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Document Name: BHMA A156.10: Power Operated Pedestrian Doors

CFR Section(s): 36 CFR 1191, App B, 105.2.1

Standards Body: Builders Hardware Manufacturers Association

APPROVED

Official Incorporator:
THE EXECUTIVE DIRECTOR
OFFICE OF THE FEDERAL REGISTER
WASHINGTON, D.C.

ANSI/BHMA A156.10-1999

AMERICAN NATIONAL STANDARD FOR POWER OPERATED PEDESTRIAN DOORS

SPONSOR

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION

BHMA MEMBER

ANSI

Hardware & Specialties
08700

American National Standard Institute
11 West 42nd Street, New York, NY 10036

ANSI/BHMA A156.10-1999
Revision of:
ANSI A156.10-1991

AMERICAN NATIONAL STANDARD

FOR

POWER OPERATED PEDESTRIAN DOORS

SPONSOR

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.

APPROVED APRIL 26, 1999
AMERICAN NATIONAL STANDARDS INSTITUTE, INC.

AMERICAN NATIONAL STANDARD

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Published by
BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.
355 Lexington Avenue New York, New York 10017

Printed in the USA

10M____/1200

This Standard was approved by ANSI under the Canvass Method. BHMA was accredited on 21 March 1983 by ANSI as a sponsor using the Canvass Method.

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 insure 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.

CONTENTS

1. GENERAL

1.1 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 design 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. The SI (metric) equivalents given in parentheses are approximate.

1.4 American National Standards referenced in A156.10 are available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036. ASTM Standards referenced in A156.10 are available from ASTM, 100 Barr Harbor Dr., West Conshohocken, PA 19428-2959 (also see Appendix C).

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

1.6 Tests described in this standard are performed under laboratory conditions. In actual usage, results vary because of installation, maintenance and environmental conditions.

2. DEFINITION OF TERMS USED IN THIS STANDARD

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

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

2.3 **Actuator (or Operator).** The mechanical device used to move (a) door(s).

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 actuating signal.

2.5 **Back Check.** The checking or slowing down of the speed of door opening before being fully opened.

2.6 **Balanced Door.** A door equipped with a hinge that moves the hinge pivot point from the hinge stile of the door towards the centerline of the door a small distance. A balanced door is employed when a reduced opening force is required.

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

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

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

2.12 **Clear Opening for Automatic Doors.**

- Swing Doors - With the door open 90 degrees, the clear width 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 width is measured between the face 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.

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

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

2.15 **Control.** A unit containing electrical components for automatic control of door operation and overload protection.

2.16 **Control Mat.** An activating or safety device placed on the floor on either side of a doorway sensing the presence of a person or object. It is constructed of a rubber like material with slip resistant surface and is either recessed into or surface mounted on the floor.

2.17 **Control Mat, Activating.** A control mat which when activated causes a door to open.

2.18 **Control Mat, Safety.** A control mat which when activated prevents a door from opening or holds a door open.

2.19 **Cycle.** The action of an automatic door operator starting with activation through opening and full closing of (a) door(s).

2.20 **Door Opening for Automatic Doors.**

- Swing or Folding Doors (Singles or Pairs) The smallest width dimension of a door opening, measured jamb to jamb.
- Sliding Doors - In the fully opened position, the door opening is measured from the edge of the leading stile to the jamb or stop if present.

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

2.21 **Exposed Area.** The visible area of a control mat after the trim is installed.

2.22 **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.

2.22 **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).

2.24 **Guide Rail.** A separator used with power operated doors for traffic separation and control.

2.25 **Knowing Act.** With reference to the act of operating a door operator, such as pressing a switch with the knowledge of what will happen.

2.26 **Latch Check.** The checking or slowing down of the speed of closing of a door before being fully closed.

2.27 **Offset Hung.** A door which has a hinge pivot point located off the centerline of the door thickness.

2.28 **Motion Sensor.** A sensor designed to detect the movement of a person or equivalent in the vicinity of the doorway and give a control signal to the power operated door.

2.29 **Power Operated Door (Automatic Door).** The combination of door, operator and controls constituting the system. Also called an Automatic Door.

2.30 **Presence Sensor.** A sensor designed to detect the presence of a person or equivalent in the vicinity of the doorway and give a control signal to the power operated door.

2.31 **Safety Zone.** An area protected such that when a swinging or folding door is fully open or closed or a sliding door is fully open, the door operator shall not operate when the area is occupied by a person or its equivalent.

2.32 **Sensor.** A device that detects the motion or presence of a person or object.

2.33 **Threshold.** A floor mounted horizontal member installed beneath a closed door or in a clear door opening.

2.34 **Trained Traffic.** People trained in the safe use and operation of a particular automatic door installation.

2.35 **Trim, Mat.** Material installed around the perimeter of a control mat securing it to the floor.

3. SWINGING DOORS

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.

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 see section 6.1
- Control Mats see section 7.1 & 7.3
- Sensor see section 8.1
- Knowing Act see section 9.
- Entrapment see section 10
- Signage see section 11.1, 11.2

4. SLIDING DOORS

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.

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 see section 7.1, & 7.4
- Sensor see section 8.2
- Knowing Act see section 9
- Entrapment see section 10
- Signage see section 11.1, & 11.3

5. FOLDING DOORS

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.

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.

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 see section 6.2
- Control Mats see section 7.1, & 7.5
- Sensor see section 8.3
- Knowing Act see sections 9
- Entrapment see section 10
- Signage see section 11.1 & 11.4

6. GUIDE RAILS

6.1 Guide Rails for Swing Doors (See Figures A-2, A-4 & A-11)

6.1.1 Two guide rails shall be installed on the swing side of each door. 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 inches (1400 mm) (See Figure A-2 & A-4).

6.1.2 A guide rail shall be 30 inches (760 mm) 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 inches (150 mm) 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 inch (51 mm) 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 2 inches (51 mm).

6.2 Guide Rails for Folding Doors (See Figures A-14 & A-15)

6.2.1 A guide rail shall be installed for each FS panel on the folding side of each door and shall project beyond the fold open position not less than:

12 inches (305 mm) minimum, for two way traffic or one way traffic approaching the fold side or
5 inches (125 mm) minimum, 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 inches (760 mm) 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 inches (150 mm) 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 inches (51 mm) 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 2 inches (51 mm).

7. CONTROL MATS—REQUIREMENTS (SEE TABLES 1-A)

7.1 The edge of the exposed area of all control mats shall not exceed 1/2 inch (12.7 mm) thickness (See Figure A-10).

7.2 Not used.

7.3 Swinging Doors

7.3.1 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 inches (125 mm) measuring from both sides for a total maximum of 10 inches (255 mm) (See Figures A-1, A-2, A-3 & A-4).

