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AMERICAN NATIONAL STANDARD
FOR
POWER OPERATED PEDESTRIAN DOORS



SPONSOR
BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.

Approved 9/20/2005
AMERICAN NATIONAL STANDARDS INSTITUTE, INC.

AMERICAN NATIONAL STANDARD

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FOREWORD

(This Foreword is not a part of ANSI/BHMA A156.10)

The general classification of builders hardware includes a wide variety of items which are divided into several categories. To recognize this diversity, a sectional classification system has been established. Power Operated Doors is one such section and this Standard is a result of the collective efforts of members of the Builders Hardware Manufacturers Association, Inc. who manufacture this product. The total Product Standards effort is, therefore, a collection of sections, each covering a specific category of items.

Performance tests and, where necessary, dimensional requirements have been established to ensure a degree of safety. There are no restrictions on design except for those dimensional requirements imposed for reasons of safety.

This Standard is not intended to obstruct but rather to encourage the development of improved products, methods and materials. The BHMA recognizes that errors will be found, items will become obsolete, and new products, methods and materials will be developed. With this in mind, the Association plans to update, correct and revise these Standards on a regular basis. It shall also be the responsibility of manufacturers to request such appropriate revisions.

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1. GENERAL

1.1 **Scope** Requirements in this Standard apply to power operated doors for pedestrian use which open automatically when approached by pedestrians and some small vehicular traffic or by a knowing act. Included are provisions to reduce the chance of user injury or entrapment. Power operated doors for industrial or trained traffic are not covered in this Standard.

1.1.1 Where this Standard contains specifications relating to minimum or maximum dimensions of various components of power operated doors for pedestrian use and some small vehicular traffic, such dimensions are included to provide user protection for what are, in the industry, standard application conditions. This Standard does not apply to custom installations.

1.2 This Standard does not apply to power assist and low energy power operated doors. Refer to ANSI/BHMA A156.19 for Power Assist and Low Energy Power Operated Doors.

1.3 Required dimensions are expressed in US units first; approximate metric equivalents follow in parentheses. The following is a conversion chart for inches to approximate mm equivalents where not given in the standard.

TO CONVERT INCHES TO MILLIMETERS, MULTIPLY INCHES BY 25.4 TO CONVERT MILLIMETERS TO INCHES, MULTIPLY MILLIMETERS BY 0.03937.							
Inches	<i>mm</i>	Inches	<i>mm</i>	Inches	<i>mm</i>	Inches	<i>mm</i>
1/16	1.6	6	152	23	584	45	1143
1/4	6.35	7	178	24	610	47	1194
1/2	12.7	8	203	25	635	48	1219
3/4	19	9	229	26	660	49	1245
1	25.4	10	254	27	686	50	1270
1 1/2	38	11	279	28	711	51	1295
1 3/4	45	12	304	30	762	52	1321
1 1/2	38	13	330	31	787	53	1346
2	51	14	356	32	813	54	1372
2.26	57	15	381	33	838	55	1397
2 1/2	63	16	406	34	864	56	1422
3	76	17	432	36	914	57	1448
3 3/4	95	20	508	40	1016	58	1473
4	102	21	533	41	1041	60	1524
5	127	22	559	43	1092	144	3658

1.4 American National Standards referenced in A156.10 are available from BHMA, www.buildershardware.com or the American National Standards Institute, 25 West 43rd Street, New York, NY 10036. ASTM Standards referenced in A156.10 are available from ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959.

1.5 **Tolerances** Where only minus tolerances are given, the dimensions are permitted to be exceeded at the option of the manufacturers. All values which do not carry specific tolerances or are not marked maximum or minimum shall have the following tolerances: Linear dimensions shall be $\pm 1/16$ in (1.6 mm). Pounds or pound force shall be $\pm 2\%$. Degrees opening shall be ± 2 degrees. Electrical measurements shall be $\pm 2\%$.

1.6 Tests described in this standard are performed under laboratory conditions. Measurements shall be taken under neutral air pressure conditions. In actual usage, results vary because of installation, maintenance and environmental conditions.

1.7 Doors used as fire doors or smoke barriers have additional requirements not covered in this standard.

1.8 Where required by the authority having jurisdiction, products meeting the requirements of this Standard are required to comply with UL 325-Fifth Edition June 2002, and be listed or labeled by a nationally recognized independent testing laboratory and be under a periodic examination service.

1.9 Tests described in paragraphs 7.6 and 12 shall be performed under the supervision of a nationally recognized independent testing laboratory on preproduction samples prior to acceptance of the design for production and subsequent installation. Production units shall be under an in-plant follow-up inspection service.

2. DEFINITIONS OF TERMS USED IN THIS STANDARD

2.1 **Active Area** The area where a sensor or control mat detects presence or motion.

2.2 **Activating Zone** An area created by a sensor or control mat such that the door will open when the area is entered by (a) person(s) .

2.3 **Activating Zone, Secondary** An area created by a sensor or control mat such that the door will reactivate or reverse and remain active until the door is almost closed.

2.4 **Automatic Door Operator** A power operated mechanism that is attached to a door for the purpose of mechanically opening and closing a door upon the receipt of an activating signal.

2.5 **Back Check** The checking or slowing down of the speed of door opening before being fully opened. (Also called Open Check.)

2.6 **Balanced Door** A door equipped with a hinge which moves the hinge pivot point from the hinge stile of the door towards the centerline of the door.

2.7 **Break Away Device** A safety device other than an exit device that permits egress under emergency conditions. (Also called Emergency Release.)

2.8 **Break Out** The process of activating a break away device causing the door or panel to swing in the direction of egress.

2.9 **Center Pivoted** A door which has the pivot point of the hinge located on the centerline of the door thickness.

2.10 **Clear Opening for Automatic Doors**

Note: The following is for the purpose of sizing activating and safety zones. Refer to applicable building codes for means of egress clear width requirements.

Swing Doors With the door open 90 degrees, the clear opening is measured between the face of the door and jamb or jamb stop.

Pair of Swing doors With the doors open 90 degrees the clear opening is measured between the faces of the two open doors.

Sliding or Folding Doors In the fully opened position, the clear opening is measured from the edge of the leading stile to the jamb or jamb stop if present.

Pair of Sliding or Folding Doors In the fully opened position, the clear opening is measured between the edges of the leading stiles of the two doors.

2.11 **Closing Cycle** Movement of a swinging, folding or sliding door from the fully open position to the fully closed position.

2.12 **Closing Time** Time from starting of a door closing until it is at rest fully closed.

- 2.13 **Control** A unit containing electrical components for automatic control of door operation and overload protection.
- 2.14 **Control Mat** An activating or safety device placed on the floor on either side of a doorway sensing the presence of a person. It is constructed of a rubber like material with slip resistant surface and is either recessed into or surface mounted on the floor.
- 2.15 **Control Mat, Activating** A control mat which when activated causes a door to open.
- 2.16 **Control Mat, Safety** A control mat which when activated prevents a door from opening or holds a door open.
- 2.17 **Custom Installations** Where an installation condition exists such that all of the performance criteria of this standard cannot be met.
- 2.18 **Cycle** The action of an automatic door operator starting with activating through opening and full closing of (a) door(s).
- 2.19 **Door Opening for Automatic Doors**
Note: The following is for the purpose of sizing activating and safety zones. Refer to applicable building codes for means of egress clear width requirements.
Swing or Folding Doors (Singles or Pairs) The smallest width dimension of a door opening, measured jamb to jamb.
Sliding Doors Same as **clear opening**.
- 2.20 **Double Egress Power Operated Swing Doors** A pair of doors that simultaneously swing with the two doors moving in opposite directions with no mullion.
- 2.21 **Face of Door** The plane of the highest part of the door exposed to view when the door is closed. Does not include hardware or other applied products.
- 2.22 **Exposed Area** The visible area of a control mat after the trim is installed.
- 2.23 **Finger Guard** A device applied at the hinge stile of a door or to the hinge jamb adjacent to the door preventing damage to hands or fingers.
- 2.24 **Folding Door** A pivoted swing panel hinged to a passive panel, the other end of which is captured in a guide, thus allowing it to slide as both panels swing into a V shape (the fold).
- 2.25 **Guide Rail** A separator used with power operated doors for traffic separation and control.
- 2.26 **Inactive Area** The area where a sensor or control mat does not detect presence or motion.
- 2.27 **Knowing Act** With reference to the act of operating a door operator, such as pressing a switch with the knowledge of what will happen.
- 2.28 **Latch Check** The checking or slowing down of the speed of closing a door before being fully closed. (Also called Close Check.)
- 2.29 **Offset Hung** A door which has a hinge pivot point located off the centerline of the door thickness.
- 2.30 **Motion Sensor** A sensor designed to detect the movement of a person in the vicinity of the doorway and give a control signal to the power operated door.
- 2.31 **Power Operated Door** The combination of door, operator and controls constituting the system. (Also called Automatic Door.)
- 2.32 **Presence Sensor** A sensor designed to detect the presence of a stationary person in the vicinity of the doorway and give a control signal to the power operated door.
- 2.33 **Safety Zone** An area of detection provided by presence sensors or control mats on swinging or folding doors.
- 2.34 **Small Vehicular** Carts used to transport people or objects.
- 2.35 **Threshold** A floor mounted horizontal member installed beneath a closed door or in a clear door opening.
- 2.36 **Trained Traffic** People trained in the safe use and operation of a particular automatic door installation.
- 2.37 **Trim, Mat** Material installed around the perimeter of a control mat securing it to the floor.

3. SWINGING DOORS

3.1 Automatic swing door systems have a variety of configurations, including:

- a single door swinging in or out, left-handed or right-handed
- a pair of doors simultaneously swinging in the same direction
- a pair of doors simultaneously swinging in opposite directions (double egress)

3.2 The door operator is concealed or surface applied. The doors are center pivoted, offset hung, balanced or hinged. No matter what the configuration or system, automatic swinging doors shall include guide rails, sensors or control mats, and signage for the safety and convenience of the user according to the following:

Guide Rails	Section 6
Control Mats <u>or</u> Sensors	Section 7 or 8
Knowing Act (when applicable)	Section 9
Entrapment	Section 10
Signage	Section 11

4. SLIDING DOORS

4.1 Automatic sliding doors are flat panels that slide horizontally and linearly. These systems have such a variety of configurations that symbols have been assigned to the individual panels that make up an entryway. See Table 1 for definitions of O, SO, X, SX and P panels.

4.2 No matter what the configuration or system, automatic sliding doors shall include sensors or control mats, and signage for the safety and convenience of the user according to the following:

Control Mats <u>or</u> Sensors	Section 7 or 8
Knowing Act (when applicable)	Section 9
Entrapment	Section 10
Signage	Section 11

5. FOLDING DOORS

5.1 Automatic folding doors are comprised of two or more separate panels, of which one panel swings, and the other panel slides in a guide. Because of the number of leaves involved, see Figure A-14 for definitions of FX and FS panels.

5.2 Automatic folding doors include a variety of configurations, including:

- a single folding door folding in or out, left-hand or right-hand
- a pair of doors simultaneously folding in or out, left-hand and right-hand

5.3 No matter what the configuration or system, automatic folding doors shall include guide rails, sensors or control mats, and signage for the safety and convenience of the user according to the following:

Guide Rails	Section 6
Control Mats <u>or</u> Sensors	Section 7 or 8
Knowing Act (when applicable)	Section 9
Entrapment	Section 10
Signage	Section 11

6. GUIDE RAILS

6.1 Guide Rails for Swing Doors (See Figures A-1, A-2, A-3, A-4, A-11, A-12A,B,C, A-19A,B,C)

6.1.1 Two guide rails shall be installed on the swing side of each door. Single doors shall have one on each side of the door and pairs or double egress shall have one rail on each hinge side. Rails shall project at least to the leading edge of the widest door in the fully open position.

Exception #1: A wall or separator is permitted to be used in place of a rail, provided that it meets the criteria in 6.1.2 through 6.1.5

Exception #2: Guide rails for swinging doors serving both egress and ingress shall project out from the face of the door jambs on the swing side to no less than the outside leading edge of the open door plus 55 in. (See Figures A-2, A-4 & A-12A,C.)

Exception #3 If double egress doors or a pair of doors are installed in a hallway, no guide rails are required if the distance between the wall and the door in the 90 degree open position does not exceed 10 in. (A-19 A,B,C)

Exception #4 Guide rails for Knowing Act swinging doors serving both egress and ingress shall project out from the face of the door jambs on the swing side to no less than the outside leading edge of the open door plus 12 in.

6.1.2 A guide rail shall be 30 in. high minimum measured from the floor surface.

6.1.3 A guide rail shall have a panel or a divider to inhibit access to the protected area.

6.1.4 There shall be 6 in. maximum clearance between the rail and the door in the fully open position or between the rail and the leading edge of the door at the point in its arc of travel when it is closest to the rail. There shall be a 2 in. minimum clearance between the rail at the hinge side and the door in the fully open position.

6.1.5 Free standing guide rails shall have a maximum dimension between the rail and jamb (or other adjacent surface) of 6 in.

6.2 Guide Rails for Folding Doors (See Figures A-14, A-15, A-16, A-17-A,B,C,D)

6.2.1 Two guide rails shall be installed on the fold side of the door. Single doors shall have one on each side of the door; pairs shall have one rail on each hinge side and shall project beyond the fold open position not less than:

12 in. for two way traffic or one way traffic approaching the fold side or

5 in. for one way traffic approaching the non fold side.

Exception: A wall separator is permitted to be used in place of a rail, provided that it meets the criteria in 6.2.2 through 6.2.5

6.2.2 A guide rail shall be 30 in. high minimum measured from the finished floor surface.

6.2.3 A guide rail shall have a panel or divider to inhibit access to the protected area.

6.2.4 There shall be 6 in. maximum clearance between the rail and the door in the fully open position or between the rail and the leading edge of the door at the point in its arc of travel when it is closest to the rail. There shall be a minimum clearance of 2 in. between the rail at the hinge side and the door in the fully open position.

6.2.5 Free standing guide rails shall have a maximum clearance between the rail and jamb (or other adjacent surface) of 6 in.

7. CONTROL MATS REQUIREMENTS

7.1 General Requirements for Mats

7.1.1 The edge of the exposed area of all control mats shall not exceed 1/2 in. thickness. (See Figure A-10.)

7.2 Swinging Doors (See Table 1-A)

7.2.1 The width of the exposed area of an activating or safety control mat shall be the width of the door opening less a maximum of 5 in. measured from both sides for a total maximum of 10 in. (See Figures A-1, A-2, A-3, A-4, A-12A.)

7.2.2 A safety zone shall be provided by a safety control mat on the swing side of the door. The length of the exposed area shall extend a minimum of 5 in. beyond the lead edge of the door in the open position. (See Figures A-1, A-2, A-3, A-4, A-12A.)

7.2.3 Swinging doors serving both egress and ingress, including non-knowing act double egress doors, shall have a series of control mats on the swing side of the door(s) consisting of a safety control mat nearest the opening with a length of exposed area a minimum of 5 in. beyond the lead edge of the door in the open position and one or more activating control mats totaling an additional 55 in. of exposed length. (See Figure A-2 & A-4.)

7.2.4 The exposed length of the activating mat on the non swing side shall be a minimum of 43 in. (See Figures A-1, A-2, A-3, A-4.)

7.3 Sliding Doors

7.3.1 The width of the exposed area of an activating mat shall be the clear opening width less a maximum of 5 in. measured from both sides for a total maximum of 10 in. (See Figures A-5 & A-6.)

7.3.2 Sliding doors shall have an activating control mat with a minimum exposed length of 43 in. (See Figures A-5 & A-6.)

7.3.3 Sliding doors used for one way traffic shall be provided with a control mat that will hold the door open or return the door to the open position when approached by a person from the side not intended for approach. The activating length shall extend a minimum of 24 in. from the face of the door. The width of the control mat shall comply with 7.3.1. The control mat shall be deactivated when the door(s) is (are) within 6 in. of the fully closed position.

7.4 Folding Doors

7.4.1 The width of the exposed area of an activating or safety control mat shall be the width of the door opening less a maximum of 5 in. measuring from both sides for a total maximum of 10 in. (See Figure A-16.)

7.4.2 A safety zone shall be provided by a safety control mat on the fold side of the door. The length of the exposed area shall extend a minimum of 5 in. beyond the edge of the door in the open position. (See Figure A-16.)

7.4.3 Folding doors serving both egress and ingress shall have a series of control mats on the fold side of the door(s) consisting of a safety control mat nearest the opening with a minimum of 5 in. beyond the edge of the FS panel in the open position, and one or more activating control mats totaling an additional 43 in. of exposed length. (See Figure A-16.)

7.4.4 The exposed length of the activating mat on the non fold side shall be a minimum of 43 in.

7.5 Joining of Control Mats

7.5.1 Control mats are permitted to be fitted side by side with the longest dimension perpendicular to the opening and shall not have an inactive area at the meeting line exceeding 2-1/2 in. (See Figure A-8.)

7.5.2 Control mats are permitted to be fitted side by side with the longest dimension parallel to the door opening and shall not have an inactive area at the meeting line exceeding 3-3/4 in. (See Figure A-9.)

7.5.3 Control mats meeting at a threshold shall not have an inactive area exceeding 6 in. including threshold width. (See Figure A-7.)

7.5.4 The active area of a control mat shall be a maximum of 1-1/2 in. from any edge of the exposed area. (See Figure A-10.)

7.6 Performance Requirements of Control Mats

7.6.1 A control mat circuit shall operate at 30 volts rms or less.

7.6.2 Control Mat Sensitivity Test

7.6.2.1 Circuit shall be activated when a solid steel test disc 2.26 in. in diameter is depressed with a 25 lbf (110 N) applied vertically, perpendicular to the disc in accordance with 7.6.2.3 and 7.6.2.4, except that if the circuit is not activated, a 30 lbf (130 N) shall be applied at the area of the electrical contact connections and adjacent locations described in 7.6.2.3. Activation is achieved when the “off” state circuit resistance and capacitance, which must be greater than 5000 ohms and less than 100 nanofarads, changes to an “on” state circuit resistance of less than 400 ohms.

7.6.2.2 The Control Mat shall be divided into 12 equal rectangles covering the active area, except when the length of the mat is such that the length of each rectangle would be greater than 12 in. then the mat shall be divided into 15 or 18 equal rectangles so that the length of each rectangle is not less than 8 in. nor more than 12 in.

