See Fig. 1.)

6.1.1 The construction of the sliding door test specimen, including all hardware, components, and arrangement of panels, shall be representative of that for which acceptance is desired.

6.1.2 The sliding door test specimen shall consist of the entire assembled unit, including frame, glazing, and anchorage as supplied by the manufacturer for installation in the building.

6.1.3 The sliding door test specimen shall be glazed with single glazing and shall be single glazed if designed for either

single or double glazing, or double glazed if designed exclusively for multiple glazing. Products shall be qualified only for the specific glazing materials tested (that is, tempered glass, laminated glass, polycarbonate glass, etc.).

6.2 *Performance Criteria*—The performance level is attained if all locking devices remain engaged and entry cannot be gained during the test or upon removal of loads. If during testing, any component, including the glazing material, fails, allowing entry, this shall be considered a failure to attain the performance level. Glazing which breaks, but which does not allow entry, shall not be considered a failure to attain the performance level.

6.3 *Multiple Panels*—Sliding door assemblies with a combination of operable panels and fixed panels (lites) shall be classified and tested separately for each panel type. If multiple panels within a sliding door assembly are identical in construction and locking condition, only one panel need be tested.

6.4 *Test Sequence*—Perform the tests for each sliding door test specimen in the sequence as outlined in Section 10. The sequence for testing multiple panels shall be at the discretion of the testing agency.

6.5 *Loading*—Apply test loads and forces at a rate not to exceed 4.5 kg/s (10 lb/s). Maintain performance loads for a period of 60 ± 5 s.

6.6 *Load Removal*—At the conclusion of each test, remove all loads before starting the next test.

7. Apparatus

7.1 *Instrumentation*—Load and time-measuring devices with an accuracy of $\pm 2\%$ of the full scale shall be incorporated in the test setups. The scale ranges used shall assure that the performance levels are within an accuracy of $\pm 5\%$.

7.2 *Load Attachments*—Brackets, fasteners, or other devices used in performing these tests shall be designed and attached so as to minimize their influence on the test results.

7.3 *Test Frame*—The test frame shall be designed and constructed to accept and rigidly secure the sliding door test specimen and to provide rigid points of anchor for all test loads described in Section 10. The load bearing members of the test frame shall be constructed to limit deflection of such members to a maximum of 3 mm ($\frac{1}{8}$ in.) under full prescribed load.

8. Hazards

8.1 Glass breakage may occur during the application of loads or forces required by these test methods. Take adequate precautions to protect personnel from broken glass.

8.2 Locking devices, glass, and other sliding door test specimen components may suddenly fail when loads and forces are applied during these test methods, causing panels to open rapidly. Take adequate precautions to protect personnel from rapidly moving weights and sliding door test specimen components.

9. Preparation

9.1 Mount the sliding door test specimen into a 2×4 or 2×6 lumber surround frame, in accordance with the manufacturer's written installation instructions. Additional attachment means are permitted between the lock jamb and the test frame provided such means do not increase the strength of the connection between locking devices and the sliding door members beyond the door manufacturer's installation specifications.

9.2 Install the mounted sliding door assembly specimen into the test frame, rigidly supporting the mounting frame to resist all loads stipulated for the panel arrangement to be tested.

9.3 Close and lock the sliding door test specimen.

9.4 Without in any other manner damaging the sliding door test specimen, remove from the sliding door test specimen all screws, glazing beads, and any other members or other mechanical fasteners that can be removed readily from the exterior within a time limit of 5 min using the following tools:

9.4.1 A spatula or other non-cutting tool with a thin blade, 0.75 to 0.85 mm (0.030 to 0.033 in.) thick, 19 to 25 mm ($\frac{3}{4}$ to 1 in.) wide, and 125 to 150 mm (5 to 6 in.) long.

9.4.2 Any non-powered screwdriver appropriate to the mechanical fastener.

9.4.3 A standard slot-type pliers with a 150 to 175 mm (6 to 7 in.) overall length.

10. Procedure

10.1 *Lock Manipulation Test:*

10.1.1 Examine the sliding door test specimen and determine a method of inserting the tools in 10.1.1.1 and 10.1.1.2 from the exterior so as to contact the locking device. Without damaging the sliding door test specimen and with one technician only, attempt to gain entry by attempting to open the panel by hand and manipulating the locking device with these tools, in any combination. Conduct this test continuously for a time limit of (T_1).