7.3.2 A safety zone shall be provided on the swing side of the door. If a safety control mat is used, the length of the exposed area shall extend a minimum of 5 inches (125 mm) beyond the lead edge of the door in the open position (See Figures A-1, A-2, A-3 & A-4).

7.3.3 Swinging doors serving both egress and ingress 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 inches (125 mm) beyond the lead edge of the door in the open position and one or more activating control mats totaling an additional 55 inches (1400 mm) of exposed length (See Figure A-2 & A-4).

7.3.4 The exposed length of the activating mat on the non swing side shall be a minimum of 43 inches (1090 mm).

7.4 Sliding Doors

7.4.1 The width of the exposed area of an activating mat shall be the clear opening width less a maximum of 5 inches (125 mm) measured from both sides for a total maximum of 10 inches (255 mm) (See Figures A-5 & A-6).

7.4.2 Sliding doors shall have an activating control mat with a minimum exposed length of 43 inches (1090 mm) (See Figures A-5 & A-6).

7.4.3 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 use. The activating length shall extend a minimum of 24 inches (610 mm) from the face of the door and be effective to comply with 7.6.3. The width of the control mat shall comply with 7.4.1. The control mat shall be deactivated when the door(s) is (are) within 6 inches (150 mm) of the fully closed position.

7.5 Folding Doors

7.5.1 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 inches (127 mm) measuring from both sides for a total maximum of 10 inches (255 mm) (See Figure A-16).

7.5.2 A safety zone shall be provided on the fold side of the door. If a safety mat is used, the length of the exposed area shall extend a minimum of 5 inches (125 mm) beyond the edge of the door in the open position (See Figure A-16).

7.5.3 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 inches (125 mm) beyond the edge of the door in the open position and one or more activating control mats totaling an additional 48 inches (1220 mm) of exposed length (See Figure A-16).

7.5.4 The exposed length of the activating mat on the non fold side shall be a minimum of 43 inches (1090 mm).

7.6 Joining of Control Mats

7.6.1 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 inches (63 mm) (See Figure A-8).

7.6.2 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 inches (95 mm) (See Figure A-9).

7.6.3 Control mats meeting at a threshold shall not have an inactive width exceeding 6 inches (150 mm) including threshold width (See Figure A-7).

7.6.4 The active area of a control mat shall be a maximum of 1 1/2 inches (38 mm) from any edge of the exposed area (See Figure A-10).

7.7 Performance Requirements of Control Mats

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

7.7.2 Control Mat Sensitivity Test

7.7.2.1 Circuit shall be activated when a solid steel test disc 2.26 inches (57 mm) in diameter is depressed with a 25 lbf (110 N) applied vertically, perpendicular to the disc in accordance with 7.7.2.3 and 7.7.2.4, 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 7.7.2.3. 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.

7.7.2.2 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 inches (305 mm) then the mat shall be divided into 15 or 18 equal rectangles so that the length of each rectangle is not less than 8 inches (205 mm) or more than 12 inches (305 mm).

7.7.2.3 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 inches (38 mm) 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.

7.7.2.4 The test shall be conducted at 68 degrees $\pm$ 5 degrees F (20 degrees $\pm$ 2 degrees C).

7.7.3 **Control Mat Friction Test**

7.7.3.1 A control mat shall have a coefficient of friction when dry and clean of not less than 0.66 when tested in accordance with 7.7.3.2 through 7.7.3.6.

7.7.3.2 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 inch (6 mm) 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 inches (100 mm). 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. Neolite is available from Biltrite Corp., P.O. Box 9045, Waltham, MA 02254.

7.7.3.3 The block shall be placed in the middle of the mat with a linear scale calibrated in pounds (kilograms) attached.

7.7.3.4 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 inch (13 mm) from the bottom of the block.

7.7.3.5 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 4 hours prior to the test.

7.7.3.6 The formula used for determining the coefficient of friction (M) shall be M = F $\div$ N where N = 15 lbs. (7 kg) weight (See 7.7.3.2) and F = 10 lbf (44 N) minimum (See 7.7.3.4).

7.7.4 **Control Mat Trim**. Surface applied control mats shall be secured to the floor with trim having a tapered lead up to a minimum of 4 times the mat thickness at the exposed edge (See Figure A-10).

8. SENSORS

Motion sensors shall detect a 28 inch (710 mm) minimum high person or equivalent and moving at a rate of 6 inches (150 mm) per second minimum toward the center of the door within the detection areas described.

Presence sensors shall detect a stationary 28 inch (710 mm) minimum high person or equivalent within the detection areas described.

8.1 Swinging Doors

8.1.1 Non-swing side activating detection areas shall have a minimum width equal to the width of the door opening less 5 inches (125 mm) maximum from both sides for a total of 10 inches (255 mm) maximum measured at 15 inches (380 mm) and 30 inches (760 mm) perpendicular from the face of the closed door. The length from the face of the door shall be 43 inches (1090 mm) minimum measured at the center of the door opening. Detection shall be effective to within 5 inches (125 mm) from the face of the door measured at the center of the door opening (See Figure A-12A).

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

8.1.2.1 If an overhead sensor(s) is used to provide a safety zone, the length of the active area shall be effective to within 5 inches (125 mm) of the face of the closed door measured at the center of the door opening. The safety zone shall extend 5 inches (125 mm) 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 inches (125 mm) maximum measuring both sides for a total of 10 inches (255 mm) maximum measured parallel to the face of the door at a distance of 15 inches (380 mm) and 30 inches (760 mm) (See Figure A-12A).

8.1.2.2 If a door mounted sensor is used to provide a safety zone, it shall provide an active area 5 inches (125 mm) maximum from the face of the door for the width of the door less 5 inches (125 mm) from the pivot point. A door mounted sensor on either side of the door shall detect a 28 inch minimum (710 mm) high person or equivalent 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 inches per second (100 mm per second) measured within 1 inch (25 mm) of the latch edge before any contact is made (See Figure 12B).

8.1.3 Swinging doors serving both egress and ingress shall have a safety zone on the swing side, as defined in 8.1.2 and an activating zone extending an additional 55 inches (1400 mm) from the leading edge of the door in the open position (See Figure A-12A).