7.6.2.3 The test disc shall be placed in the approximate center of each interior rectangle. For perimeter rectangles, place the disc so that it abuts the edge of the active area 1-1/2 in. from the exposed edge of the mat at the approximate center line of the rectangle. Compensating for the weight of the disc, apply a force to activate the circuit and take a single reading. If the disc and force fail to activate the Control Mat at any of the test locations, place the disc on adjacent 90 degree tangents to the test location(s) within the active area of the mat. The disc shall activate the mat at all adjacent locations. If a check on the initial reading is desired, a period of at least 10 minutes shall be allowed between readings. One test disc diameter shall be omitted from each corner of the mat when testing. The mats shall be tested on a flat, rigid surface.

7.6.2.4 The test shall be conducted at 68 degrees \pm 5 degrees F (20 degrees \pm 2 degrees C). Mats shall be placed in the test room not less than four hours prior to the test.

7.6.3 Control Mat Friction Test

7.6.3.1 A control mat shall have a coefficient of friction when dry and clean of not less than 0.66 when tested in accordance with 7.6.3.

7.6.3.2 Coefficient of friction (M) shall be measured using a standard friction block (N) having a diameter of 4 inches (100 mm), weighing 15 lbs. (7 kg) and equipped with a Neolite bottom 1/4 in. thick. The Neolite composition rubber shall have a smooth flat bottom surface without ridges and Shore A hardness of 90 \pm 3. The sheen shall be removed from the Neolite surface prior to use. To prepare the assembly surface prior to its initial use, place a sheet of 400 grit wet or dry silicon carbide paper on a flat surface. Sand the Neolite material gently by moving the assembly back and forth four times for a distance of about 4 in. Repeat at an angle of 90 degrees. This constitutes one cycle of surface preparation. This procedure is to be repeated for a total of 10 cycles.

7.6.3.3 The block shall be placed in the middle of the mat with a linear scale calibrated in

pounds (kilograms) attached.

7.6.3.4 Force required to just begin to move the block in any direction shall be a minimum of a 10 lbf (44 N) applied 1/2 in. from the bottom of the block.

7.6.3.5 The test shall be conducted in a room temperature of 68 degrees F \pm 5 (20 degrees C \pm 2). Mats shall be placed in the test room not less than four hours prior to the test.

7.6.3.6 The formula used for determining the coefficient of friction (M) shall be $M = F \div N$ where $N = 15$ lb. (7 kg) weight (See 7.6.3.2) and $F = 10$ lbf (44 N) minimum.

7.6.4 **Control Mat Trim.** Surface applied control mats shall be secured to the floor with trim having a tapered lead up a minimum of four times the mat thickness at the exposed edge. (See Figure A-10.)

8. SENSORS

8.1 General Requirements for Sensors

8.1.1 **Activating zones** for swinging, sliding and folding doors shall have a minimum **width** equal to the width of the clear opening measured at 8 in. and 30 in. perpendicular from the face of the closed door(s). The length from the face of the door shall be 43 in. minimum measured at the center of the clear opening. Detection shall be effective to within 5 in. from the face of the door measured at the center of the clear opening.

8.1.2 **Motion sensors** shall detect a 28 in. minimum high person, moving at a rate of 6 in. per second minimum toward the center of the door within the detection areas described.

8.1.3 **Presence sensors** shall detect a stationary 28 in. minimum high person within the detection areas described for a minimum of 30 seconds.

8.2 Swinging Doors

8.2.1 Swinging doors shall have an activating zone as defined in 8.1.1.

8.2.2 A **safety zone** shall be provided on the swing side of all power operated swinging doors.

8.2.2.1 If an **overhead sensor(s)** is used to provide a **safety zone**, the length of the active area shall be effective to within 5 in. of the face of the closed door measured at the center of the door opening. The safety zone shall extend 5 in. minimum beyond the leading edge of the door in the open position when measured at the center of the door opening. The width of the active area measured perpendicular from the face of the closed door shall be the door opening less 5 in. maximum measuring both sides for a total of 10 in. maximum measured parallel to the face of the door at a distance of 8 in. and 30 in. When the safety zone is occupied by a 28 in. minimum high person fully in the safety zone of a fully open or closed door, the door operator shall not operate. (See Figure A-12A.)

8.2.2.2 When an **overhead sensor** is prevented from providing a safety signal to the control during the **closing** cycle, an additional sensor, sensors, or photo beam shall be used to either

- (1) inhibit reopening of the door until the safety zone is cleared; **or**
- (2) stop, slow, reverse to a maximum latch edge speed of 4 in. per second measured within 1 in. of the latch edge before any contact is made.

8.2.2.3 If a **door mounted sensor** is used to provide a **safety zone**, it shall be effective to within 5 in. from the face of the door for the width of the door less 5 in. from the pivot point and to within 1 in. of the lead edge. A door mounted sensor on either side of the door shall detect a 28 in. minimum high person fully in the swing path, during the opening or closing cycle and shall cause the

door to reverse direction, stop or slow down to a maximum latch edge speed of 4 in. per second measured within 1 in. of the latch edge before any contact is made. (See Figure A-12B&C.)

8.2.3 Swinging doors serving both egress and ingress, including non-knowing act double egress doors, shall have on the swing side, a safety zone as defined in 8.2.2 and an activating zone. The length of the activating zone shall be established as follows: the activating zone starts adjacent to the safety zone and extending an additional 55 in. from the leading edge of the door in the open position. (See Figure A-12A&C.) The activating zone shall have a minimum width equal to the width of the clear opening measured at 8 in. and 30 in. from the interface of the safety and activating zones.

8.2.4 If a sensor is used for activating and a safety control mat is used as a safety zone, the exposed area of the safety control mat shall extend 5 in. minimum beyond the edge of the door in the open position and:

- (1) extend 5 in. into the non swing side area of the door measured from the face of the door; or
- (2) the door opening area shall be provided with a presence sensor which shall be used to prevent a fully open door(s) from closing when a person is in the space between two non overlapping activating or safety zones; or
- (3) the door closing cycle shall have a delay of four seconds minimum after the activating zone is clear; or
- (4) be equipped with a door mounted sensor on the non swing side as described in 8.2.2.2.

8.2.4.1 The width of a safety control mat shall be in accordance with 7.2.1. (See Figure A-12A.)

8.2.5 When sensors are used to provide both an activating and a safety zone, if the distance between the two non overlapping zones exceeds 8 in. the door system shall:

- (1) be equipped with a safety control mat; or
- (2) be equipped with a presence sensor across the door opening; or
- (3) have a door closing cycle delay of 4 seconds minimum after the activating zone is clear; or
- (4) be equipped with a door mounted sensor on the non swing side as described in 8.2.2.3.

8.3 Sliding Doors

8.3.1 Sliding doors shall have an activating zone as defined in 8.1.1.

8.3.2 A presence sensor shall be used to detect a person in the space between two non overlapping activating zones for the width of the clear opening as follows:

8.3.2.1 If photo electric beams are used (See Figure A-18A):

- (1) a minimum of four photo electric beams shall be installed, two minimum **on each side of the sliding door**. The beams' location shall alternate from side to side. The lowest beam shall be installed 6 to 28 in. from the floor and the other three at a spacing between 6 and 12 in. apart with the top beam at 45-55in. from the floor. The photo electric beam area of detection shall extend across the clear door opening. (See Figure A-18A); and
- (2) the beams shall be installed within 3 in. from the centerline of the slide door; and
- (3) the beams shall remain active from fully open to within 6 in. of closed; and
- (4) the door shall remain fully open for 2.5 seconds minimum after loss of detection.

8.3.2.2 If an overhead presence sensor is used through the door opening it (See Figure A-18B.):

- (1) shall detect a 28 in. minimum high person and extend out a minimum of 5 in. from the face of the door on each side; and

- (2) the detection zone shall remain active from open to within 6 in. of closed or shall have a minimum of two photo electric beams on one side of the door, with the lower beam installed 6-28 in. and top beam 45-55 in. from the floor. (See Figure A-18B.);
- (3) if beams are required they shall be installed within 3 in. from the centerline of the slide door and remain active from fully open to within 6 in. of closed; and
- (4) the door shall remain fully open for 1.5 seconds minimum after loss of detection.

8.3.2.3 If overhead presence sensors are installed on each side of the sliding door opening (See Figure A-18C.):

- (1) they shall not have an inactive area more than 5 in. extending out from the face of the door. If the inactive area exceeds 3 in. from the face of the door, it shall have a minimum of two photo electric beams on one side of the door, with the lower beam installed 6-28 in., and top beam 45-55 in. from the floor; and
- (2) the detection zone shall remain active from open to within 6 in. of closed;
- (3) if beams are required they shall be installed within 3 in. from the centerline of the slide door and remain active from fully open to within 6 in. of closed; and
- (4) the door shall remain fully open for 1.5 seconds minimum after loss of detection.

8.3.2.4 If photo electric beams are used on one side of the door and an overhead presence sensor is installed on the opposite side of the sliding door opening (See Figure A-18D):

- (1) a minimum of two photo electric beams shall be installed on one side of the door with the lower beam installed 6-28 in. and top beam 45-55 in. from the floor; and
- (2) the beams shall be installed within 3 in. from the centerline of the slide door; and
- (3) the overhead presence sensor installed on the side opposite the beams shall not have an inactive area more than 5 in. extending out from the face of the door; and
- (4) the beams and overhead presence sensor must remain active from fully open to within 6 in. of closed; and
- (5) the door shall remain fully open for 2.5 seconds minimum after loss of detection.

8.3.3 Sliding doors used for one way traffic shall be provided with a secondary activating zone on the side not intended for approach. The secondary activating zone shall extend a minimum of 24 in. from the face of the door and be effective to within 5 in. from the face of the door measured at the center of the door opening. The zone shall have a minimum width equal to the width of the clear opening measured at 8 inches perpendicular from the face of the closed door. The sensor shall be deactivated when the door(s) is (are) within 6 in. of the fully closed position.

8.4 Folding Doors

8.4.1 Folding doors shall have an activating zone as defined in 8.1.1.

8.4.2 A safety zone shall be provided on the fold side of all power operated folding doors that shall extend 5 in. minimum beyond the edge of the FS panel measured when open. Detection shall be effective to within 5 in. from the face of the door. The width of the safety zone when the door is closed shall be equal to the door opening less 5 in. maximum from both sides for a total of 10 in. maximum. The width of the safety zone when the door is open shall be equal to the clear opening less 5 in. maximum from both sides for a total of 10 in. maximum measured 8 in. perpendicular to the door. When the safety zone is occupied by a 28 in. minimum high person fully in the safety zone of a fully open or closed door, the door operator shall not operate. (See figure A-17A, 17B, 17C & 17D.)

8.4.2.1 One way traffic doors with an intended approach from the fold side of the door shall have a secondary activating zone that extends a minimum of 24 in. on the non-fold side from the face

of the closed door and be effective within 5 in. from the face of the door measured at the center of the clear opening. The zone shall be deactivated when the door(s) is (are) within 6 in. or less of the fully closed position. (See Figure A-17D.)

8.4.2.2 One way traffic doors with an intended approach from the fold side shall have an activating zone on the fold side with a minimum width equal to the clear opening measured at 8 in. and 30 in. from the outer edge of the safety zone and perpendicular to the face of the closed door. (See Figure A-17D.)

8.4.2.3 Folding doors for one way traffic with intended approach from the non-fold side shall have, on the folding side of the door, both a safety zone as defined in 8.4.2 and a secondary activating zone. The length of the secondary activating zone on the fold side shall be established as follows: The zone starts adjacent to the safety zone and shall extend 24 in. beyond the edge of the FS panel when open. (See Figure A-17A&B.) The zone shall have a minimum width equal to the width of the clear opening measured at 8 in. from the outer edge of the safety zone and perpendicular to the face of the closed door. The sensor shall be deactivated when the door(s) is (are) within 6 in. of the fully closed position.

8.4.3 Folding doors serving both egress and ingress shall have, on the folding side of the door, both a safety zone as defined in 8.4.2 and an activating zone. The length of the activating zone shall be established as follows: The activating zone (as defined in 8.4.1) starts adjacent to the safety zone and shall be effective to within 5 in. and shall extend 48 in. beyond the edge of the FS panel when open. (see Figure A-17C). The activating zone shall have a minimum width equal to the width of the clear opening measured at 8 in. and 30 in. from the outer edge of the safety zone and perpendicular to the face of the closed door.

8.4.4 When both activating and safety control mats are used in combination with sensors they shall be in accordance with section 7.4. (See Figure A-17A & A-17B.)

8.4.5 If a sensor is used for activating and a safety control mat is used as a safety zone, the exposed area of the safety control mat shall extend 5 in. minimum beyond the edge of the FS panel in the open position and:

- (1) extend 5 in. into the approach area of the door measured from the face of the door in the closed position;
- (2) the door opening area shall be provided with a presence sensor which shall be used to prevent a fully open door(s) from closing when a person is in the space between two non overlapping activating/safety zone; or
- (3) the door closing cycle shall have a delay of four seconds minimum after the activating zone is clear. (See Figure A-17A & A-17B.)

8.4.6 When sensors are used to provide both an activating and safety zones, if the distance between the two non overlapping zones exceeds 8 in. the door system shall:

- (1) be equipped with a safety control mat;
- (2) the door opening shall be equipped with a presence sensor across the door opening; or
- (3) have a door closing cycle delay of four seconds minimum after the activating zone is clear. (See Figure A-17A & A-17B.)

9. KNOWING ACT DOOR ACTIVATION

9.1 **Swinging, Sliding, and Folding Doors** Use of an activating device which requires a knowing act to activate the automatic door shall meet the following requirements:

- 9.1.1 Be installed in a location within view of the automatic door; and

9.1.2 Have an installation height of a minimum of 36 in. and a maximum of 48 in.; and

9.1.3 Be located a maximum distance of 12 feet (3.7 m) from the center of the door, and remain accessible from the swing or fold side when the door is opened and shall not be located in a position where the user would be in the path of the moving door; and

9.1.4 The door shall remain fully open for a minimum of five seconds after release of the knowing act device; and

9.1.5 The door shall be equipped with a safety zones, time delays, and guide rails as required in this standard for the type door and detection system selected.

9.1.5.1 Swinging (except double egress), sliding, and folding doors shall be equipped with a secondary activating zone as follows:

(1) Sliding doors required for one or two way traffic requires a secondary activating zone on each side the door.

(2) Swinging and folding doors for one or two way traffic only require the secondary activating zone on the non-swing or non-fold side of the door.

(3) The secondary activating zone (s) shall extend a minimum of 24 in. from the face of the door and be effective to within 5 in. from the face of the door measured at the center of the door opening. The secondary activating zone shall have a minimum width equal to the clear door opening. The secondary activating device for **sliding and folding doors** shall be deactivated when the door (s) is (are) within 6 in. of the fully closed position. The secondary activating zone for **swinging doors** must remain active while the door is closing and shall be deactivated within the last 10 degrees of closing.

9.2 Double Egress Automatic Swing Doors The activating device shall meet the requirements of 9.1.1 through 9.1.4.

9.2.1 One of the following safety zones is required:

- a. If an **overhead sensor(s)** is used to provide a **safety zone**, the length of the active area shall be effective to within 5 in. of the face of the closed door measured at the center of the door opening. The safety zone shall extend 5 in. minimum beyond the leading edge of the door in the open position when measured at the center of the door opening. Overhead mounted sensors shall provide a detection zone equal to the door panel width minus 5 in. from the pivot jamb and to within 5 in. of the lead edge of the door, measured at 8 and 30 in. parallel to the door face (A-19A).
- b. **Door mounted sensors** shall meet 8.2.2.3. (A-19B)
- c. **Mats** The safety zone shall extend 5 in. minimum beyond the leading edge of the door in the open position when measured at the center of the door opening. Mats shall provide a detection zone equal to the door panel width minus 5 in. from the pivot jamb, and to within 5 in. of the lead edge of the door. (A-19C)

9.2.2 The door shall be equipped with a secondary activating zone on the approach side of the swing door as it swings away from the user. (A-19A, A-19C)

- a. The secondary activating zone for sensors shall come to within 5 in. of the face of the door measured at the center of the door opening. If control mats are used they must extend a minimum 24 in. from the face of the door.
- b. The width of the secondary activating zone shall be equal to the width of the door panel less 5 in. from each side in the closed position.
- c. The secondary activating zone must remain active while the door is closing and shall be deactivated within the last 10 degrees of closing.

9.2.3 The doors shall be simultaneously operated.

9.3 **Swinging and folding door safety zones** shall be active when the door (s) are closed and shall have the same zone sizes as required for non Knowing Act activation.

10. ENTRAPMENT PROTECTION

10.1 Sliding Doors

10.1.1 A sliding door shall be adjusted so that the **closing speed** is one foot per second maximum to latch check for doors weighing up to and including 160 lbs (71 kg):

For doors weighing more than 160 lbs (71 kg):

$$V = \sqrt{161/W} \quad \text{where:}$$

V = Velocity in ft/sec

W = Weight of Door in lbs

10.1.2 **Latch check** shall occur for sliding doors at no less than 2 in. from the closed position of each sliding door leaf.

10.1.3 A **stopped** sliding door shall not require more than 30 lbf (133 N), measured at the leading edge, to prevent it from closing at any point in the closing cycle.

10.1.4 Sliding doors provided with a **break away device** shall require no more than a 50 lbf (222 N) applied 1 in. (25 mm) from the leading edge of the lock stile for the break out panel to open. Break away devices (swinging panels) for doors that slide on the egress side of an opening shall be equipped with a self closing device or interrupt automatic operation when used in the break out mode. Break away devices incorporating swing out sidelites shall interrupt automatic operation when used in the break out mode.

10.1.5 Sliding doors utilizing **sensors or control mats** shall remain fully open a minimum of 1.5 seconds after loss of detection, unless otherwise specified within this standard.

10.2 Swinging Doors

10.2.1 The **opening time** of a swing door to 80 degrees shall not be less than 1.5 seconds.

10.2.2 The force required to prevent a **stopped** power operated swinging door in the last 10 degrees of opening from moving in the direction of opening shall not exceed 40 lbf (180 N) measured 1 in. from the lock edge of the door.

10.2.3 **Back check** shall occur at no less than 10 degrees of full open position.