10.1.1.1 A spatula or other non-cutting tool with a thin blade, 0.75 to 0.85 mm (0.030 to 0.033 in.) thick, 19 to 25 mm ($\frac{3}{4}$ to 1 in.) wide, and 125 to 150 mm (5 to 6 in.) long.

10.1.1.2 A piece of stiff steel wire (such as, a coat hanger) at least long enough to reach from the point of insertion to the locking device(s). The wire diameter shall be 1.3 to 1.8 mm (0.05 to 0.07 in.).

10.2 *Static Load on Panels and Locking Device Strength Resistance Tests:*

10.2.1 *Type A Sliding Door Assembly:*

10.2.1.1 *Test A1*—With the sliding panels in the test position, a concentrated load (L_1) shall be applied separately to each member incorporating a locking device, at a point on the member within 75 mm (3 in.) of the locking device, in a direction parallel to the plane of the glass that would tend to open the panel. The load shall be distributed evenly between the interior and exterior sides of the locking device so as to minimize rotation. (See Fig. 2.)

10.2.1.2 *Test A2*—Repeat Test A1 (see 10.2.1.1) while, simultaneously, an additional concentrated load (L_2) is applied to the panel member containing the locking device, at a point on the member within 75 mm (3 in.) of the locking device, in the direction perpendicular to the plane of the glazing material toward the interior side of the sliding door test specimen. (See Fig. 2.)

10.2.1.3 *Test A3*—Repeat Test A1 (see 10.2.1.1) while, simultaneously, an additional concentrated load (L_2) is applied to the panel member containing the locking device, at a point on the member within 75 mm (3 in.) of the locking device, in the direction perpendicular to the plane of the glazing material toward the exterior side of the sliding door test specimen. (See Fig. 2.)

10.2.1.4 *Test A4*—Repeat Test A2 (see 10.2.1.2) with the sliding door panel lifted vertically to the uppermost limit within the confines of the door frame assembly with a force (L_4). Apply the lifting force at the midspan of the bottom rail of the test panel. (See Fig. 2.)

10.2.1.5 *Test A5*—Repeat Test A3 (see 10.2.1.3) with the sliding door panel lifted vertically to the uppermost limit within the confines of the door frame assembly with a force (L_4). Apply the lifting force at the midspan of the bottom rail of the test panel. (See Fig. 3.)

10.2.1.6 *Test A6, Inside Sliding Panels*—With the sliding door panel lifted vertically to the uppermost limit within the confines of the door frame assembly with a force (L_4), repeat Test A1 (see 10.2.1.1), while simultaneously applying a concentrated load (L_3), in the direction perpendicular to the plane of the glazing material, toward the interior side of the sliding