8.1.4 If a sensor is used for activation and a safety control mat is used as a safety zone, the exposed area of the safety control mat shall extend 5 inches (125 mm) minimum beyond the edge of the door in the open position and:

1) extend 5 inches (125 mm) 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 that shall be used to prevent a fully open door(s) from closing when a person is in the space between two non overlapping activation or safety detection areas; or

3) the door closing cycle shall have a delay of 4 seconds minimum after the activating area is clear; or

4) be equipped with a door mounted sensor on the non swing side as described in 8.1.2.2.

8.1.4.1 The width of a safety control mat shall be in accordance with 7.3.1 (See Figure A-12A).

8.1.5 If the distance between the two non overlapping zones exceeds 8 inches (205 mm) when sensors are used to provide both an activation and a safety zones, 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 activation area is clear; or

4) be equipped with a door mounted sensor on the non swing side as described in 8.1.2.2.

8.2 Sliding Doors

8.2.1 Activating detection areas shall have a minimum width equal to the width of the clear opening measured at 15 inches (380 mm) and 30 inches (760 mm) perpendicular from the face of the closed door(s). The length from the face of the door shall be 43 inches minimum (1090 mm) measured at the center of the clear opening. Detection shall be effective to within 5 inches (125 mm) from the face of the door measured at the center of the clear opening (See Figures A-13 & 18A, B & C).

8.2.2 A presence sensor shall be used to prevent a fully open door(s) from closing when a person is in the space between two non overlapping activation detection areas (See Figure 18A, B & C).

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

(1) A minimum of two photo electric beams shall be installed with the lower beams installed 6 - 28" (150 - 710 mm) and top beam 45" - 55" (1145 - 1400 mm) from the floor; and

(2) They shall be installed within 3 inches (76 mm) from the center of the slide door if both are installed on same side or within 5 inches (125 mm) of the centerline of the slide door if more than two photo electric beams are installed on each side of the sliding door; and

(3) The beams shall remain active from fully open to within 6 inches (150 mm) of closed.

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

(1) Shall detect a 28 inch (710 mm) minimum high person or equivalent and extend out a minimum of 5 inches (125 mm) from the face of the door on each side; and

(2) The detection zone shall remain active from open to within 6 inches (150 mm) of close or shall have a photo electric beam at 6" – 28" (150 - 710 mm) from the floor or a time delay of 4 seconds minimum after the activation signal ceases (See Figure 18B).

8.2.2.3 If 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 inches (125 mm) extending out from the face of the door. If the inactive area exceeds 3 inches (76 mm) from the face of the door, one beam is required at 6" – 28" (150 - 710 mm) from the floor; and

(2) The detection zone shall remain active from open to within 6 inches (150 mm) of closed or shall have a photo electric beam at 6" – 28" (150 - 710 mm) from the floor or a time delay of 4 seconds minimum after the activation signal ceases.

8.2.3 Sliding doors used for one way traffic shall be provided with a sensor that holds the door open or returns the door to the open position when approached by a person from the side not intended for use. The activating zones shall extend a minimum of 24 inches (610 mm) from the face of the door and be effective to within 5 inches (125 mm) from the face of the door both measured at the center of the door opening. The width of the activating zone shall be effective to within 5 inches (125 mm) of each side of the clear door opening. The sensor shall be deactivated when the door(s) is (are) within 6 inches (150 mm) of the fully closed position. The sensor shall detect an object defined in 8.0.

8.3 Folding Doors

8.3.1 Non-fold side detection activating areas shall have a minimum width equal to the width of the door opening less 5 inches (125 mm) maximum from both sides for a total of 10 inches (255 mm) maximum measured at 15 inches (380 mm) and 30 inches (760 mm) perpendicular from the face of the closed door. The length from the face of the door shall be 43 inches (1090 mm) minimum measured at the center of the door opening. Detection shall be effective to within 5 inches (125 mm) from the face of the door measured at the center of the door opening (See Figures A-17A & A-17B).

8.3.2 A safety zone shall be provided on the fold side of all power operated folding doors that shall extend 5 inches (125 mm) minimum beyond the edge of the FS panel measured when open. Detection shall be effective to within 5 inches (125 mm) 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 inches (125 mm) maximum from both sides for a total of 10 inches (255 mm) maximum. The width of the safety zone when the door is open shall be equal to the clear opening less 5 inches (125 mm) maximum from both sides for a total of 10 inches (255 mm) maximum measured 15 inches (380 mm) perpendicular to the door (See figure A-17A, 17B, 17C & 17D).

8.3.2.1 One way traffic doors with an intended approach from the fold side of the door shall have an activating zone that extends a minimum of 24 inches (610 mm) on the non-fold side from the face of the closed door and be effective within 5 inches (125 mm) from the face of the door measured at the center of the door opening . The width of the activating zone shall be effective to 5 inches (125 mm) of each side of the clear door opening. The activating zone shall be deactivated when the door(s) is (are) within 6 inches (150 mm) or less of the fully closed position. The sensor shall detect an object as defined in 8.0 (See Figure A17 D).

8.3.3 Folding doors serving both egress and ingress shall have, on the folding side of the door, both a safety zone as defined in 8.3.2 and an activating zone. The width of the activating zone shall be equal in width to the door opening less 5 inches (125 mm) maximum each side for a total of 10 inches (255 mm) measured perpendicular to the door at 15 inches (380 mm) and 30 inches (760 mm). The length of the activating detection zone shall be established as follows. The activation detection zone starts adjacent to the safety zone and shall be effective to within 5 inches (125 mm) and shall extend 48 inches (1400 mm) beyond the edge of the FS panel when open (See Figure A-17C).

8.3.4 When both activating and safety control mats are used in combination with sensors they shall be in accordance with section 7.5 (See Figure A-17A & A-17B).

8.3.5 If a sensor is used for activation and a safety control mat is used as a safety zone, the exposed area of the safety control mat shall extend 5 inches (125 mm) minimum beyond the edge of the FS panel in the open position and:

1) Extend 5 in (125 mm) into the approach area of the door measured from the face of the door in the closed position; 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 activation/safety detection areas; or

3) The door closing cycle shall have a delay of 4 seconds minimum after the activating area is clear (See Figure A-17A & A-17B).

8.3.6 If the distance between the two non-overlapping zones exceeds 8 inches (205 mm) when sensors are used to provide both an activation and safety zones, the door system shall:

1) Be equipped with a safety control mat; or

2) The door opening shall be equipped with a presence sensor across the door opening; or

3) Have a door closing cycle delay of 4 seconds minimum after the activation area is clear (See Figure A-17A & A-17B).

9. KNOWING ACT DOOR ACTUATION

9.1 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 inches (915 mm) and a maximum of 48 inches (1220 mm); and

9.1.3 Be located a maximum distance of 12 feet (3.7 m) from the center of the door; and

9.1.4 The door shall remain open for a minimum of 5 seconds after release of the activating device; and

9.1.5 The door shall be equipped with a safety zone(s) as required in this standard for the type door and detection system selected.