10.2.4 Swing doors utilizing **sensors or control mats** shall remain open a minimum of 1.5 seconds after loss of detection unless otherwise specified within this standard.

10.2.5 A swinging door shall be adjusted so that **closing times** to latch check shall be the minimum values in the following table:

(D)	Inches	36 & under	36	42	42	48	48
(W)	Pounds (kg)	to 100 (45)	to 140 (64)	to 110 (50)	to 150 (68)	to 120 (55)	to 160 (73)
(T)	Seconds	2.0	2.3	2.3	2.7	2.8	3.2

For doors of other weights and widths:

$$T = D\sqrt{W}/188 \quad \text{where:}$$

W = Weight of door in pounds

D = Width of door in inches

T = Closing time to latch check in seconds

10.2.6 **Latch check** shall occur for swinging door at no less than 10 degrees from closed position and the door shall not close through the final 10 degrees in less than 1.5 seconds.

10.2.7 The force required to prevent a **stopped** power operated swinging door from moving in the direction of closing shall not exceed a 30 lbf (133 N) measured 1 in. from the lock edge of the door at any point in the closing cycle.

10.2.8 In the event of power failure, a swing door shall be capable of being **opened manually** with no greater than a 30 lbf (133 N), applied 1 in. from the edge of the lock stile to open.

10.2.9 Swinging doors provided with a **break away device** shall require no more than 50 lbf (222 N) applied 1 in. from the edge of the lockstile to open. When the door(s) is opened in the break out mode, powered operating components excluding spring power shall not operate the doors.

10.2.10 The **opening at hinge side** of swinging doors shall be: a) Less than ¼ in. wide with the door in any position, or b) At least ¾ in. wide with the door in any position. A door that does not comply with the above is acceptable if provided with a finger guard.

10.3 Folding Doors

10.3.1 **Opening time** of a folding door to back check shall not be less than 1.5 seconds.

10.3.2 The force required to prevent a **stopped** power operated folding door in the last 10 degrees of the opening, from moving in the direction of opening shall not exceed 40 lbf (180 N) measured 1 in. from the leading edge of the FS leaf.

10.3.3 Folding doors utilizing **sensors or control mats** shall remain fully open a minimum of 1.5 seconds after loss of detection unless otherwise specified within this standard.

10.3.4 A folding door shall be adjusted so that the **closing speed** to latch check is a maximum of 1 foot/sec. (287 mm/sec.) measured at the leading edge.

10.3.5 **Latch check** shall occur for folding doors at no less than 2 in. from the closed position measured per FX leaf.

10.3.6 A folding door shall not close through the last 2 in. in less than 1.5 seconds for each FX leaf.

10.3.7 A **stopped** folding door shall not require more than 30 lbf (133 N), measured at the leading edge of the FX panel, to prevent it from closing from fully opened to latch check.

10.3.8 Folding doors provided with a **break away device** shall require no more than 50 lbf (222 N) applied 1 in. (25 mm) from the edge of the lockstile to open. When the door (s) is opened in the break out mode, powered operating components excluding spring power shall not operate the doors.

10.3.9 The opening at hinge side of a center pivoted folding door shall be: a) Less than ¼ in. wide with the door in any position, or b) At least ¾ in. wide with the door in any position. A door that does not comply with the above is acceptable if provided with a **finger guard**.

11. SIGNAGE Consistent with section 2.2.1 of ANSI Z535.4, the "signage and warnings" guidelines of A156.10 are recognized, industry-specific standards that predate the adoption of Z535.4 and are not replaced by the standards set forth therein.

11.1 **All swinging, sliding and folding doors** shall be equipped with signage visible from both sides reading, "AUTOMATIC DOOR" with letters 1/2 in. high minimum. The sign described in Figures B-1, B-3, B-5 shall be permitted to be used to satisfy this requirement.

11.2 **Swinging Doors** (See Appendix Figures B-3 & 4)

11.2.1 An arrow sign shall be visible from the approach side of a swinging door mounted on the door at a height 58 in. \pm 5 in. from the floor to the center line of the sign. The sign shall be a minimum of 6 in. in diameter, having a green circle surrounding a black arrow on a white background.

11.2.2 An international "DO NOT ENTER" sign shall be visible from the side of doors that swings towards pedestrians attempting to travel in the wrong direction mounted on the door at a height 58 in. \pm 5 in. from the floor to the center line of the sign. The sign shall be a minimum of 6 in. in diameter, having a red circle with the wording, "DO NOT ENTER," in the red circle.

11.2.3 Swinging doors serving both egress and ingress shall be marked with a decal, visible from the swing side of the door, with the words "AUTOMATIC CAUTION DOOR." The sign shall be mounted on the door at a height 58 in. \pm 5 in. from the floor to the center line of the sign. The sign shall be a minimum of 6 in. in diameter and with black lettering on a yellow background.

11.3 **Sliding Doors** (See Appendix Figures B-1 & 2)

11.3.1 Sliding doors with swinging leaves shall be provided with signs reading, "IN EMERGENCY PUSH TO OPEN." The signs shall have red backgrounds with contrasting letters 1 in. high minimum. The signs shall read horizontally and be located adjacent to the lock stile on a center line 36 in. minimum and 60 in. maximum from the floor applied to the side appropriate for egress.

11.3.2 Sliding doors that slide alongside an adjacent sidelite or wall shall be equipped with a sign that instructs users to stand clear of the sliding door travel path. The letters shall be 1 in. high minimum on contrasting background and located at 36 to 60 inches from the floor.

11.4 **Folding Doors** (See Appendix Figures B-5 & 6)

11.4.1 For one way traffic folding doors, an arrow sign, shall be visible from the approach side of a folding door mounted on the door at a height 58 in. \pm 5 in. from the floor to the center line of the sign on the FX panel. The sign shall conform to the sign described in paragraph 11.2.1. On the non approach side the international "DO NOT ENTER" sign as described in paragraph 11.2.2 shall be visible. If folding doors are being used in pairs, each FX panel is required to have signs.

11.4.2 Folding doors serving both egress and ingress shall be marked with an arrow sign as described in paragraph 11.2.1, visible from the non fold side and the fold side shall be marked with the "AUTOMATIC CAUTION DOOR" sign as described in paragraph 11.2.3.

11.4.3 Folding doors shall be provided with signs as described in paragraph 11.3.1, mounted on the FX panel applied to the side appropriate for egress and a "DO NOT ENTER" sign as described in paragraph 11.2.2 shall be applied to the appropriate sides of the FX panel as determined by traffic flow.

11.5 **Knowing Act Doors** (See Appendix Figures B-1 & 3 & 5)

11.5.1 The door shall have signage which says "Automatic Door" along with other required signage visible from each side of the door. In addition the door shall have signage which says "Activate Switch to Operate" on the side of the door having the Knowing Act switch. Each sign in 1/2" high minimum letters.

12. **BREAK AWAY EGRESS TEST FOR SWINGING, FOLDING AND SLIDING DOORS.**

12.1 Cycle Test Doors with power operators shall be installed in a simulated wall and door framing assembly of sufficient strength to withstand all forces required by the tests. Installation shall be in accordance with manufacturer's printed instructions. Maintenance and repair of other than break away equipment is permitted to be performed during the testing cycles.

12.1.1 The test specimen shall be of the largest door size to be listed by the manufacturer.

12.1.2 Cycle for 300,000 cycles at a rate of 5 to 8 per minute.

12.1.3 Break away devices shall not be lubricated or adjusted during the test.

12.1.4 At every 50,000 cycles during the test, the doors shall undergo 1,000 break out cycles. At the conclusion of the test, break out forces shall not exceed those listed in 10.1.4, 10.2.9, and 10.3.8.

12.2 Salt Spray Test

12.2.1 A sample of the latching and hinge assembly of the break away device of a power operated door contained in an approximately 25 in. wide panel shall be subjected to a salt fog test in accordance with ANSI/BHMA A156.18-2000 for Materials and Finishes for 168 hours.

12.2.2 Record the release force prior to conducting the test. This shall not exceed 50 lbf (222 N).

12.2.3 At the conclusion of the exposure time, remove the sample and allow to dry for 24 hours without cleaning.

12.2.4 Then cycle the sample 10 times. The release force for the first cycle shall not exceed a 100 lbf (445 N). Release forces for the next nine cycles shall not exceed 50 lbf (222 N).

TABLE 1 SYMBOLS USED FOR POWER OPERATED SLIDING DOORS

TYPICAL DOOR TYPES

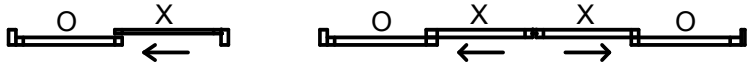
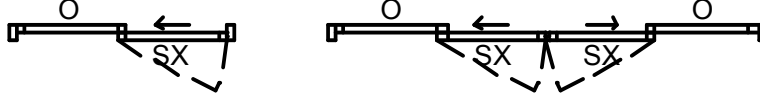
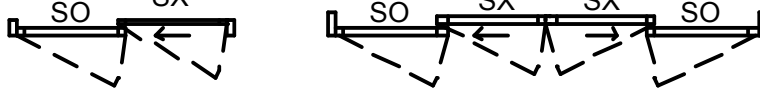
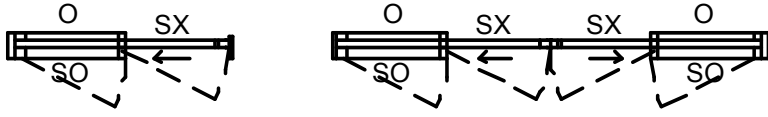
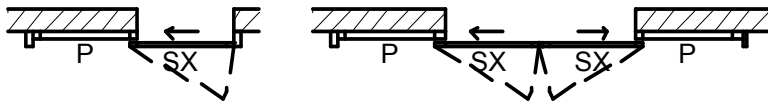
<p>PERIMETER MOUNT</p> 	<p>O-X The sliding panel shall be installed to the inside or outside of the sidelight. Sliding panel slides along sidelight.</p>
	<p>O-SX The swing-slide panel shall be installed to the exterior of the fixed sidelight. The swing-slide panel(s) (SX) shall swing out 90 degrees from any position of slide movement.</p>
	<p>SO-SX The swing out sidelite (SO) shall be installed to the exterior of the swing-slide panel (SX). Swing out sidelight(s) is (are) provided to allow the sliding panel to swing out from any point of slide travel.</p>
	<p>O/SO-SX Swing pocket panel applied to outside of the unit.</p>
<p>SURFACE MOUNT</p> 	<p>P-SX Mounting of the unit is to the surface of the wall. As the door opens, the sliding panel slides beside the wall.</p>

TABLE 1-A MINIMUM EXPOSED MAT SIZES FOR SWINGING DOORS (See 7.2)

To convert inches to mm multiply by 25.4

Door Opening Size in.	Min. Width Required in.	Activating Side - Min. Length in.	Safety Mat Min. Length 3 in. Threshold in.	Safety Mat Min. Length 1in. Threshold in.	
36	26	43	36 ³ / ₄	37 ³ / ₄	CENTER PIVOT SINGLES
37	27	43	36 ³ / ₄	37 ³ / ₄	
42	32	43	42 ³ / ₄	43 ³ / ₄	
43	33	43	42 ³ / ₄	43 ³ / ₄	
44	34	43	44 ³ / ₄	45 ³ / ₄	
45	35	43	44 ³ / ₄	45 ³ / ₄	
48	38	43	48 ³ / ₄	49 ³ / ₄	
49	39	43	48 ³ / ₄	49 ³ / ₄	
48	38	43	24 ³ / ₄	25 ³ / ₄	CENTER PIVOT PAIRS
50	40	43	24 ³ / ₄	25 ³ / ₄	
60	50	43	30 ³ / ₄	31 ³ / ₄	
62	52	43	30 ³ / ₄	31 ³ / ₄	
72	62	43	36 ³ / ₄	37 ³ / ₄	
74	64	43	36 ³ / ₄	37 ³ / ₄	
84	74	43	42 ³ / ₄	43 ³ / ₄	
86	76	43	42 ³ / ₄	43 ³ / ₄	
36	26	43	41 ³ / ₄	41 ³ / ₄	BUTT HINGE & OFFSET PIVOTS (SINGLE)
42	32	43	47 ³ / ₄	47 ³ / ₄	
44	34	43	49 ³ / ₄	49 ³ / ₄	
48	38	43	53 ³ / ₄	53 ³ / ₄	
48	38	43	29 ³ / ₄	29 ³ / ₄	BUTT HINGE & OFFSET PIVOTS (PAIRS)
60	50	43	35 ³ / ₄	35 ³ / ₄	
72	62	43	41 ³ / ₄	41 ³ / ₄	
84	74	43	47 ³ / ₄	47 ³ / ₄	

APPENDIX A (NOT PART OF A156.10)

APPENDIX A

FIGURE A-1 (Ref. 7.2.1, 7.2.2 & 7.2.4)

CONTROL MAT LAYOUTS FOR ONE-WAY TRAFFIC BUTT OR OFFSET PIVOTED SWING DOORS.

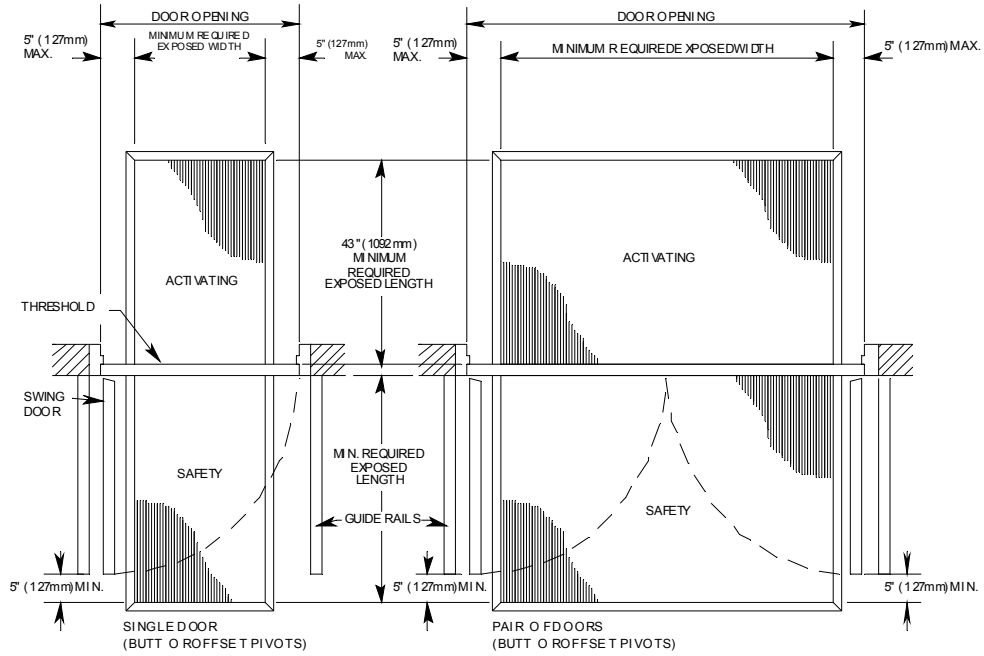
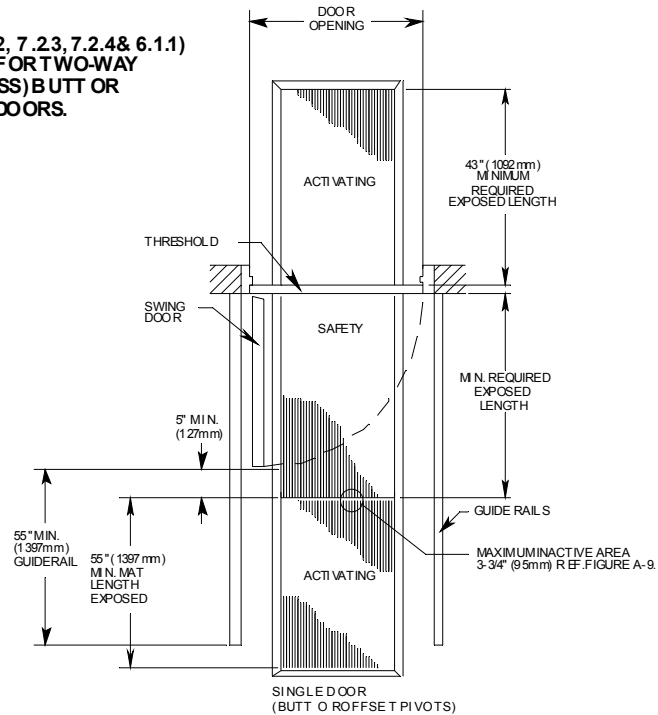
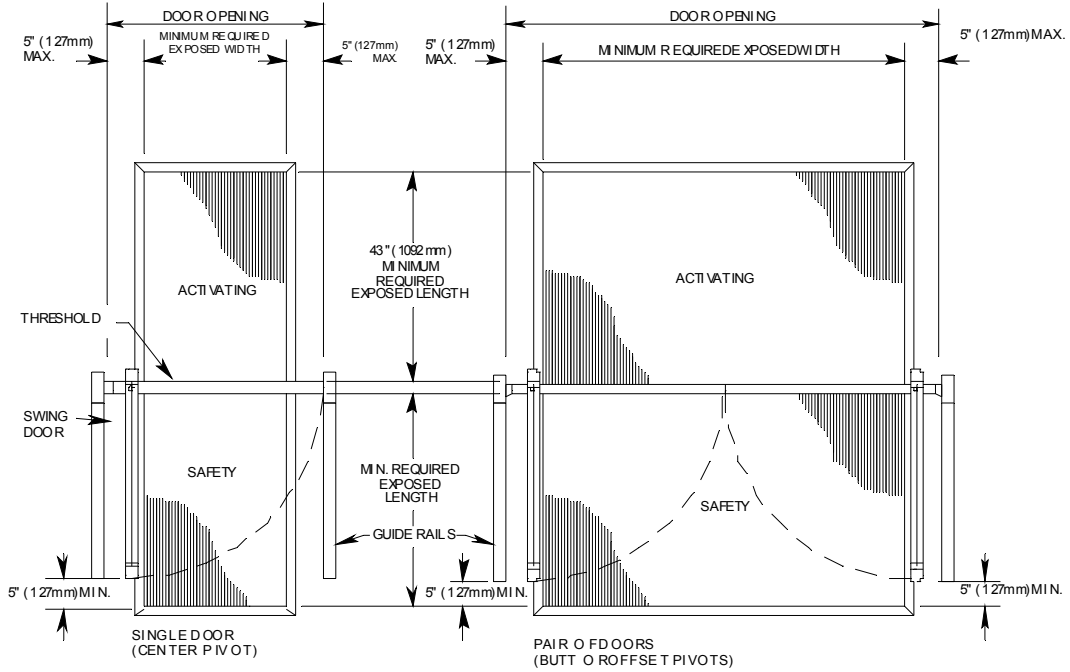


FIGURE A-2 (Ref. 7.2.1, 7.2.2, 7.2.3, 7.2.4 & 6.1.1)
CONTROL MAT LAYOUTS FOR TWO-WAY TRAFFIC (INGRESS/EGRESS) BUTT OR OFFSET PIVOTED SWING DOORS.