TYPE A ASSEMBLIES

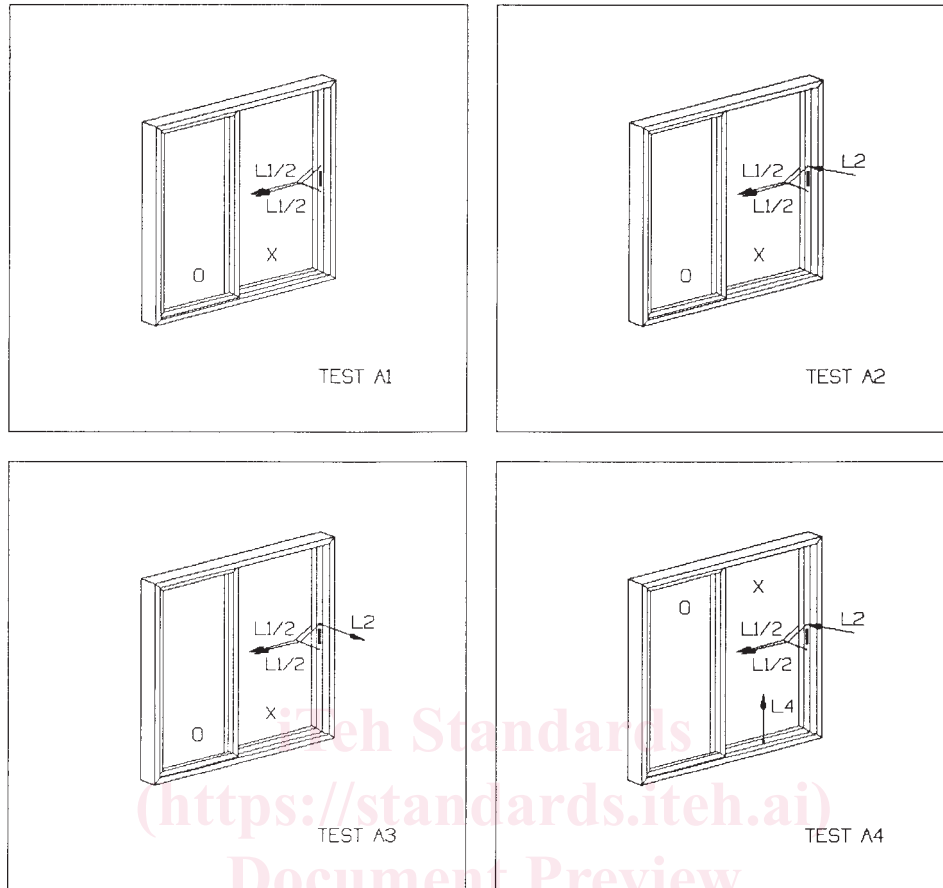


FIG. 2 Schematic of Test Load Applications (viewed from the exterior)

door test specimen, to the bottom rail on the same panel, within 75 mm (3 in.) of the corner opposite the stile containing the locking device. (See Fig. 3.)

10.2.1.7 *Test A7, Outside Sliding Panels*—With the sliding door panel lifted vertically to the uppermost limit within the confines of the door frame assembly with a force (L_4), repeat Test A1 (see 10.2.1.1), while simultaneously applying a concentrated load (L_3), in the direction perpendicular to the plane of the glazing material, toward the exterior side of the sliding door test specimen, to the bottom rail on the same panel, within 75 mm (3 in.) of the corner opposite the stile containing the locking device. (See Fig. 3.)

10.2.1.8 After completion of Tests A1 through A7 (see 10.2.1.1-10.2.1.7) and with all loads removed, perform the Lock Manipulation Test (see 10.1).

10.2.2 *Type B Sliding Door Assembly:*

10.2.2.1 Perform all tests required for Type A assembly (see 10.2.1). Identify these tests as B1 through B7. Where force (L_1) is specified, apply two forces, each equal to the (L_1) force. Apply the first force at the stile in such a manner as to exert the force on the locking device or handle by straddling it at points on the door panel member within 75 mm (3 in.) of each side of the locking device in a direction parallel to the plane of the glazing material that would tend to open the door. Apply the second force at the intermediate jamb in such a manner as to exert the force on the intermediate jamb in a direction parallel

to the plane of the glazing material and opposite the first force. The load attachment point for the second force shall be at the same height above the frame sill and in the same vertical plane as the load attachment points for the first force. Apply both loads simultaneously and equally. (See Figs. 4 and 5.)

NOTE 1—The application of the (L_1) forces singly or eccentrically will tend to deglaze the adjacent fixed panel which could effect the results of this test adversely. In order to alleviate this situation, apply the second re-active (L_1) force in 10.2.2.1 before the first (L_1) force, or apply both forces in equal stages so that the results are not adversely effected by deglazing of the fixed panel.

10.2.3 *Type C Sliding Door Assembly:*

10.2.3.1 Perform all tests required for Type A assembly (see 10.2.1). Identify these tests as C1 through C7. Where force (L_1) is specified, apply two forces, each equal to the (L_1) force. Apply the first force at the stile in such a manner as to exert the force on the locking device or handle by straddling it at points on the door panel member within 75 mm (3 in.) of each side of the locking device, in a direction parallel to the plane of the glazing material that would tend to open the door. Apply the second force at the meeting stile of the sliding panel that is adjacent to the sliding panel that contains the lock. Apply this force in such a manner as to exert the force on the meeting stile in a direction parallel to the glazing material and opposite the first force in an effort to separate the engaged meeting stiles. The load attachment point for the second force shall be the