9.1.5.1 The door shall be equipped with a secondary activating zone of size and function as defined in 7.4.3 or 8.2.3.

10. ENTRAPMENT PROTECTION

10.1 Entrapment Protection measurements shall be taken under neutral air pressure conditions.

10.2 The force required to prevent a stopped power operated swinging door from moving in the direction of closing shall not exceed a 40 lbf (180 N) applied 1 inch (25 mm) from the lock edge of the door at any point in the closing cycle.

10.3 The opening time of a swinging or folding door to back check shall not be less than 1.5 seconds.

10.4 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) applied 1 inch (25 mm) from the lock edge of the door.

10.4.1 For folding doors, the force required to prevent a stopped door, in the last 10 degrees of the opening, from moving in the direction of opening shall not exceed 40 lbf (180 N) applied 1 inch (25 mm) from the leading edge of the FS leaf.

10.5 A door shall not close through the final 10 degrees for swinging doors or no less than 2 inches (51 mm) for folding doors in less than 1.5 seconds.

10.6 Swing, sliding and folding doors utilizing sensors or control mats shall remain open a minimum of 1.5 seconds after loss of detection.

10.7 A swinging door shall be adjusted so that closing time to latch check shall be the minimum values in the following table:

Inches (mm)	(D)	36 (914) & under	36 (914)	42 (1067)	42 (1067)	48 (2119)	48 (2119)
Lbs. (kg)	(W)	to 100 (45)	to 140 (64)	to 110 (50)	to 150 (68)	to 120 (55)	to 160 (73)
Time	T (secs.)	2.0	2.3	2.3	2.7	2.8	3.2

For doors of other weights and widths:

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

W = Weight of door in pounds

D = Width of door in inches

T = Closing time to latch check in seconds

10.8 **Clearance.** Center pivoted swinging & folding doors shall have provisions for finger guard protection if the door clearance at the hinge side is greater than 1/4 inch (6.4 mm) and less than 3/4 inch (19 mm) with the door in any position.

10.9 A stopped sliding or folding 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.

10.10 A sliding door shall be adjusted so that the closing speed is one foot per second maximum for doors weighing up to and including 160 lbs (71 kg) per leaf.

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

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

V = Velocity in foot/sec.

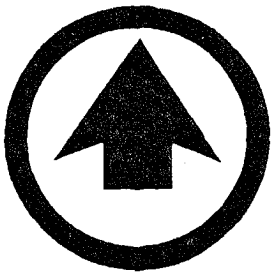
W = Weight of Door in lbs

10.11 A folding door shall be adjusted so that the closing speed is a maximum of 1 foot/sec. (305 mm/sec.) measured at the leading edge.

11. SIGNAGE

11.1 **All swinging, sliding and folding doors** shall be equipped with signage visible from both sides reading, "AUTOMATIC DOOR" with letters 1/2 inch (12.7 mm) high minimum. The sign described in 11.2.3 shall be permitted to be used to satisfy this requirement.

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

 Figure 1	11.2.1 An arrow sign (See Figure 1.) shall be visible from the approach side of a swinging door mounted on the door at a height 58 inches ± 5 inches (1475 ± 125 mm) from the floor to the center line of the sign. The sign shall be a minimum of 6 inches (150 mm) in diameter, having a green circle surrounding a black arrow on a white background.
 Figure 2	11.2.2 An international "DO NOT ENTER" sign (See Figure 2.) shall be visible from the side of doors that swings or folds towards pedestrians attempting to travel in the wrong direction mounted on the door at a height 58 inches ± 5 inches (1475 ± 125 mm) from the floor to the center line of the sign. The sign shall be a minimum of 6 inches (150 mm) in diameter, having a red circle with the wording, "DO NOT ENTER", in the red circle.
 Figure 3	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" (See Figure 3). The sign shall be mounted on the door at a height 58 inches ± 5 inches (1475 ± 125 mm) from the floor to the center line of the sign. The sign shall be a minimum of 6 inches (150 mm) in diameter and with black lettering on a yellow background.

11.3 **Sliding Doors** (See Figure 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 inch (25 mm) high minimum. The signs shall read horizontally and be located adjacent to the lock stile on a center line 36 inches (915 mm) minimum and 60 inches (1525 mm) maximum from the floor applied to the side appropriate for egress.

11.4 **Folding Doors** (See Figure B 5 & 6)

11.4.1 For one way traffic folding doors, an arrow sign (Figure 1), shall be visible from the approach side of a folding door mounted on the door at a height 58 inches ± 5 inches (1475 ± 125 mm) from the finished 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 para. 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 para. 11.2.1, visible from the non fold side. The fold side shall be marked with the "AUTOMATIC CAUTION DOOR" sign as described in para. 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 Figure 2 sign shall be applied to the appropriate sides of the FX panel as determined by traffic flow.

11.5 **Knowing Act Doors** The door shall have signage which says "Automatic Door - Activate Switch to Operate" in 1/2 inch (13 mm) letters along with other required signage visible from each side of the door.

12. GENERAL PERFORMANCE

12.1 **Latch Check**. Latch check shall occur for swinging doors at no less than ten degrees from closed position and for sliding and folding doors at no less than 2 inches (51 mm) from the closed position.

12.2 **Manual Opening Force for Swinging Doors**. In the event of a power failure, the door shall be capable of opening with no greater than a 30 lbf (133 N), applied one inch (25 mm) from the edge of the lock stile.

12.3 **Break Away Device for Swinging and Folding Doors**. Swinging and folding doors provided with a break away device shall require no more than 50 lbf (222 N) applied 1 inch (25 mm) from the edge of the lock stile to open. When the door is opened in the break out mode, powered operating components excluding spring power shall not operate the door.

12.4 **Break Away Device for Sliding Doors**. Sliding doors provided with a break away device shall require no more than a 50 lbf (222 N) applied 1 inch (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 actuation of the operator when used in the break out mode. Break away devices incorporating swing out side lites shall interrupt actuation of the operator when used in the break out mode (See Appendix D1.3).

12.5 **Break Away Egress Test for Swinging, Folding and Sliding Doors**.

12.5.1 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.

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

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

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

12.5.5 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 12.3 and 12.4.

12.6 **Salt Spray Test**

12.6.1 A sample of the latching and hinge assembly of the break away device of a power operated door contained in an approximately 25 inch (635 mm) wide panel shall be subjected to a salt fog test in accordance with ANSI/BHMA A156.18-1993 for Materials and Finishes for 168 hours.