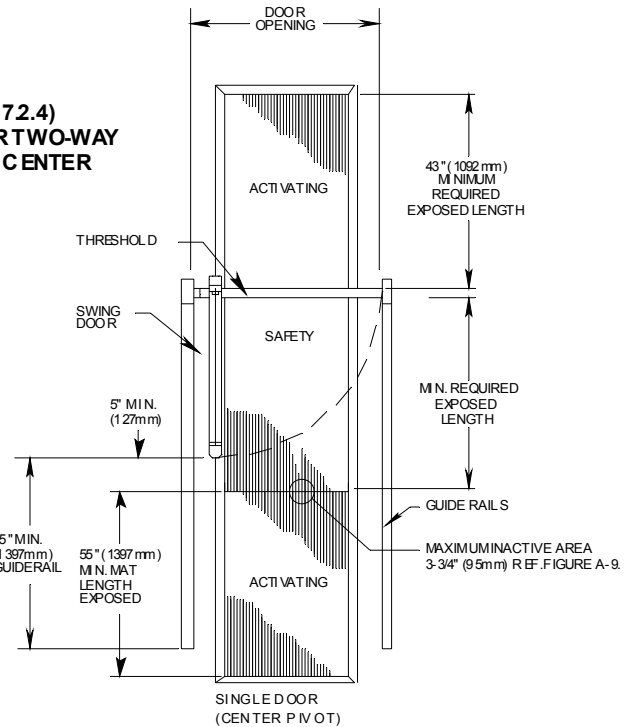


APPENDIX A (Continued)

**FIGURE A-3 (Ref. 7.2.1, 7.2.2 & 7.2.4)
CONTROL MAT LAYOUTS FOR ONE-WAY TRAFFIC CENTERPIVOTED SWING DOORS.**



**FIGURE A-4 (Ref. 6.1.1, 7.2.3 & 7.2.4)
CONTROL MAT LAYOUTS FOR TWO-WAY TRAFFIC (INGRESS/EGRESS) CENTER PIVOTED SWING DOORS.**



APPENDIX A (Continued)

FIGURE A-5 (Ref. 7.3.1 and 7.3.2)
CONTROL MAT LAYOUTS FOR
SINGLE SLIDE DOORS.

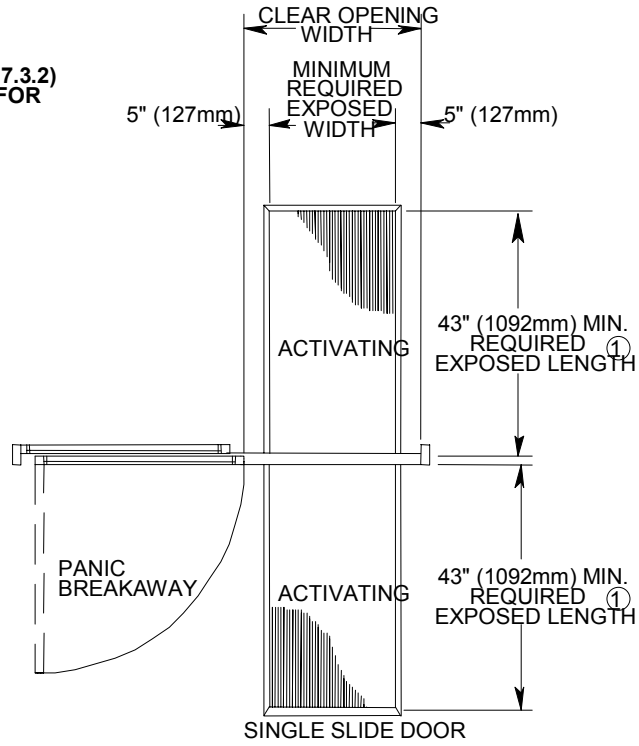
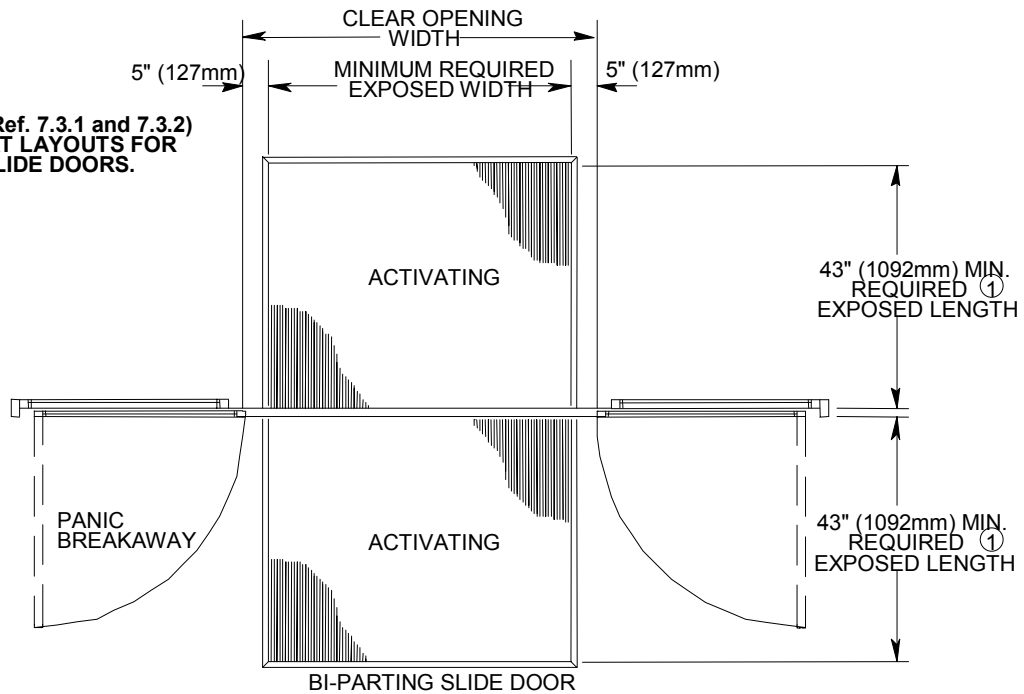


FIGURE A-6 (Ref. 7.3.1 and 7.3.2)
CONTROL MAT LAYOUTS FOR
BIPARTING SLIDE DOORS.



① SEE 7.3.3 FOR ONE-WAY TRAFFIC
EXPOSED LENGTH IS 24" MINIMUM

APPENDIX A (Continued)

CONTROL MATS CROSS SECTIONS.

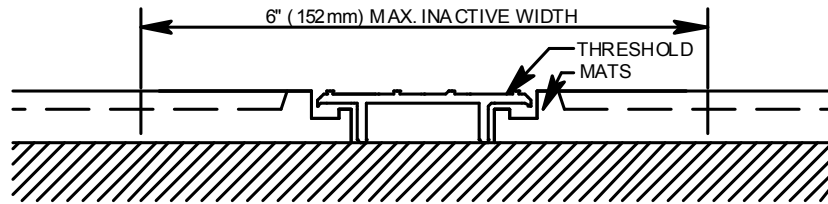


FIGURE A-7
(Ref. 7.5.3)

CROSS SECTION at THRESHOLD

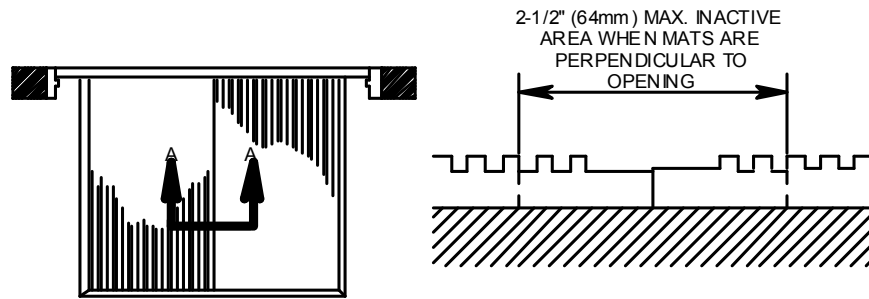


FIGURE A-8
(Ref. 7.5.1)

PLAN VIEW- PERPENDICULAR MATS

CROSS SECTION A-A at JOINT

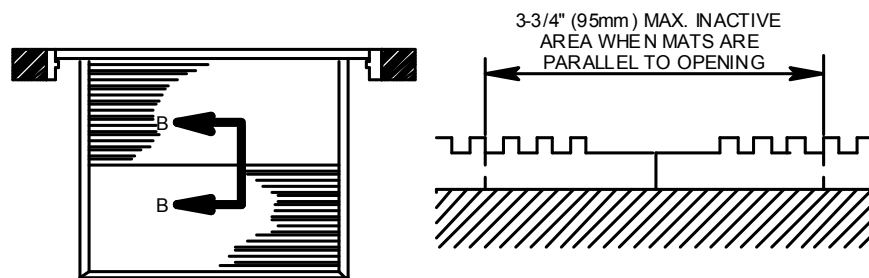


FIGURE A-9
(Ref. 7.5.2)

PLAN VIEW- PARALLEL MATS

CROSS SECTION B-B at JOINT

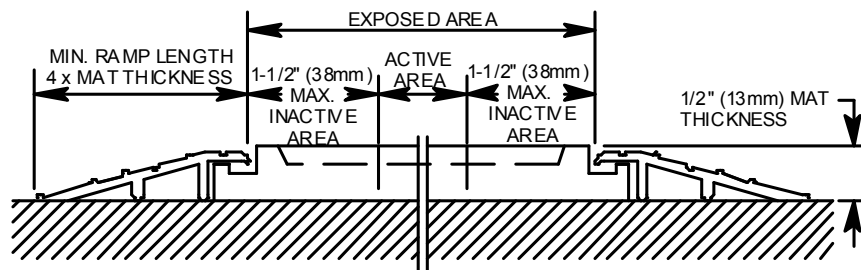


FIGURE A-10
(Ref. 7.1, 7.5.4, and 7.6.4)

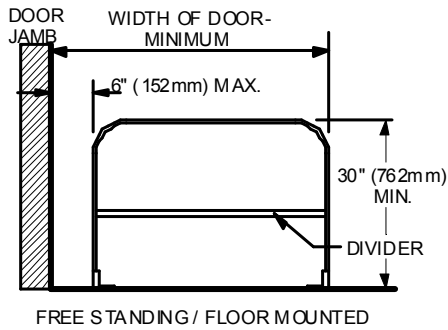
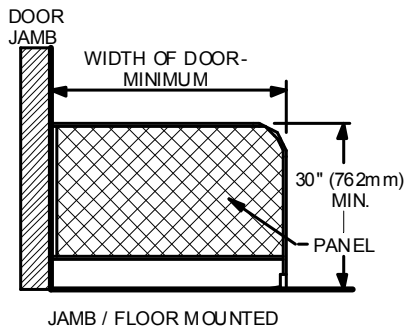
CROSS SECTION at SURFACE MAT TRIM

APPENDIX A (Continued)

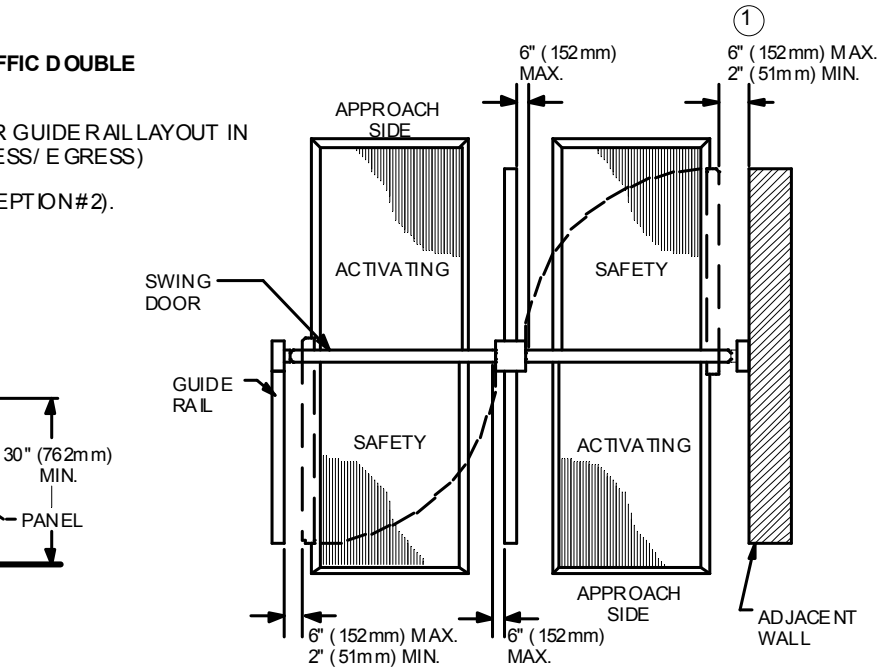
FIGURE A-11 (Ref. 6.1)
GUIDE RAIL LAYOUTS FOR SWINGING DOORS

PLAN VIEW-ONE-WAY TRAFFIC DOUBLE SWING DOORS.

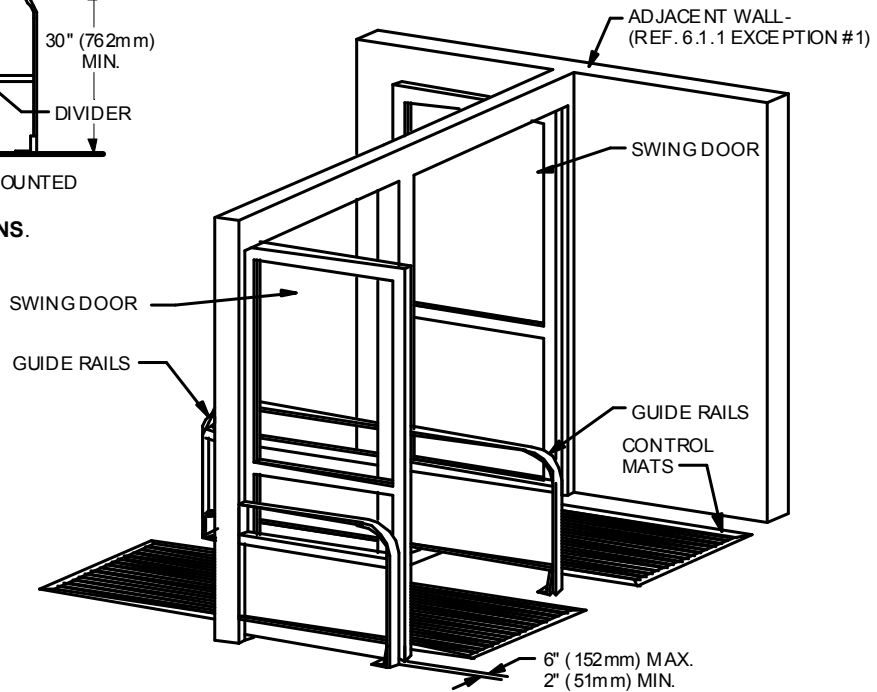
REFER TO FIGURE A-2 FOR GUIDE RAIL LAYOUT IN TWO-WAY TRAFFIC (INGRESS/ EGRESS) APPLICATION (REF. A-12A and 6.1.1, E XCEPT ION#2).



GUIDERAIL ELEVATIONS.



① SWING DOOR IN HALL WAY UTILIZING KNOWING ACT ACTIVATING DEVICE MAX. 10" WITHOUT ADDING A GUIDE RAIL



APPENDIX A (Continued)

FIGURE A-12A (Ref. 8.1 & 8.2)
ACTIVATING AND SAFETY DETECTION ZONES - SWING DOORS.