TYPE A ASSEMBLIES (continued)

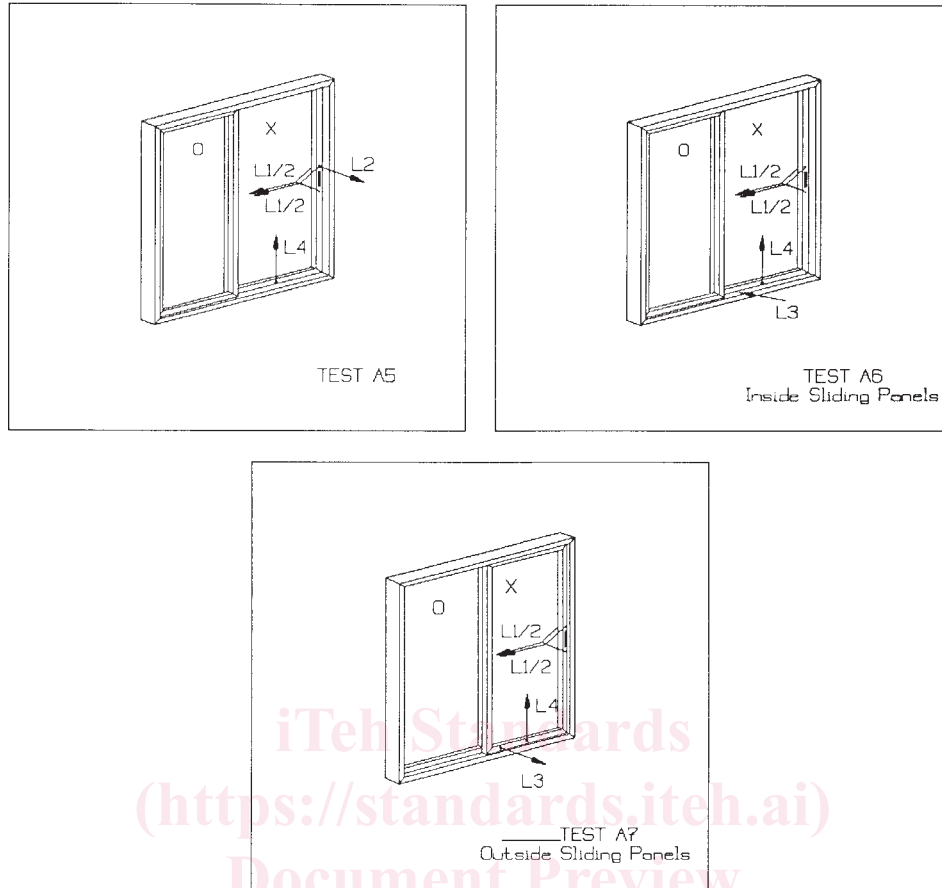


FIG. 3 Schematic of Test Load Applications (viewed from the exterior)

same height above the sill as the load attachment points for the first force. Apply both loads simultaneously and equally. (See Figs. 6 and 7.)

NOTE 2—The application of the (L_1) forces and their opposite reactive forces will tend to deglaze the adjacent panel which could effect the results of this test adversely. In order to alleviate this situation, apply these forces simultaneously in nearly equal stages with special care being taken to prevent deglazing of either panel.

10.2.4 Type D Sliding Door Assembly:

10.2.4.1 Test D1—With the fixed panel in the test position, apply a concentrated load (L_1) at the center of the fixed jamb stile in the direction parallel to the plane of the glazing material that would tend to separate the fixed panel from the jamb. (See Fig. 8.)

10.2.4.2 Test D2—Repeat Test D1 (see 10.2.4.1) while, simultaneously an additional concentrated load (L_2) is applied to the center of the stile opposite the fixed jamb stile in the direction perpendicular to the plane of the glazing material, and in a direction that would tend to separate the stile from member with which it mates. (See Fig. 8.)

10.2.4.3 Test D3—Repeat Test D1 (see 10.2.4.1) with the fixed panel lifted vertically to the uppermost limit within the confines of the door frame assembly with a force (L_4). Apply the lifting force to the midspan of the bottom rail of the fixed test panel. (See Fig. 8.)