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

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

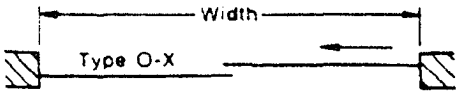
12.6.4 Then cycle the sample 10 times. The release force for the first cycle shall not exceed a 100 lbf (445 N). Release forces for the next 9 cycles shall not exceed 50 lbf (222 N).

12.7 Testing Laboratory

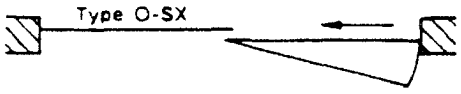
12.7.1 Tests described in 7.7.3 and 12 shall be performed under the supervision of a nationally recognized independent testing laboratory on preproduction samples prior to acceptance of the design for production and subsequent installation. Production units shall be under an in-plant follow-up inspection service.

TABLE 1 SYMBOLS USED FOR POWER OPERATED SLIDING DOORS

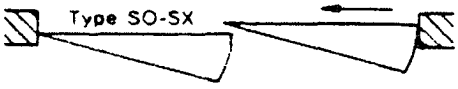
TYPICAL DOOR ELEVATIONS



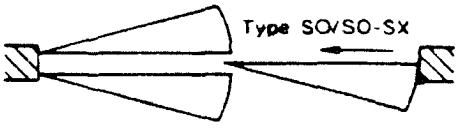
O-X The sliding panel shall be installed to the inside or outside of the sidelight. Sliding panel slides along sidelight.



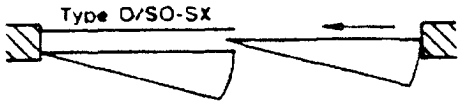
O-SX The swing-slide panel shall be installed to the exterior of the fixed sidelight. The swing-slide panel(s) (SX) shall swing out 90 degrees from any position of slide movement.



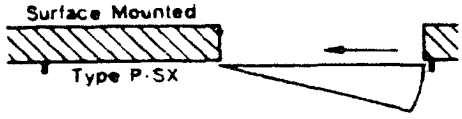
SO-SX The swing out sidelite (SO) shall be installed to the exterior of the swing-slide panel (SX). Swing out sidelight(s) is (are) provided to allow the sliding panel to swing out from any point of slide travel.



SO/SO-SX The swing out sidelite (SO) shall be installed to the exterior and interior of the swing-slide panel (SX). Swing out sidelite(s) exterior only is (are) provided to allow the sliding panel to swing out from any point of slide travel.



O/SO-SX Swing pocket panel applied to outside of the unit.



P-SX Mounting of the unit is to the surface of the wall. As the door opens, the sliding panel slides beside the wall.

For Letter Designation Units Are Viewed From Exterior, Left To Right

TABLE 1-A MINIMUM EXPOSED MAT SIZES FOR SWINGING DOORS (see 7.3.1 and 7.3.2) - (inches)

Door Opening Size inches (mm)	Min. Width Required inches (mm)	Activating Side - Min. Length inches (mm)	Safety Mat Min. Length 3" Threshold inches (mm)	Safety Mat Min. Length 1" Threshold inches (mm)	
36 (915)	26 (660)	43 (1090)	36 ¾ (935)	37 ¾ (960)	
37 (940)	27 (685)	43 (1090)	36 ¾ (935)	37 ¾ (960)	CENTER
42 (1065)	32 (815)	43 (1090)	42 ¾ (1085)	43 ¾ (1110)	PIVOT
43 (1090)	33 (840)	43 (1090)	42 ¾ (1085)	43 ¾ (1110)	SINGLES
44 (1120)	34 (865)	43 (1090)	44 ¾ (1135)	45 ¾ (1160)	
45 (1145)	35 (890)	43 (1090)	44 ¾ (1135)	45 ¾ (1160)	
48 (1220)	38 (965)	43 (1090)	48 ¾ (1240)	49 ¾ (1265)	
49 (1245)	39 (990)	43 (1090)	48 ¾ (1240)	49 ¾ (1265)	
48 (1220)	38 (965)	43 (1090)	24 ¾ (630)	25 ¾ (655)	CENTER
50 (1270)	40 (1015)	43 (1090)	24 ¾ (630)	25 ¾ (655)	PIVOT
60 (1525)	50 (1270)	43 (1090)	30 ¾ (780)	31 ¾ (805)	PAIRS
62 (1575)	52 (1320)	43 (1090)	30 ¾ (780)	31 ¾(805)	
72 (1830)	62 (1575)	43 (1090)	36 ¾ (935)	37 ¾ (960)	
74 (1880)	64 (1625)	43 (1090)	36 ¾ (935)	37 ¾ (960)	
84 (2135)	74 (1880)	43 (1090)	42 ¾ (1085)	43 ¾ (1110)	
86 (2185)	76 (1930)	43 (1090)	42 ¾ (1085)	43 ¾ (1110)	
36 (915)	26 (660)	43 (1090)	41 ¾ (1060)	41 ¾ (1060)	BUTTS &
42 (1065)	32 (815)	43 (1090)	47 ¾ (1215)	47 ¾ (1215)	OFFSET
44 (1120)	34 (865)	43 (1090)	49 ¾ (1265)	49 ¾ (1265)	HUNG
48 (1220)	38 (965)	43 (1090)	53 ¾ (1365)	53 ¾ (1365)	SINGLES
48 (1220)	38 (965)	43 (1090)	29 ¾ (755)	29 ¾ (755)	BUTTS &
60 (1525)	50 (1270)	43 (1090)	35 ¾ (910)	35 ¾ (910)	OFFSET
72 (1830)	62 (1575)	43 (1090)	41 ¾ (1060)	41 ¾ (1060)	HUNG
84 (2135)	74 (1880)	43 (1090)	47 ¾ (1215)	47 ¾ (1215)	PAIRS

APPENDIX A

FIGURE A-1 (Ref. 7.3.1 and 7.3.2)
CONTROL MAT LAYOUTS FOR ONE-WAY TRAFFIC BUTT OR OFFSET PIVOTED SWING DOORS.