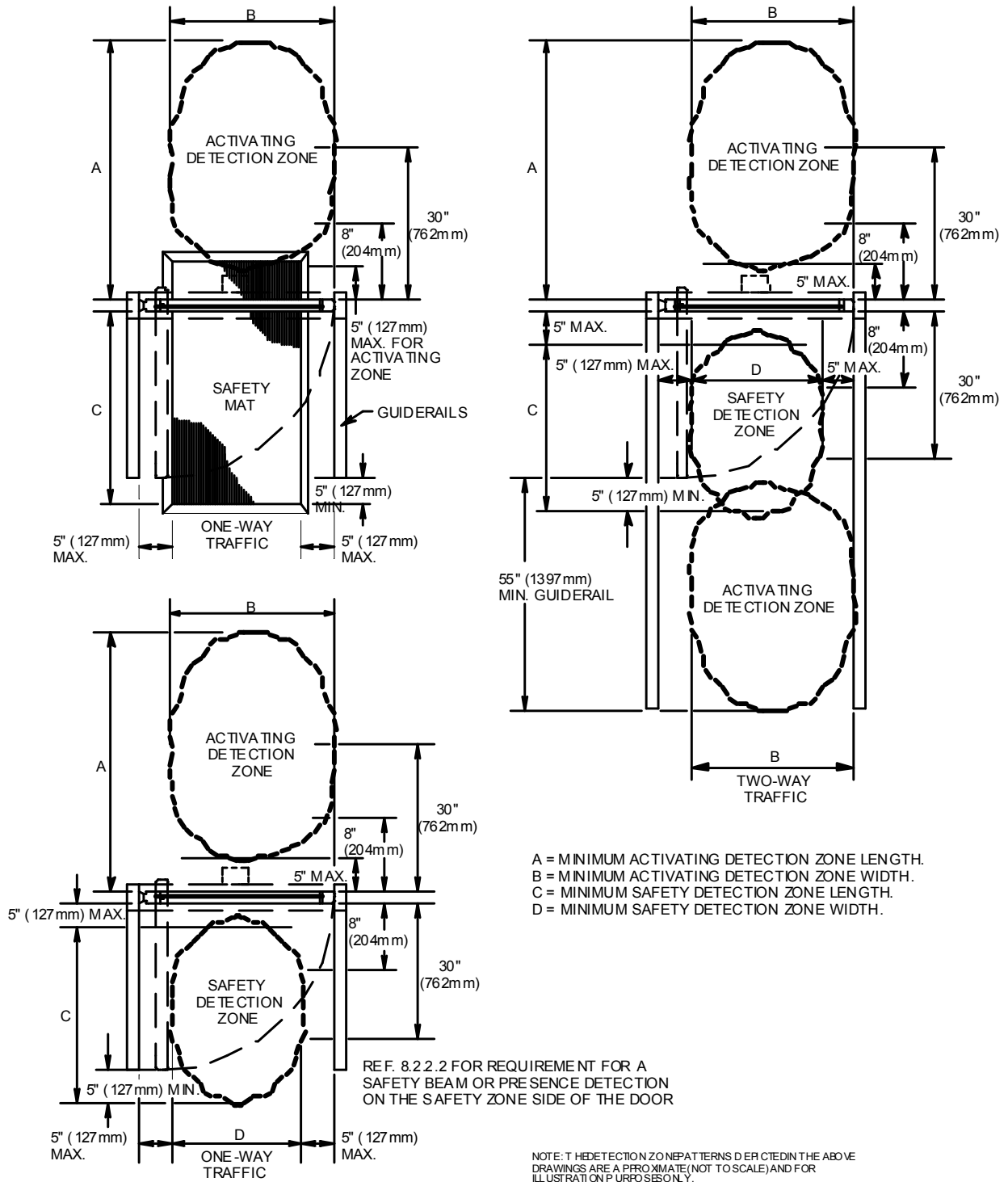
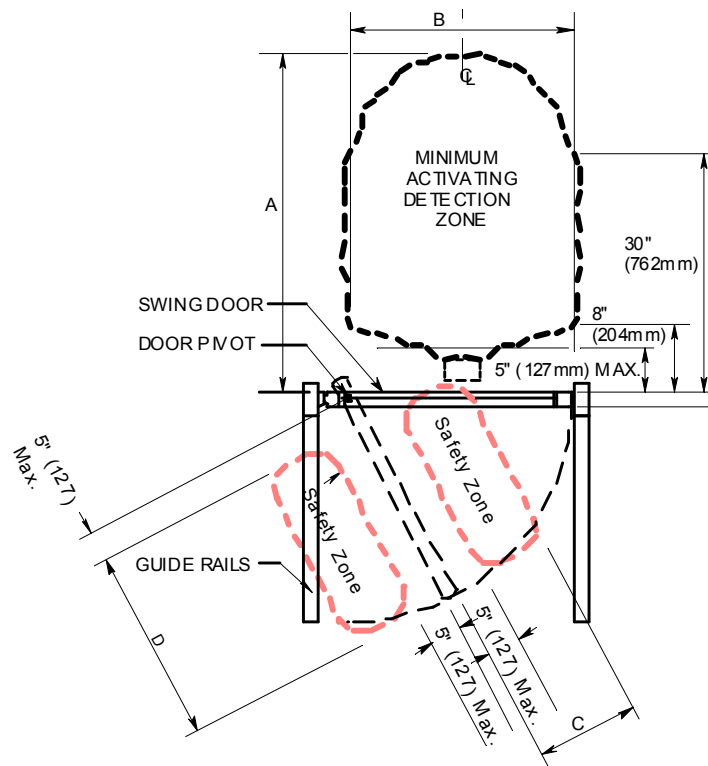


FIGURE A-12B (Ref. 8.2.2.3)
 ACTIVATING AND SAFETY DETECTION ZONES - SWING DOORS WITH DOOR MOUNTED SENSORS.



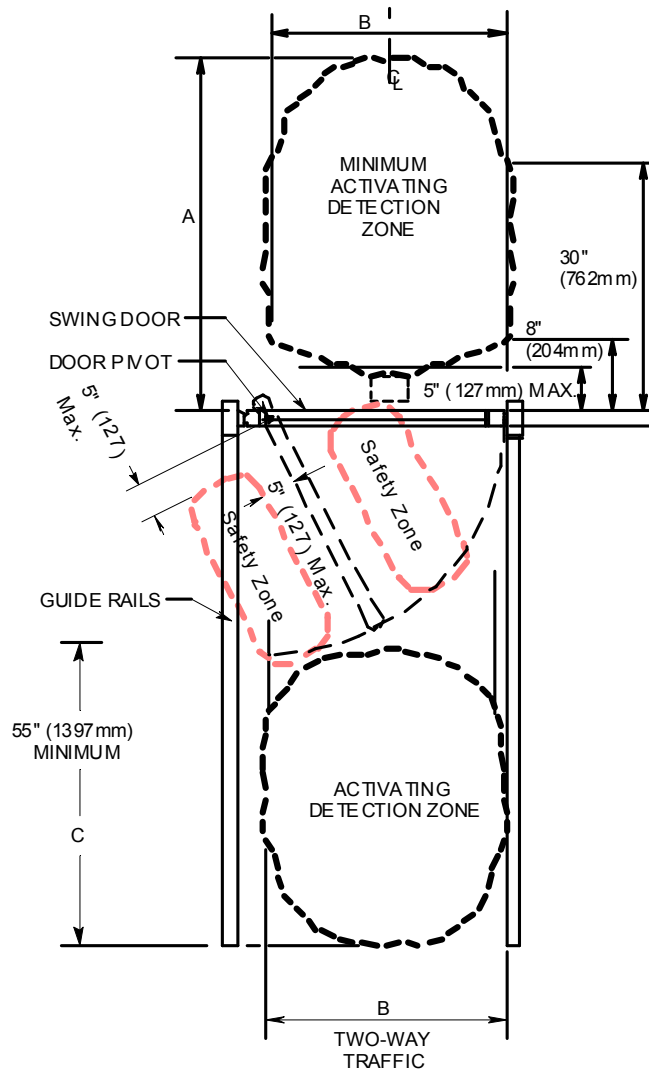
- A = MINIMUM ACTIVATING DETECTION ZONE LENGTH.
- B = MINIMUM ACTIVATING DETECTION ZONE WIDTH.
- C = SAFETY DETECTION ZONE DEPTH BASED ON PERFORMANCE.
- D = MINIMUM SAFETY DETECTION ZONE WIDTH.

NOTE: DETECTION ZONES DERIVED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

NOTE: DETECTION ZONES DERIVED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

APPENDIX A (Continued)

FIGURE A-12C (Ref. 8.23)
 ACTIVATING AND SAFETY DETECTION ZONES - SWING DOORS WITH DOOR MOUNTED SENSORS
 TWO-WAY TRAFFIC.



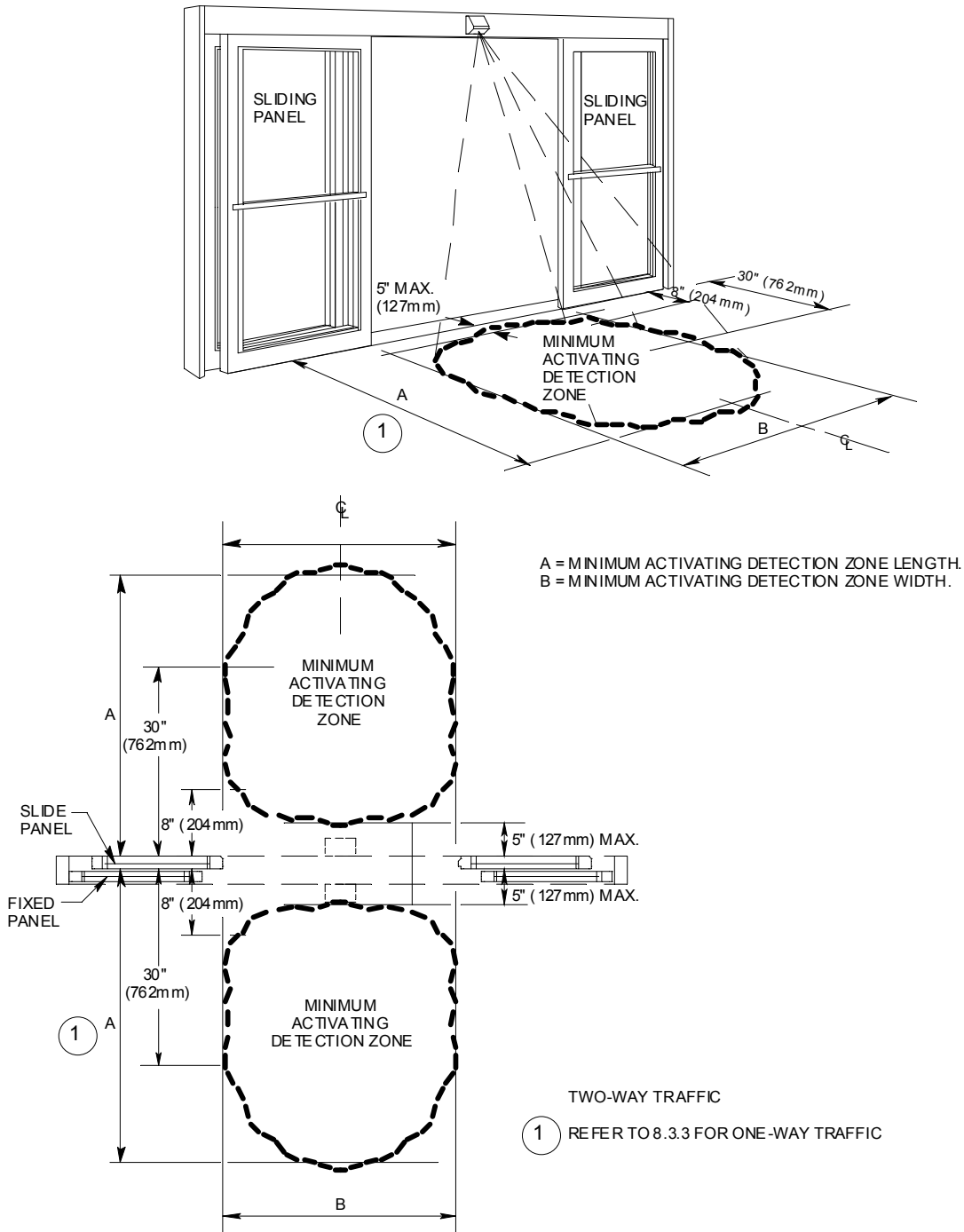
A = MINIMUM ACTIVATING DETECTION ZONE LENGTH.
 B = MINIMUM ACTIVATING DETECTION ZONE WIDTH.
 C = 55" MINIMUM ACTIVATING DETECTION ZONE & GUIDE RAIL LENGTH.

SEE FIGURE A-12B FOR SAFETY ZONE DIMENSIONS.

NOTE: DETECTION ZONES DERIVED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

APPENDIX A (Continued)

FIGURE A-13 (Ref. 8.2)
ACTIVATING DETECTION ZONES - SLIDE DOORS.



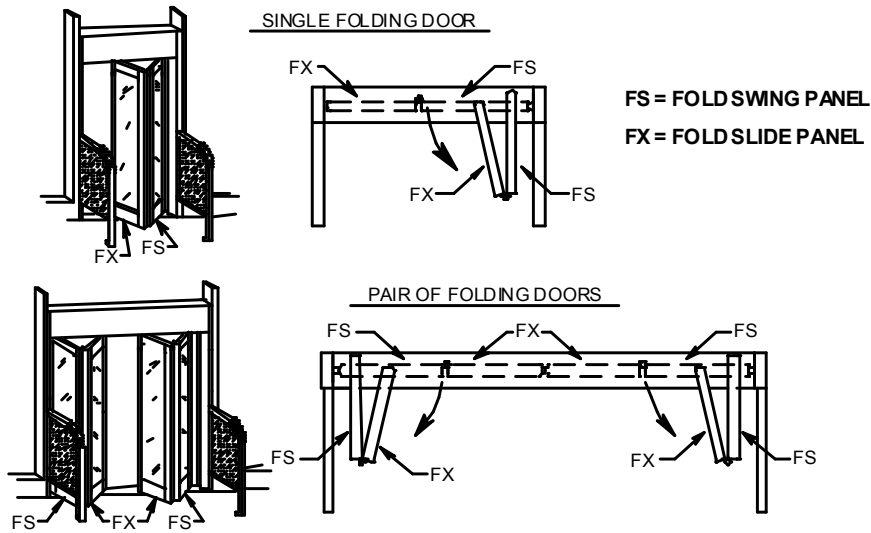
NOTE: DETECTION ZONES DEPICTED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

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APPENDIX A (Continued)

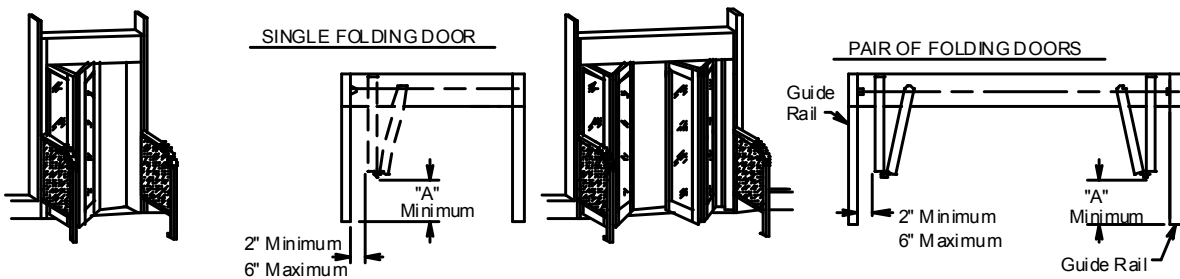
FOLDING DOORS PANEL LAYOUT

Figure A-14
(Ref. 5.0)

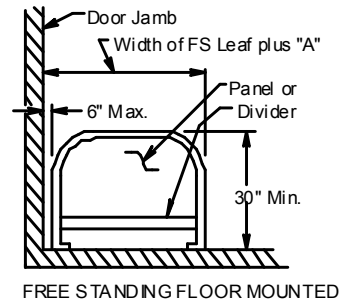
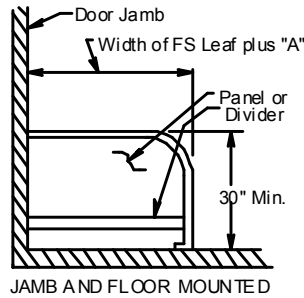


GUIDE RAIL LAYOUTS FOR FOLDING DOORS

Figure A-15
(Ref. 6.2)



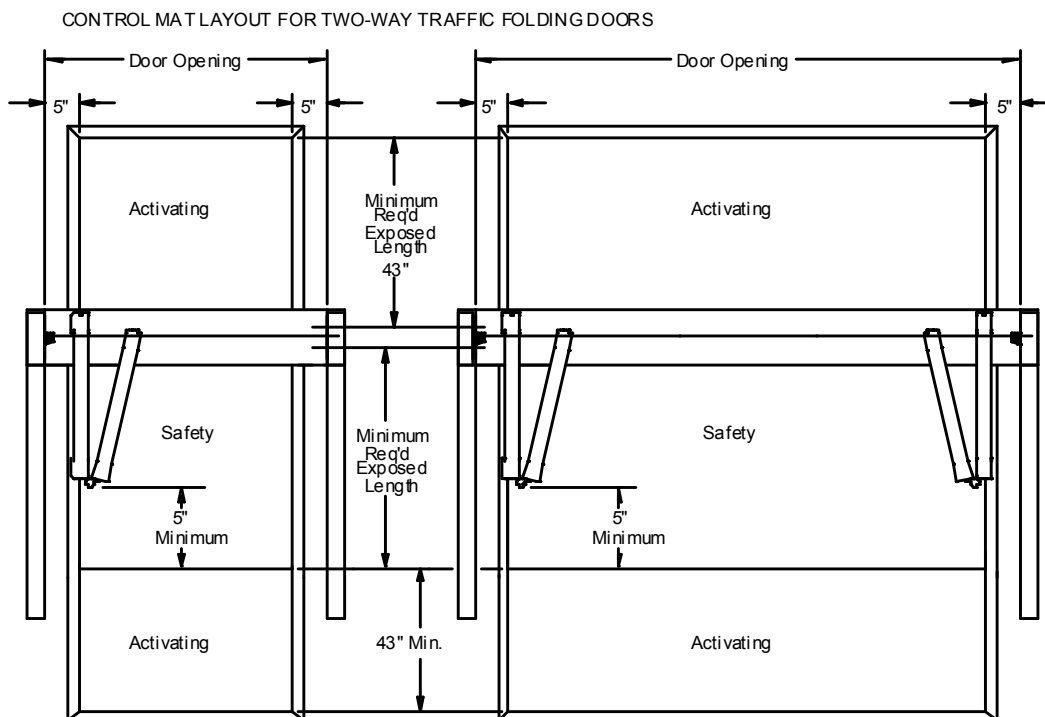
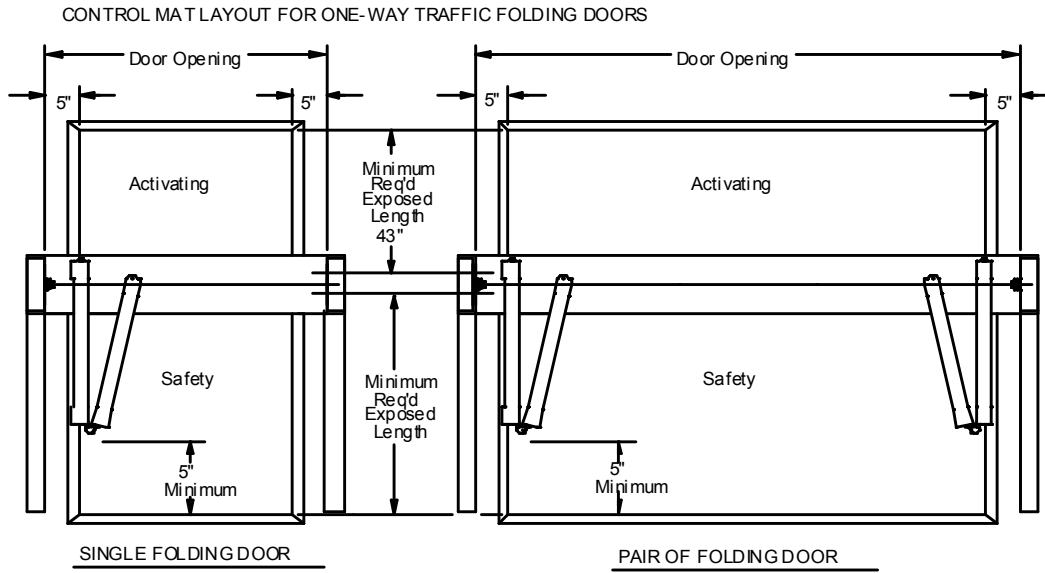
"A" = 12 inches, (305mm), for Two Way Traffic or One Way Traffic approaching from the Fold Side.
or
5 inches, (130mm), for One Way Traffic approaching from the Non-Fold Side.