10.2.4.4 After completion of Tests D1 through D3 (see 10.2.4.1-10.2.4.3) and with all loads removed, conduct the Lock Manipulation Test (see 10.1).

11. Report

11.1 The report shall contain a description of the results of the test(s) performed in accordance with these test methods.

11.2 The report shall also include at least the following:

- 11.2.1 Identification of the sliding door test specimen;
- 11.2.2 Type, size, location, and number of locking devices and other hardware;
- 11.2.3 Type, location, and number of installation fasteners;
- 11.2.4 Type and thickness of glazing material;
- 11.2.5 Bill of materials;
- 11.2.6 Assembly drawing;
- 11.2.7 Performance level, loads, and time (L_1, L_2, L_3, L_4, T_1) used;
- 11.2.8 A statement as to whether the door specimen complies or not and the grade at which it complies;
- 11.2.9 A description of the method of installation or installation fastening; and
- 11.2.10 A description of the test equipment used.

TYPE B ASSEMBLIES

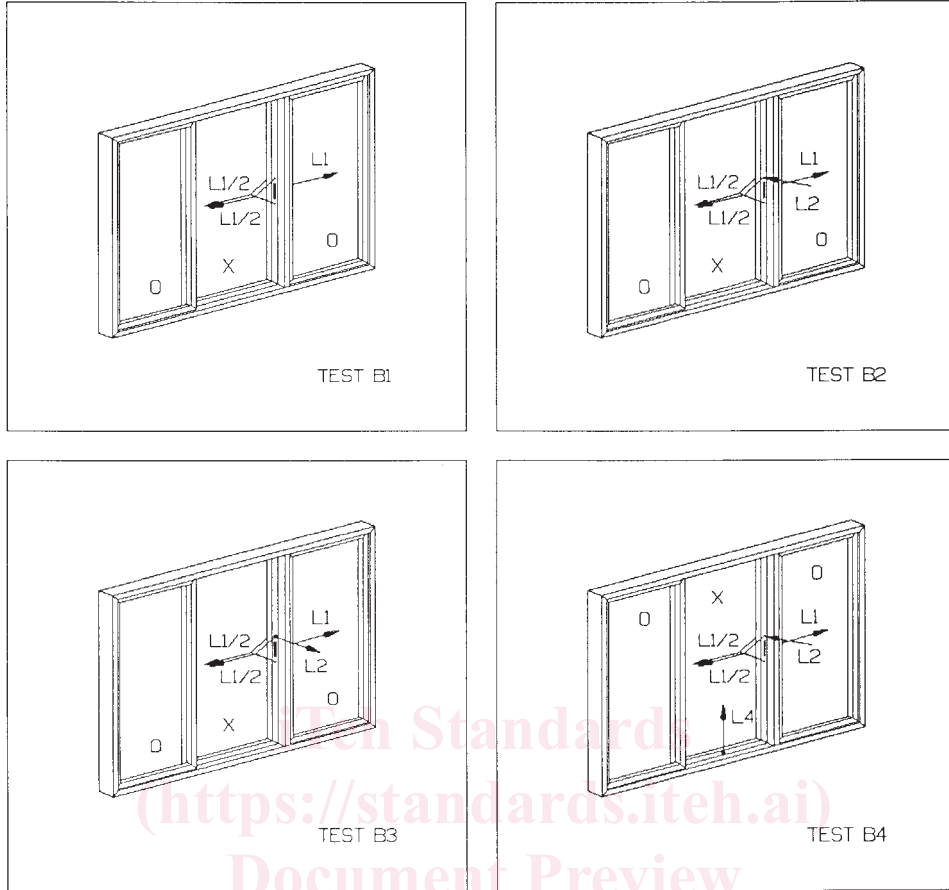


FIG. 4 Schematic of Test Load Applications (viewed from the exterior)

12. Precision and Bias

12.1 These test methods do not generate numerical values. They establish a pass/fail condition which cannot generate numerical values for precision and bias.

13. Keywords

13.1 doors; fenestration; forced entry resistance; laboratory method; sliding glass doors