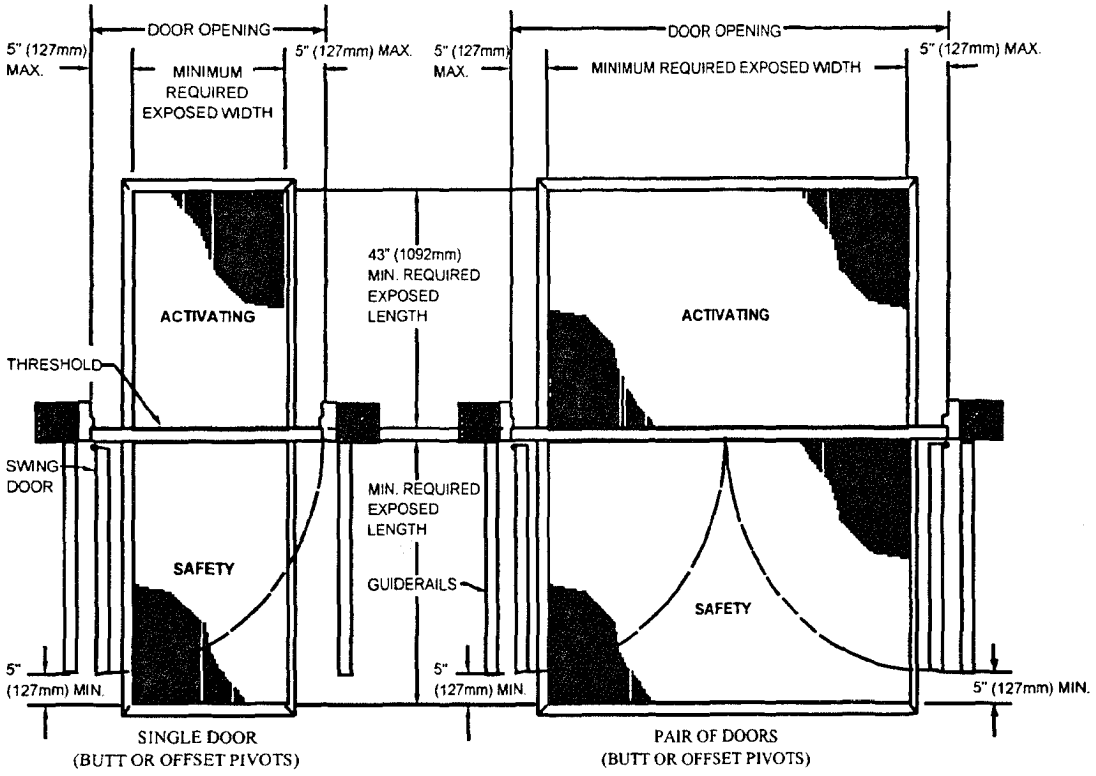
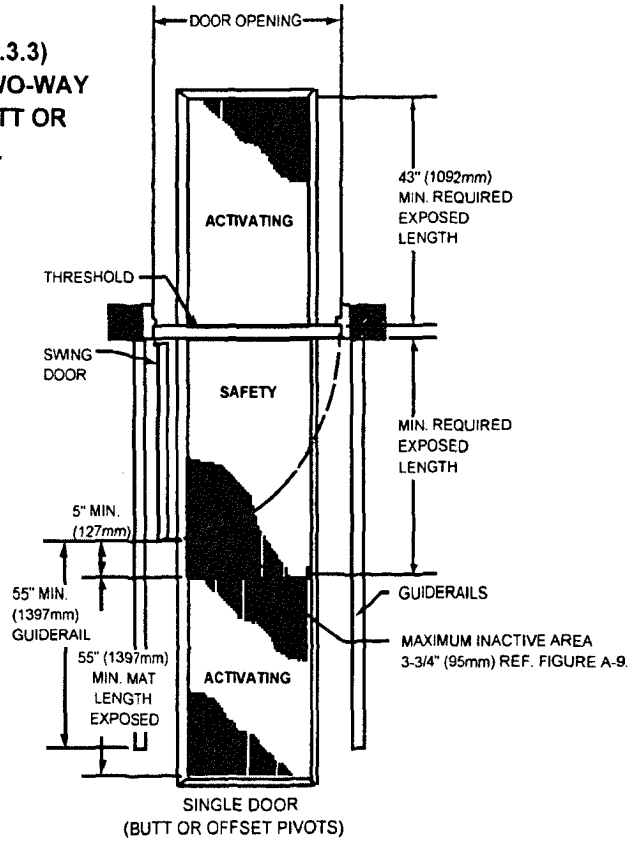


FIGURE A-2 (Ref. 7.3.1, 7.3.2 and 7.3.3)
CONTROL MAT LAYOUTS FOR TWO-WAY TRAFFIC (INGRESS/ EGRESS) BUTT OR OFFSET PIVOTED SWING DOORS.



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

FIGURE A-3 (Ref. 7.3.1 and 7.3.2)
CONTROL MAT LAYOUTS FOR ONE-WAY TRAFFIC CENTER PIVOTED SWING DOORS.