11-1-04

CONTROL MAT LAYOUTS FOR FOLDING DOORS

Figure A-16
(Ref. 7.4 through 7.4.4.)

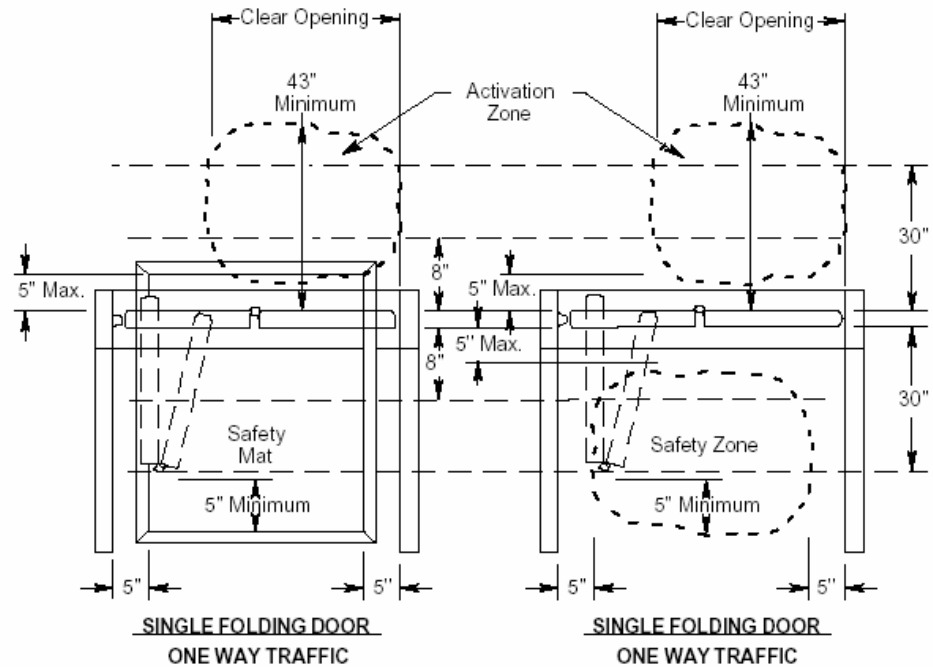


DETECTION PATTERN LAYOUTS FOR FOLDING DOORS

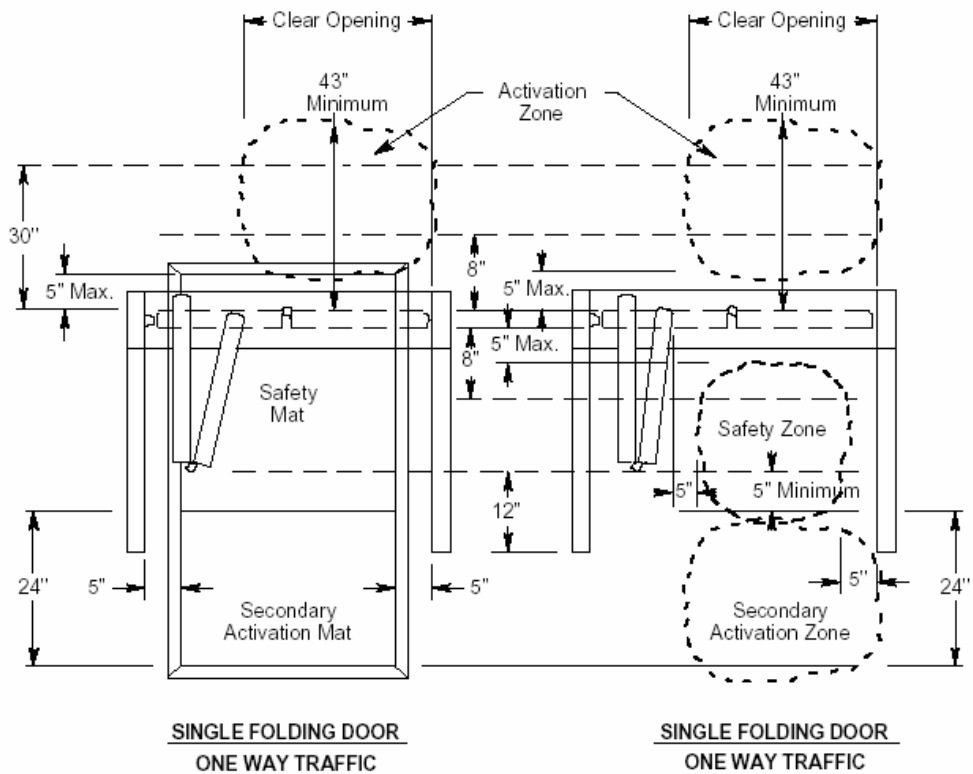
Figure A-17A

(Ref. 8.4)

ONE WAY TRAFFIC WITH APPROACH FROM NON-FOLD SIDE



WITH DOORS CLOSED



WITH DOORS OPEN

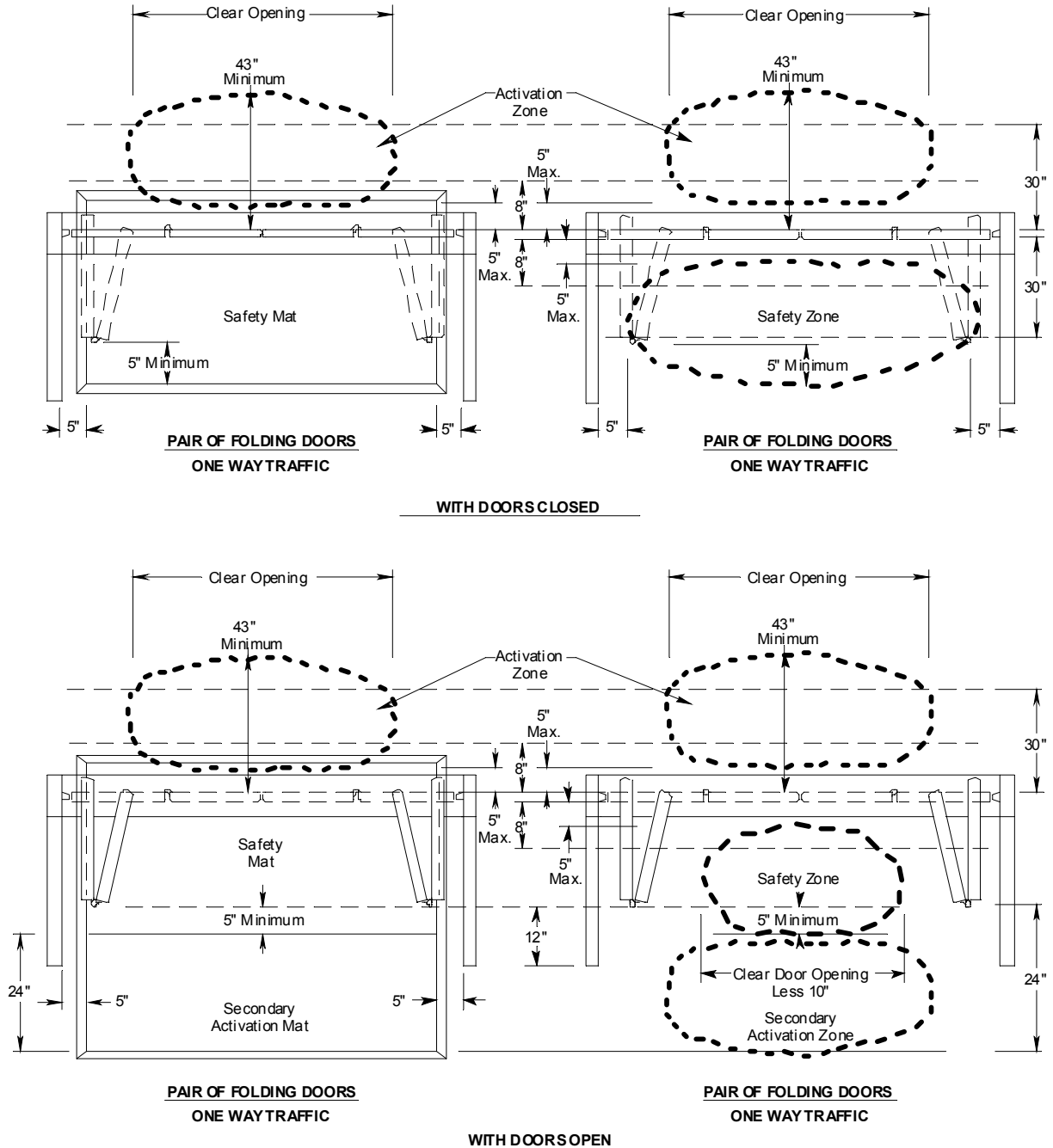
NOTE: DETECTION ZONES DEPICTED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

APPENDIX A (Continued)

DETECTION PATTERN LAYOUTS FOR FOLDING DOORS

Figure A-17B

(Ref. 8.4)



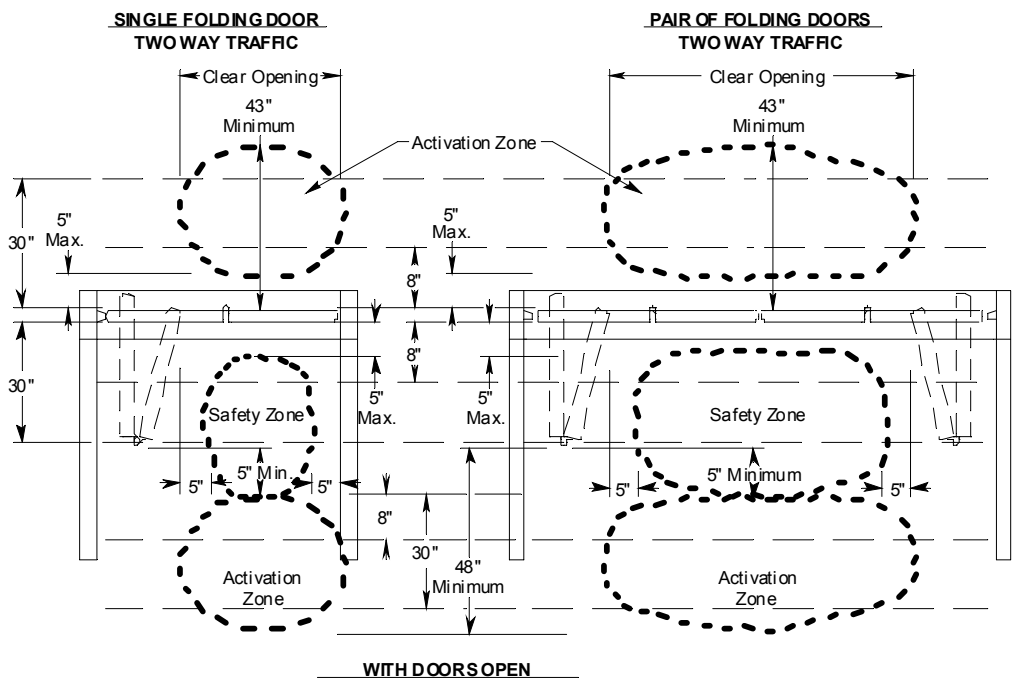
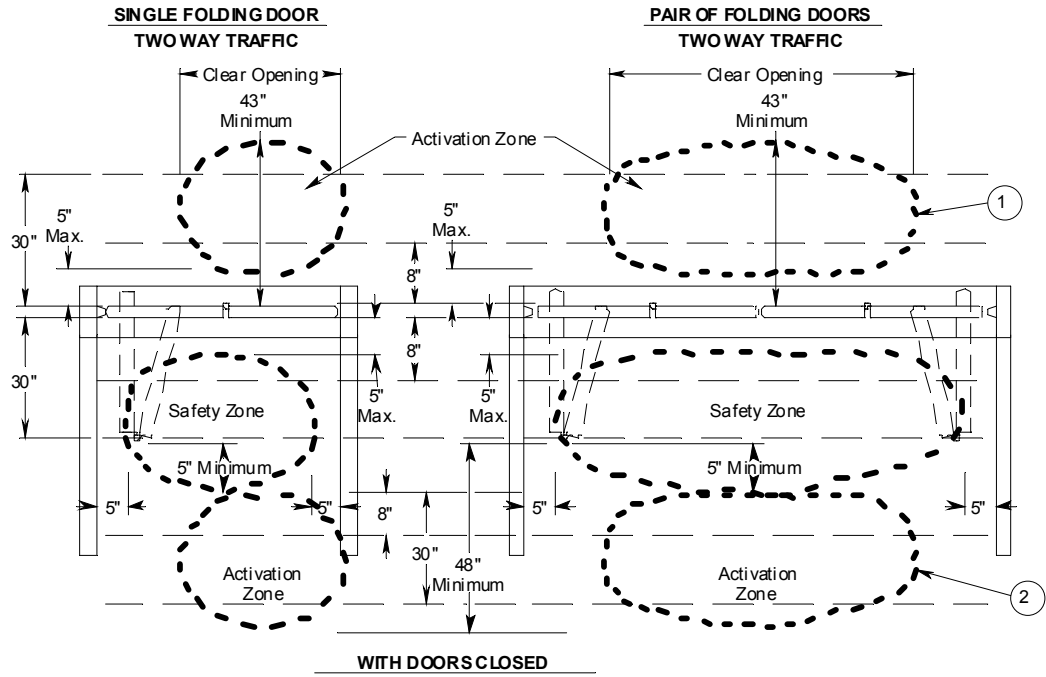
NOTE: DETECTION ZONES DERIVED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

12-6-04

APPENDIX A (Continued)

DETECTION PATTERN LAYOUTS FOR FOLDING DOORS

Figure A-17C (Ref. 8.4)



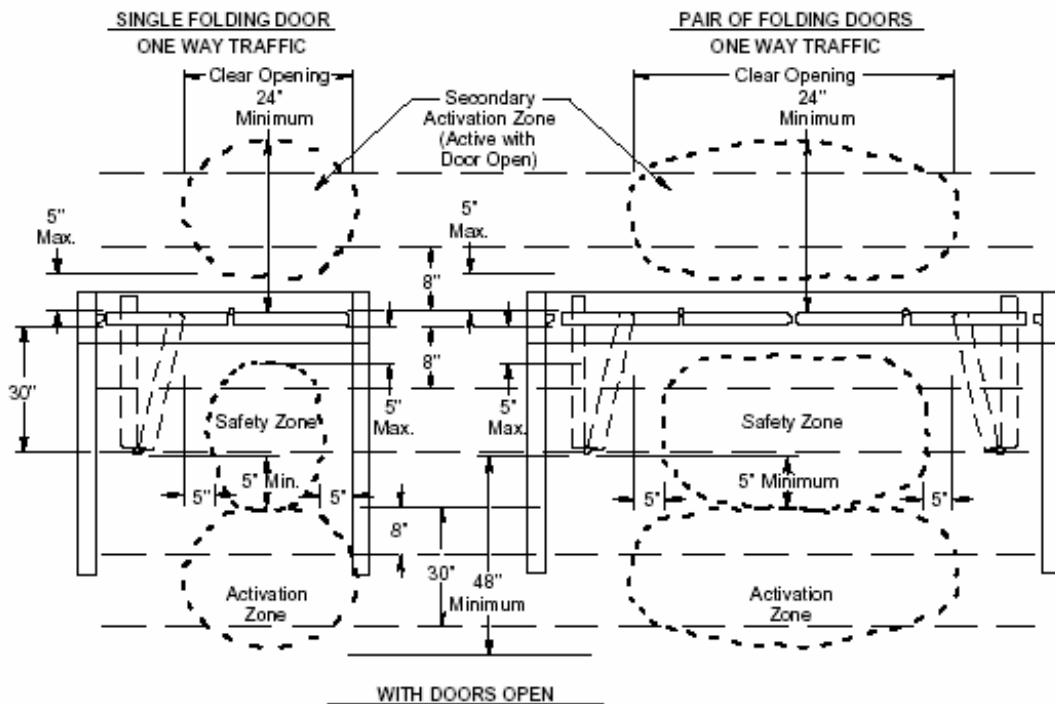
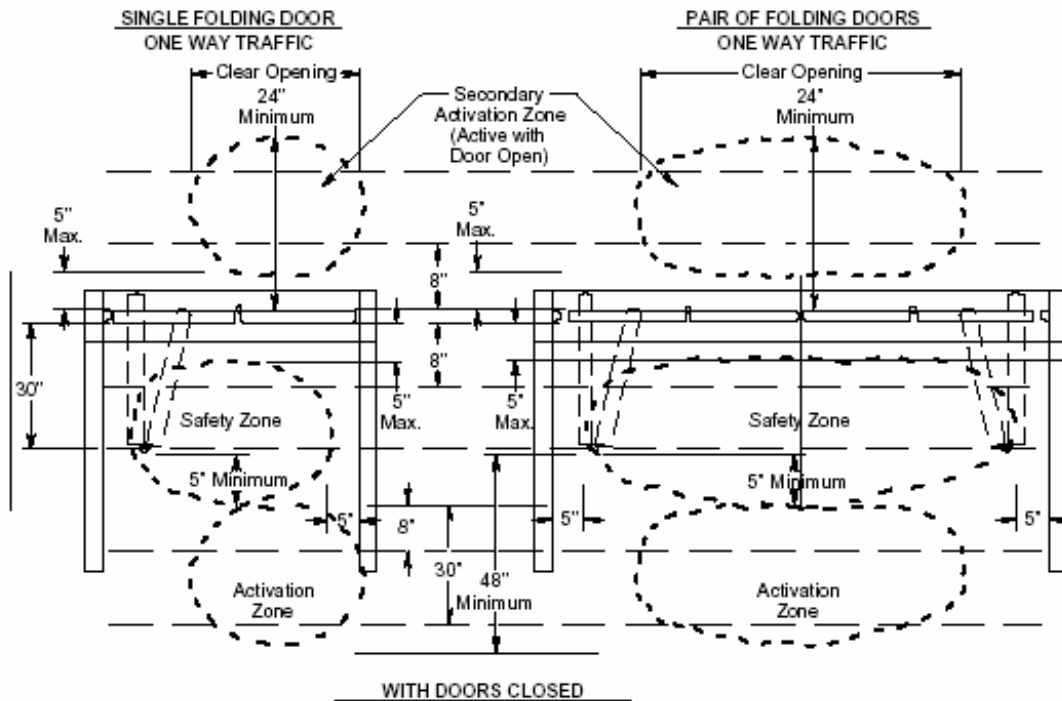
IF ONE-WAY TRAFFIC
 1. NON FOLD SIDE REDUCE TO 24" MINIMUM
 2. FOLD SIDE REDUCE TO 24" MINIMUM

NOTE: DETECTION ZONES DERIVED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

DETECTION PATTERN LAYOUTS FOR FOLDING DOORS

Figure A-17D (Ref. 8.4)

ONE WAY TRAFFIC WITH APPROACH FROM FOLD SIDE

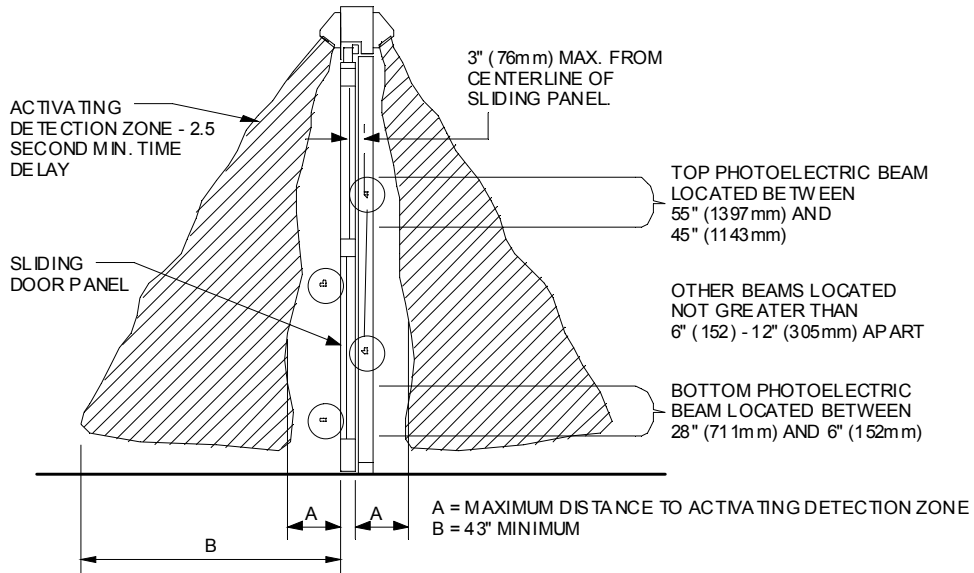


NOTE: DETECTION ZONES DEPICTED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

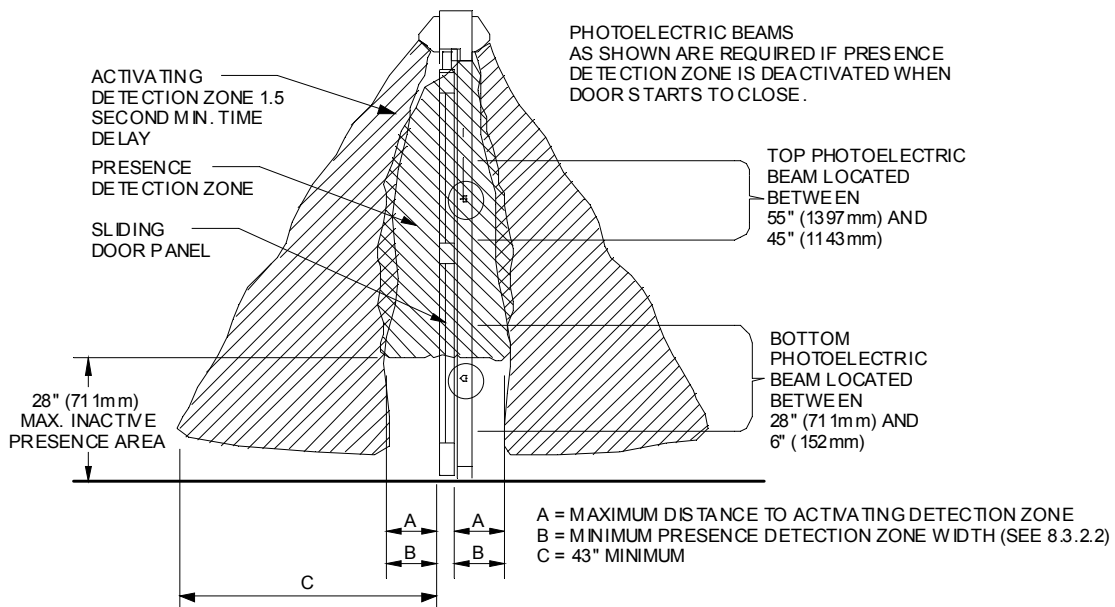
12-6-04

APPENDIX A (Continued)

A-18A (Ref. 8.3.2.1) VERTICAL SECTION - SLIDE DOOR SHOWING ACTIVATING DETECTION AND PHOTOELECTRIC BEAM ZONES (4 minimum).



A-18B (Ref. 8.3.2.2) VERTICAL SECTION - SLIDE DOOR SHOWING ACTIVATING AND PRESENCE DETECTION ZONE THROUGH DOOR OPENING.

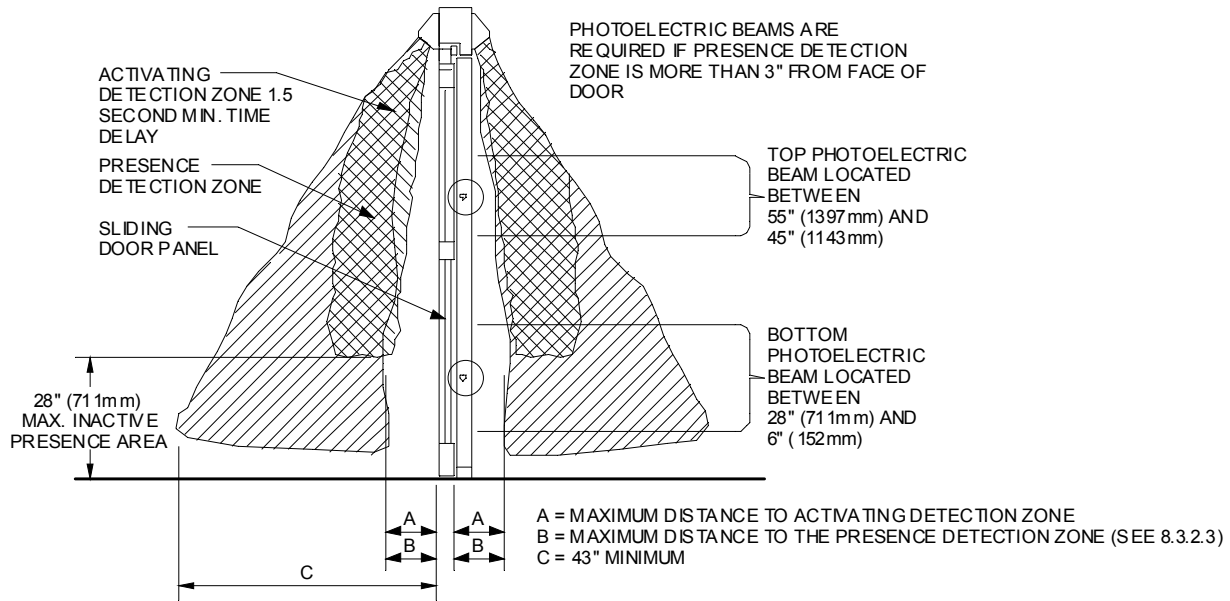


NOTE: DETECTION ZONES DEPICTED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

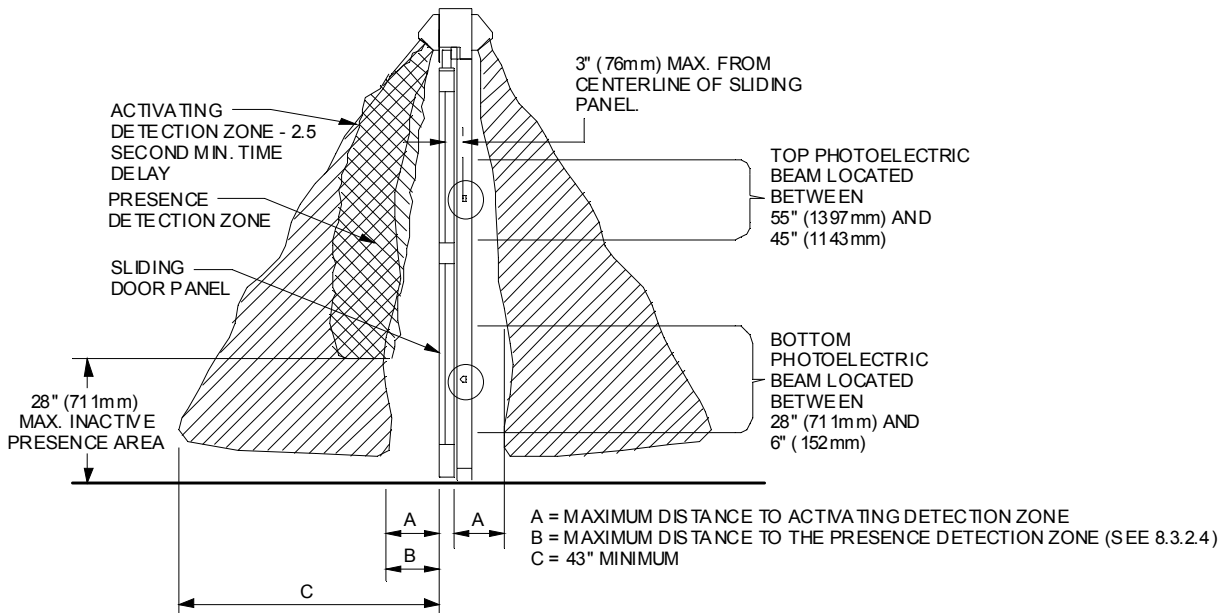
12-6-04

APPENDIX A (Continued)

A-18C (Ref. 8.32.3) VERTICAL SECTION - SLIDE DOOR SHOWING ACTIVATING AND PRESENCE DETECTION ZONE ON EACH SIDE OF DOOR.



A-18D (Ref. 8.32.4) VERTICAL SECTION - SLIDE DOOR SHOWING ACTIVATING DETECTION AND PHOTOELECTRIC BEAM ONE SIDE AND PRESENCE DETECTION ZONE ON OTHER SIDE OF DOOR.



NOTE: DETECTION ZONES DEPICTED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

12-6-04

APPENDIX A (Continued)

FIGURE A-19A (Ref. 9.2)
 'Knowing Act' - Double Egress (Using Header Mounted Sensors)

Push Plate Switch Activation:
 After push plate is pressed & released door to remain open a minimum of five seconds.
 Switch to be installed within view of door at a maximum distance of 144" (3658mm) from the center of door and mounted a minimum of 36" (914mm) and maximum 48" (1219mm) from the finished floor.

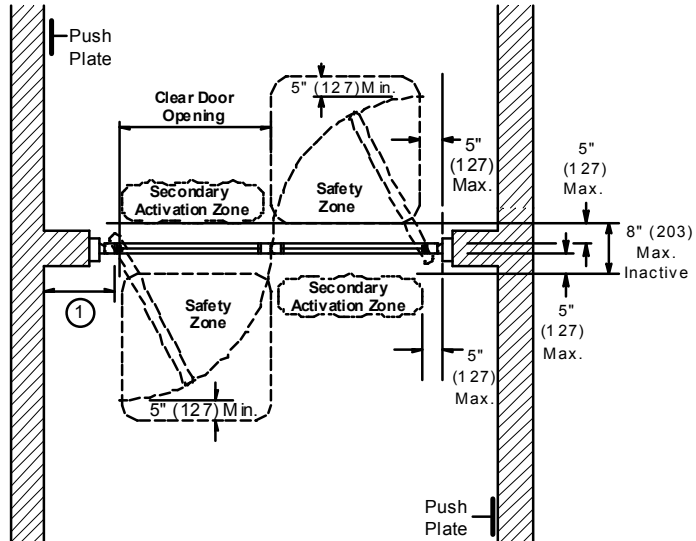
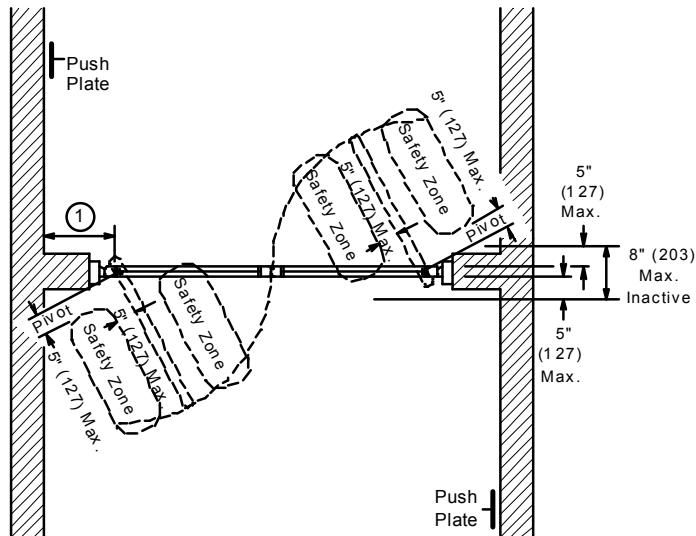


FIGURE A-19B (Ref. 9.2)
 'Knowing Act' - Double Egress (Using Door Mounted Safety Sensors)

① SWING DOOR IN HALLWAY UTILIZING KNOWING ACT ACTIVATING DEVICE MAX. 10' WITHOUT ADDING A GUIDE RAIL



See A12B for more details

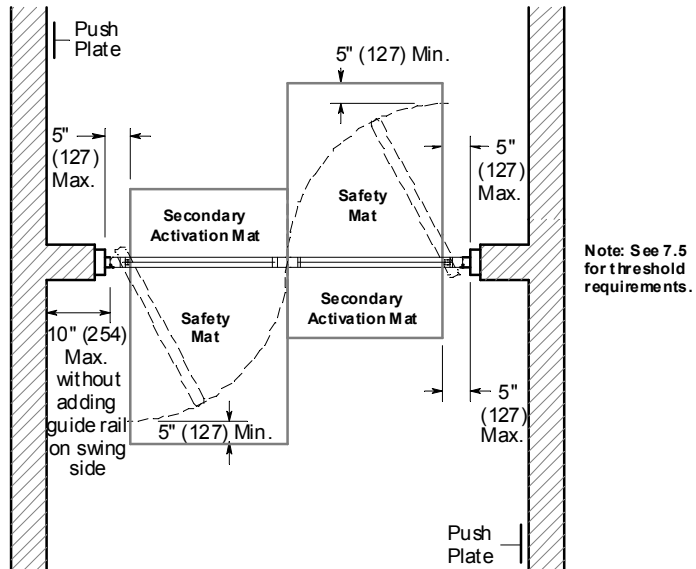
4-27-05

NOTE: DETECTION ZONES DEPICTED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

Appendix A (Continued)

FIGURE A-19C (Ref. 9.2)
'Knowing Act' - Double Egress (Using Control Mats)

Push Plate Switch Activation:
After push plate is pressed & released door to remain open a minimum of five seconds. Switch to be installed within view of door at a maximum distance of 144" (3658mm) from the center of door and mounted a minimum of 36" (914mm) and maximum 48" (1219mm) from the finished floor.



SEE DETAIL A7 FOR THRESHOLD DETAIL

APPENDIX B (NOT A PART OF ANSI/BHMA A156.10)

APPENDIX B

FIGURE B-1 (Ref. 11.)
SIGNAGE FOR AUTOMATIC SLIDE DOORS.

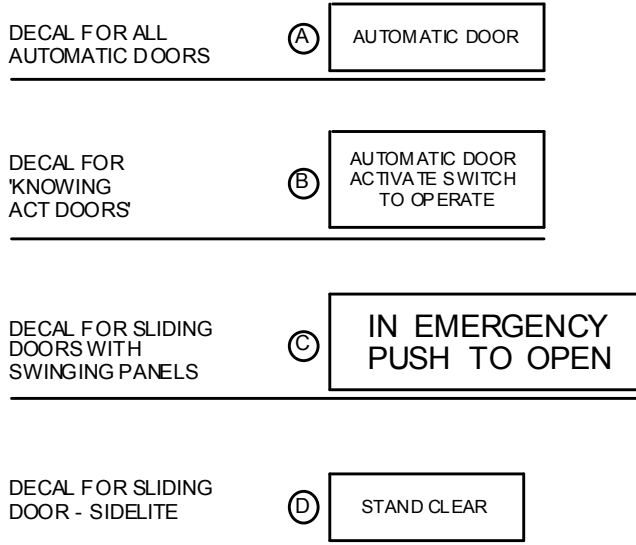
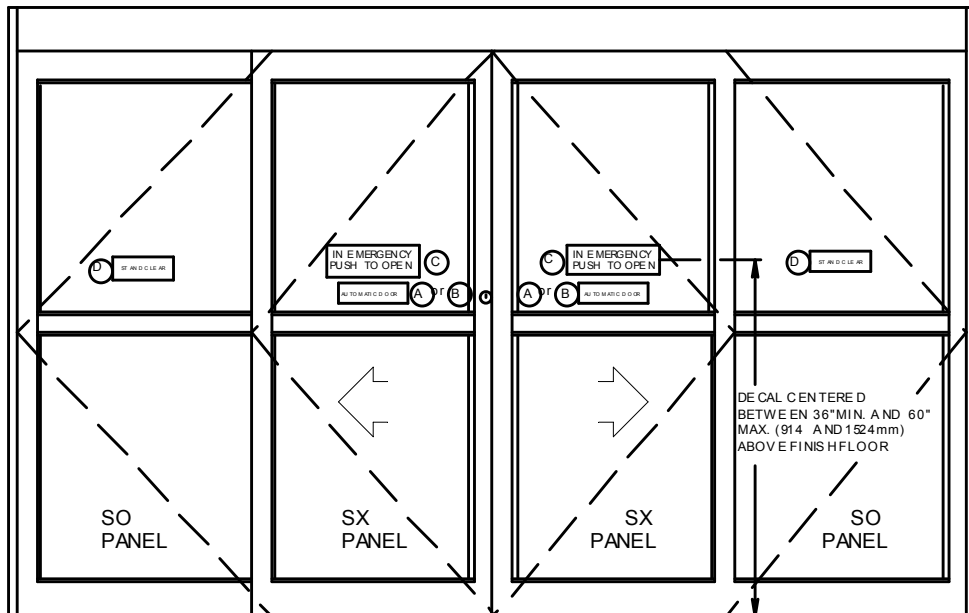


FIGURE B-2 (Ref. 11.)
INTERIOR VIEW - AUTOMATIC SLIDE DOOR WITH APPROPRIATE SIGNAGE FOR TWO-WAY TRAFFIC CONTROL.