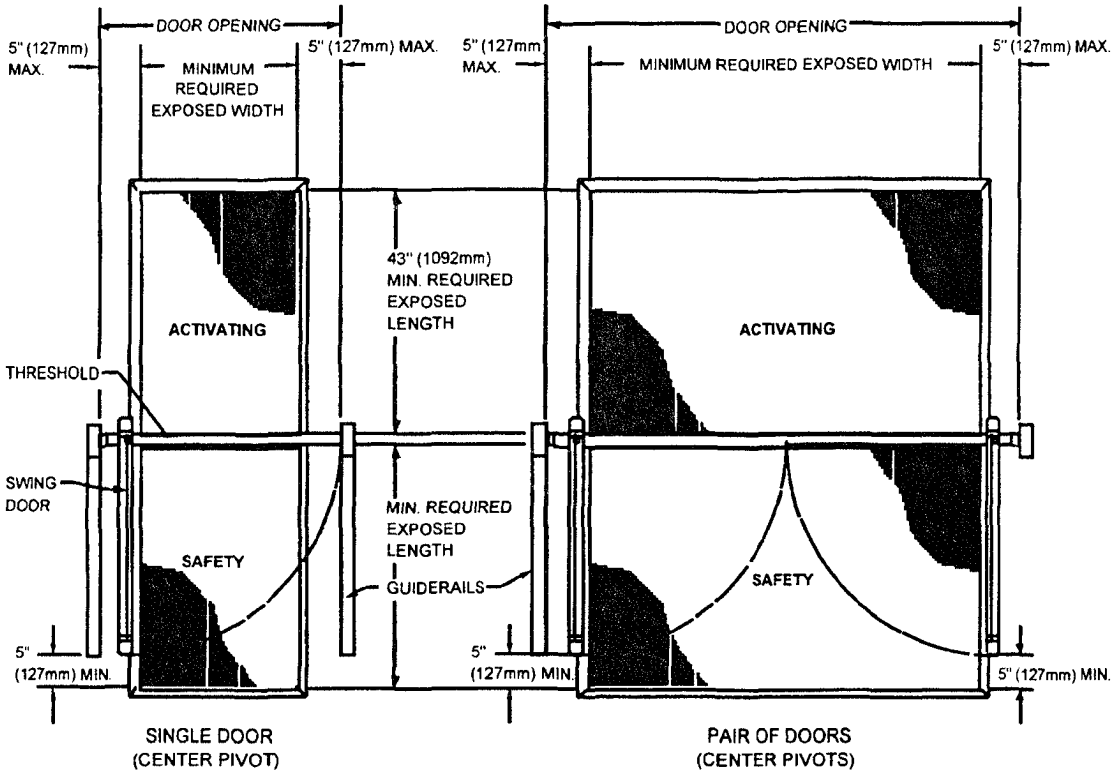
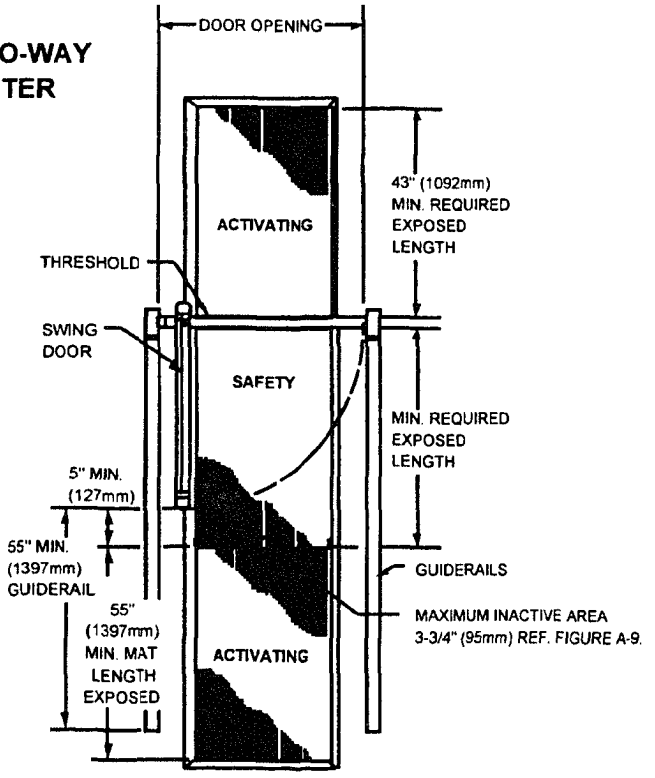
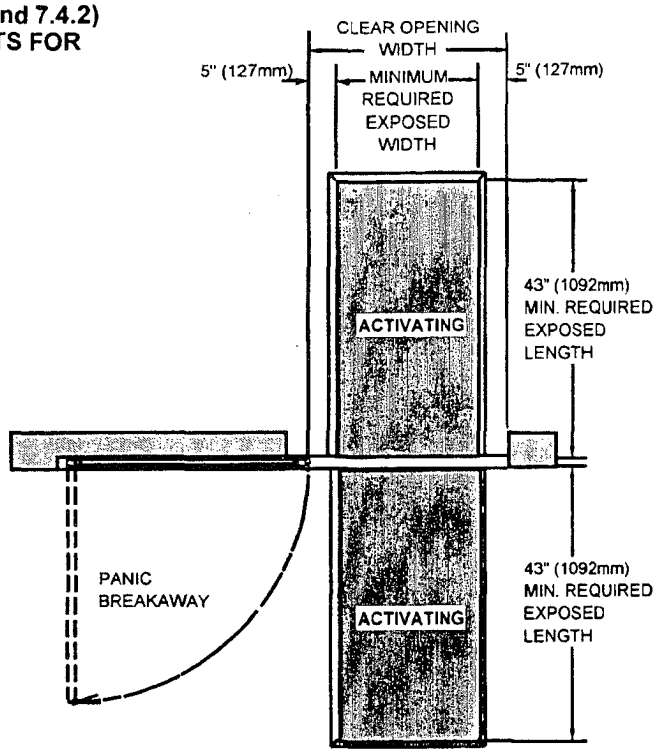


FIGURE A-4 (Ref. 6.1.1 and 7.3.3)
CONTROL MAT LAYOUTS FOR TWO-WAY TRAFFIC (INGRESS/ EGRESS) CENTER PIVOTED SWING DOORS.



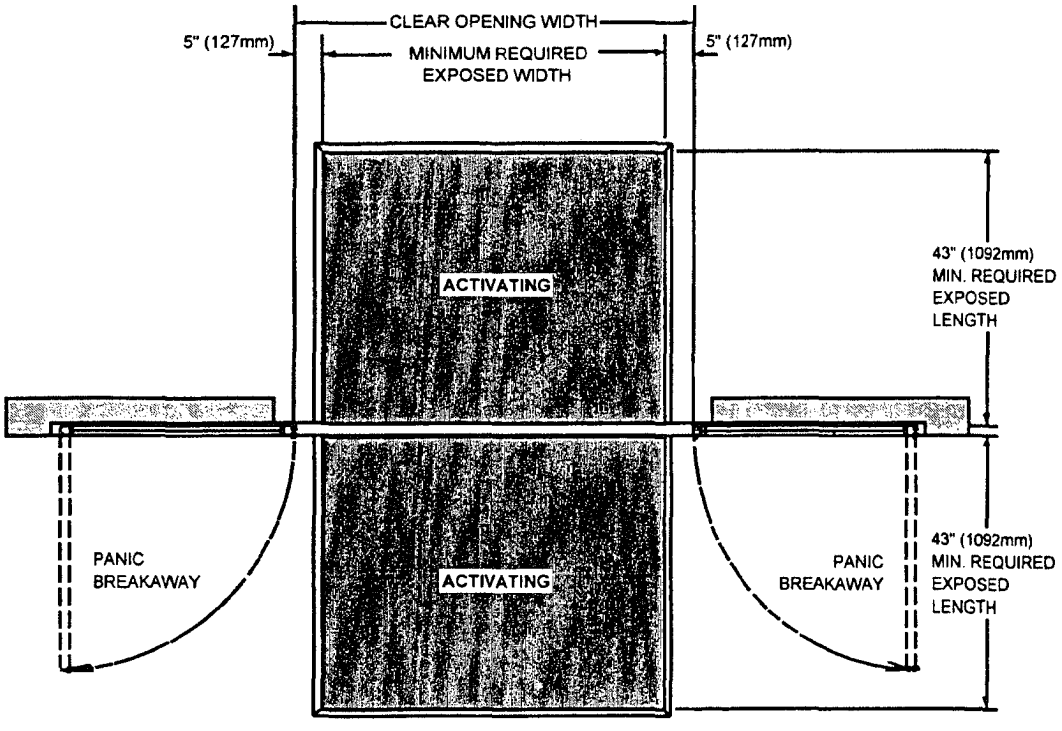
NOTE: DETECTION ZONES DEPICTED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

FIGURE A-5 (Ref. 7.4.1 and 7.4.2)
CONTROL MAT LAYOUTS FOR SINGLE SLIDE DOORS.