NOTE: THE DRAWINGS DEPICTED ABOVE ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

11-1-04

APPENDIX B

FIGURE B-3 (Ref. 11.)
SIGNAGE FOR AUTOMATIC SWING DOORS.

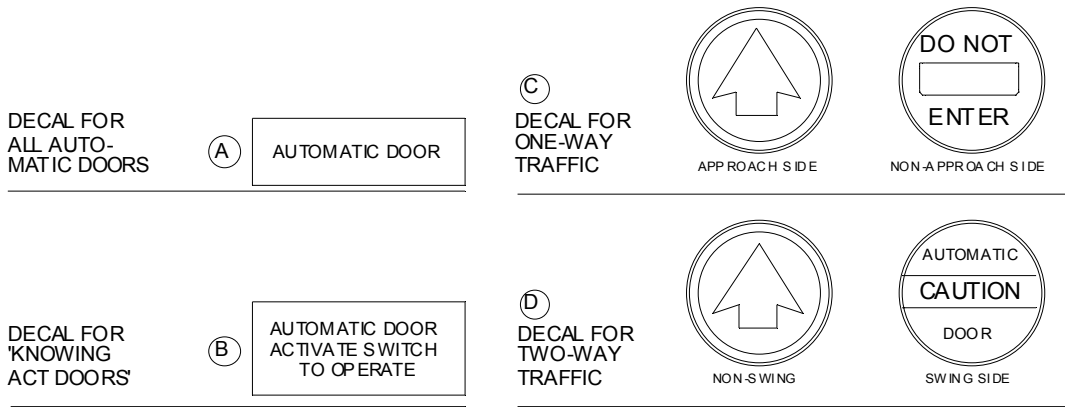
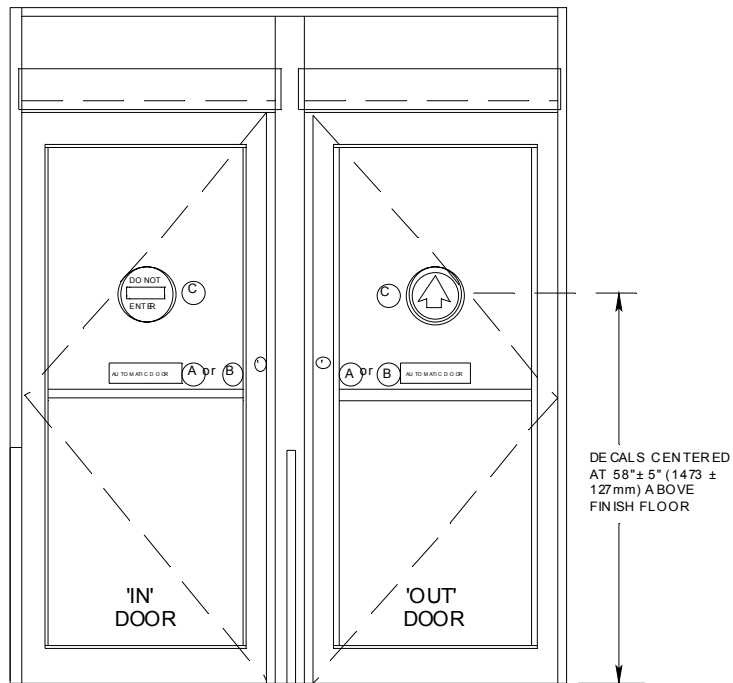


FIGURE B-4 (Ref. 11.)
INTERIOR VIEW - AUTOMATIC SWING DOORS WITH APPROPRIATE SIGNAGE FOR ONE-WAY TRAFFIC CONTROL.



NOTE: THE DRAWINGS DEPICTED ABOVE ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

11-1-04

APPENDIX B

FIGURE B-5 (Ref. 11.)
SIGNAGE FOR AUTOMATIC FOLDING DOORS.

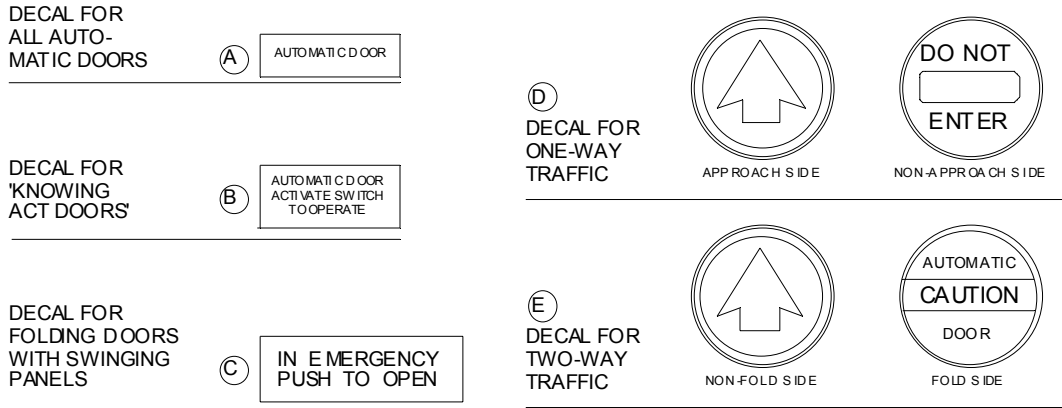
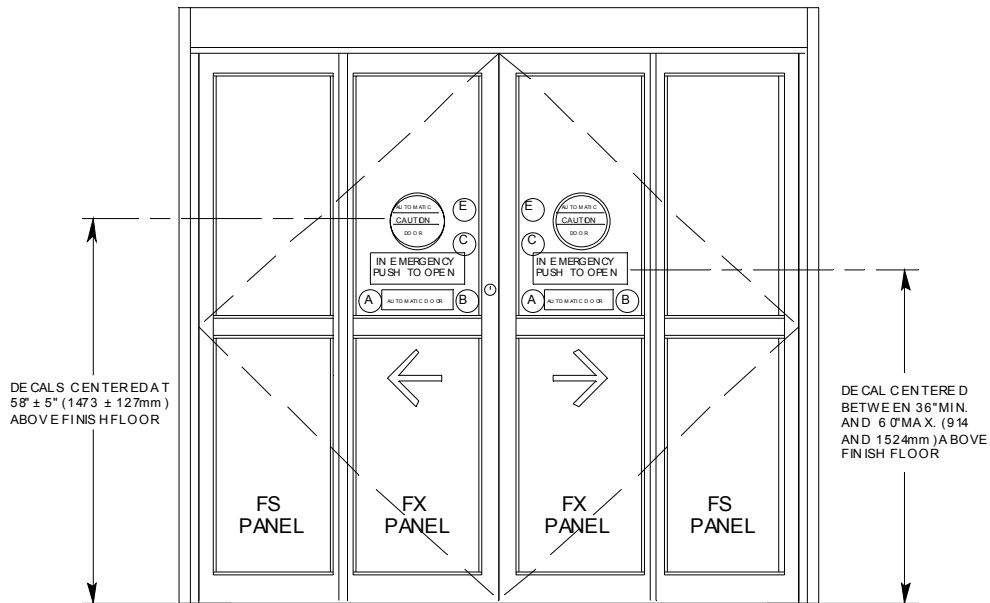


FIGURE B-6 (Ref. 11.)
INTERIOR VIEW (FOLD SIDE) - TYPICAL FOLDING DOOR WITH APPROPRIATE SIGNAGE FOR TWO-WAY TRAFFIC.



NOTE: THE DRAWINGS DEPICTED ABOVE ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

APPENDIX C (NOT A PART OF ANSI/BHMA A156.10)

DEFINITIONS OF TERMS AS USED IN THE POWER OPERATED DOOR INDUSTRY.

Air Lock Air space between doors such as in a vestibule where only one door or set of doors can be opened at one time.

Approach Beam Photo-electric control beam used to activate an automatic door.

Automatic Entrance Package Complete entrance way containing door(s), frame, controls, and automatic operator.

Bi-Parting Sliding Doors A pair of door leaves sliding away from each other to form a single common door opening.

Bottom Arm (Hardware) The arm mechanism attached to the bottom rail of a door and connecting to the spindle of a floor closer, pivot or automatic door operator.

Break Out Opening The clear space in a doorway when a swinging or sliding door is operated in the emergency mode. This opening is not necessarily the same as the clear opening in the doorway when the door is operated in the normal mode.

Break Out Side The side of the opening to which the door swings when broken out.

Concealed Mounting Automatic door operators which are mounted above or below the door and power the door through an inconspicuous pivot or arm.

Cover Plate In reference to door hardware, a finish plate used to cover the exposed face of a floor closer not covered by the threshold; also a plate used to cover the exposed face of a closer or automatic door operator mounted in the head of the door frame.

Door Arm A device which is usually located in the top or bottom rail of a swinging automatic door. The function of this device is to provide suitable connection of the automatic door operator to the door. It is concealed, semi-concealed or surface applied.

Door Light The glass area in a glazed door.

Door Size (Actual) For swinging or sliding doors, the actual width and height of the door leaf itself.

Flush Glazing A method of setting glass whereby glazing beads are recessed and flushed with the edge of the frame.

Guard Bar A protective bar applied to the lower portion of a door or sidelight to prevent collision with the glass.

Harness. A combination of wires and connectors providing connection of electrical controls to operating equipment.

"In" Door An automatic door installation designed for traffic into a building, space, etc.

In-Header Operator A door operator completely contained in the door header requiring only electric, pneumatic or hydraulic power.

Left Hand Traffic The traffic routing when the entrance door is placed to the left of adjacent exit doors as viewed from the outside.

Lintel A horizontal structural member spanning an opening at its head to carry construction above the opening.

Masonry Opening The wall opening into which the door is installed.

Meeting Stile The vertical edge of a door or window, in a pair, which is adjacent to the other door or window. A parallel meeting stile is one which has a beveled edge paralleling the edge of the door. A round meeting stile is one having a rounded edge.

Neolite Material is available from Biltrite Corp., P.O. Box 9045, Waltham, MA 02254.

Opening Cycle Movement of a swinging or sliding door from closed position to fully open. For swinging doors, this is normally 90 degrees.

"Out" Door An automatic door installation designed for traffic out of a building or space.

Photoelectric Control A device which employs the use of a visible or invisible light beam across or through an opening. When the beam is interrupted by a person or object, a signal is generated.

Power Closing The closing of a door by energy supplied from hydraulics, pneumatics or electricity.

Power Open The opening of a door by energy supplied by other than manual means.

Power Unit A remote mechanical device used to convert energy (usually electrical) to pneumatic, hydraulic, or mechanical energy for transmission to the actuator.

Pressure Relief A safety device to guard against excessive pressure buildup. Usually with reference to pneumatic or hydraulic systems.

Prismatic Prismatic doors are used to identify bi-parting sliding doors that meet at an inside angle of less than 180 degrees.

Pull Cord Switch A switch located above the doorway having a cord with handle extending down to approximately 6 feet above the floor. When the cord is pulled, a switch is closed and a signal generated which can be used to activate an automatic door operator.

Recessed Frame (Setting Frame) A frame set into the floor during construction which secures mats into a frame provide flush condition between floor and mat surface.

Recycle A mode of operation of an automatic door operator that occurs when the door is in the closing portion of its travel and is actuated causing the door to immediately reverse and go to the open position.

Right Hand Traffic The traffic routing when the entrance door is placed to the right of adjacent exit doors as viewed from the outside.

Self-contained Operator An automatic operator in which the actuator and the power unit are made as a single unit.

Sequential or Latching Operation Operation of push switch to actuate and push switch to de-actuate.

Setting Blocks Small pieces of neoprene, lead or other material which are placed under the lower edge of a sheet of glass to support it within a frame.

Single Slide Automatic Door An automatic door which has one sliding leaf, either left hand or right hand.

Sliding Left Hand Automatic Door Automatic sliding doors are said to be left hand when the door is viewed from the break out side of the opening and it travels to the left side of the viewer to open.

Sliding Right Hand Automatic Door Automatic sliding doors are said to be right hand when the door is viewed from the break out side of the opening and it travels to the right side of the viewer to open.

Spring Closing The closing of a door by energy supplied by springs.

Strike An opening or retaining device provided in a frame, threshold or in the edge of a stile of an inactive door to receive a lock or latch bolt. (Also referred to as a Keeper or Strike Plate).

Synchronized Operators Operators connected together either mechanically or electrically for simultaneous operation. (Synonyms - coactive, simultaneous.)

Trim, Recessed Mat Material installed around the perimeter of a control mat securing it recessed into the floor.

Unknowing Act Activating a door operator, such as pressing a switch, without specific knowledge of how it is done or what will happen.

Variable Time Delay A device which is adjusted to change the time a door remains open, after removal of the activation signal.

Visible Mounting Automatic door operators which are mounted above the door, protruding from the wall, and drive the door with a visible bracket and arm are said to be visibly mounted.

Definitions of other terms are found in the American National Standard for Nomenclature for Steel Doors and Steel Door Frames, ANSI A250.7, and in the other ANSI/BHMA A156 Series of Standards.

APPENDIX D (NOT A PART OF ANSI/BHMA A156.10)

D1. REFERENCE TO OTHER STANDARDS

D1.1 When power operated fire doors are used, they are subject to the requirements of the Standard for Fire Doors and Windows ANSI/NFPA 80.

D1.2 Glazing in doors are subject to criteria in the Standard, Performance Specifications and Methods of Test for Safety Glazing Material Used in Buildings, ANSI Z97.1 or CPSC requirements.

D1.3 Where required by the authority having jurisdiction, products meeting the requirements of this Standard shall also comply with applicable local building code requirements.

APPENDIX E (NOT A PART OF ANSI/BHMA A156.10)

E-1 CONFORMANCE CRITERIA

Certification that products offered meet the requirements of this Standard and conform to individual manufacturer's drawings, specifications, standards and quality assurance practices are available and in some circumstances are required. Buyer requirements determine the need for proof of conformance such as first article inspection, test laboratory reports, or listings. Specifiers requiring assertions of conformance utilize statements of conformance by individual manufacturers, or test reports acceptable to the buyer.

E-2 PRESERVATION, PACKAGING AND PACKING

Unless other arrangements between buyer and seller are made, preservation, packaging and packing shall be sufficient to protect containers and their contents under normal shipping and handling conditions from the source of supply to the destination point.

E-3 MARKING

Unless other arrangements between buyer and seller are made, marking shall be in accordance with the individual manufacturer's standard practice.

E-4 MAINTENANCE

Automatic pedestrian doors require periodic maintenance and inspection to ensure compliance with this standard. It is strongly recommended that all automatic pedestrian doors be inspected at the time of installation, and at a minimum annually thereafter, by an inspector certified by the American Association of Automatic Door Manufacturers (AAADM). It is also recommended that the doors be maintained on a regular basis by a qualified professional per the manufacturer's instructions. AAADM encourages compliance to current standards at the time of service.

E-5 RECOMMENDED PRACTICES AND OTHER INFORMATION

Sensors The intent of this standard is to provide reasonable safety to humans. To establish sensor compliance, human characteristics are required. Humans have instincts to protect themselves that cannot otherwise be duplicated.

Sensor mounting varies from one installation to another, and field tests should be conducted on each installation. AAADM has established a sensor walk test as part of its training of inspectors for certification to this standard. The method is to use humans to conduct the walk test.

It is recommended that the AAADM procedure be used to establish sensor compliance with this standard. If new methods are determined AAADM can adopt them at a shorter cycle than it would take to establish procedures through this standard.

Vestibule Depth Vestibule depth should be a minimum of 10 feet between doors to keep sensors or mats from overlapping and to give some degree of air lock.

Double Egress Swing Doors Added to the Standard in the 2005 edition. Their primary use is in hallways of office or hospital buildings where an automated door is needed. They are similar to Knowing Act Doors except due to location, use and type of user, a separate section was added to address preferred practices.

Two-Way Traffic Caution In general, it is not recommended to design traffic flow for two-way traffic through an automatic swing door. The better choice is an IN-OUT swing door, automatic sliding door, or folding door. However, where it is necessary due to space constraints, or to preserve an entrance for historical reasons, the standard provides the best practice.

Custom Installations The following comments are provided for guidance recognizing there will be certain installations that will require deviation from the Standard requirements. It is important to obtain guidance and approval from qualified experts. Slower speeds and lower forces should be considered to compensate for other variances.

Examples include but are not limited to:

- Special security installations such as airport checkpoints or government buildings.
- Historical or other existing buildings.
- Heavy draft and stack pressures.
- Security grilles needed to protect the automatic entrance during the night. Placement of guide rails in the required position may interfere, necessitating setting the rail back an inch or so.
- Air locks in office buildings with high stack pressure needed next to a revolving door for accessibility.

These should be countered by additional caution signage or sensors, restricting traffic, or reducing the door speed in both opening and closing. Activating zone, opening and closing force, speed, and safety zone requirements should be considered.