SINGLE SLIDE DOOR

FIGURE A-6 (Ref. 7.4.1 and 7.4.2)
CONTROL MAT LAYOUTS FOR BI-PARTING SLIDE DOORS.

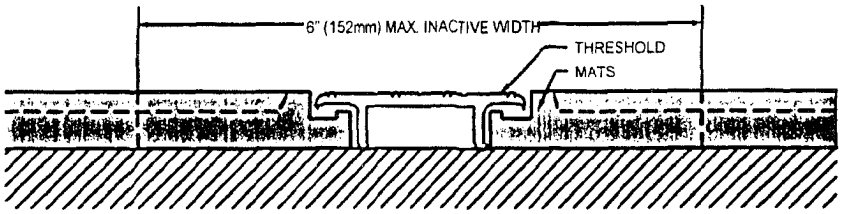


BI-PARTING SLIDE DOOR

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

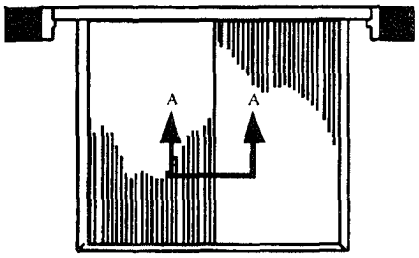
APPENDIX A (Continued)

CONTROL MATS CROSS SECTIONS.

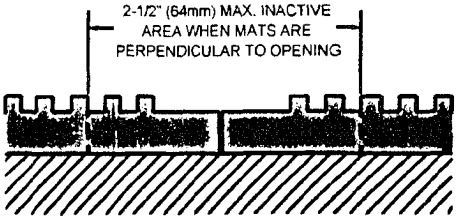


CROSS SECTION at THRESHOLD

FIGURE A-7 (Ref. 7.6.3)

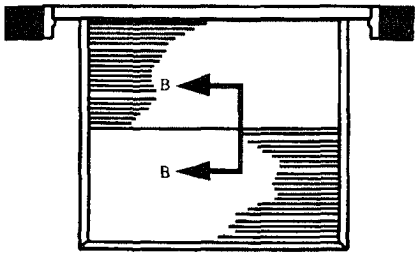


PLAN VIEW- PERPENDICULAR MATS

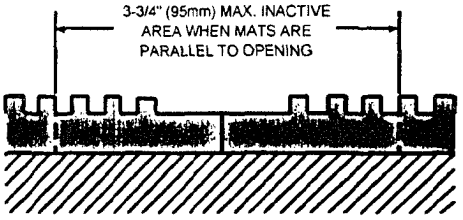


CROSS SECTION A-A at JOINT

FIGURE A-8 (Ref. 7.6.1)

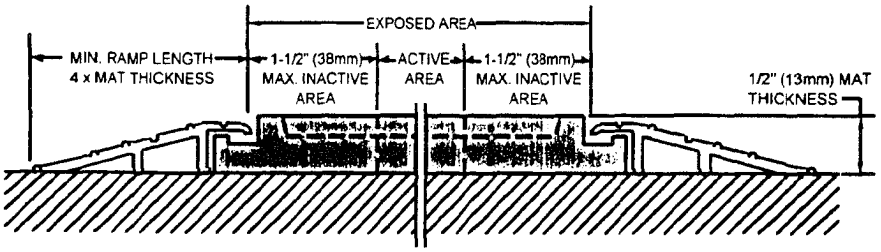


PLAN VIEW- PARALLEL MATS



CROSS SECTION B-B at JOINT

FIGURE A-9 (Ref. 7.6.2)



CROSS SECTION at SURFACE MAT TRIM

FIGURE A-10 (Ref. 7.1, 7.6.4, and 7.7.4)

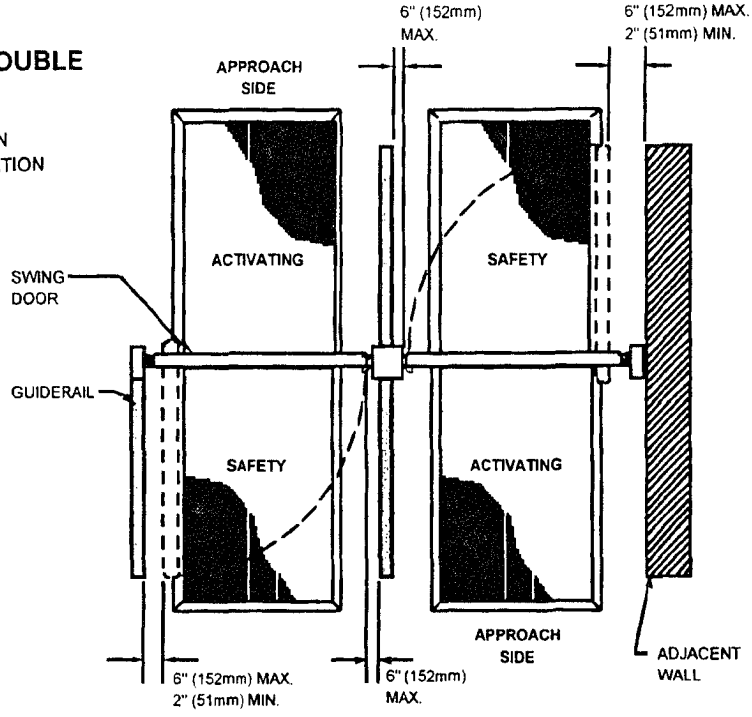
NOTE: THE DRAWINGS DEPICTED ABOVE ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

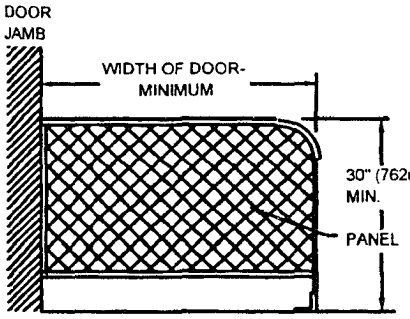
APPENDIX A (Continued)

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

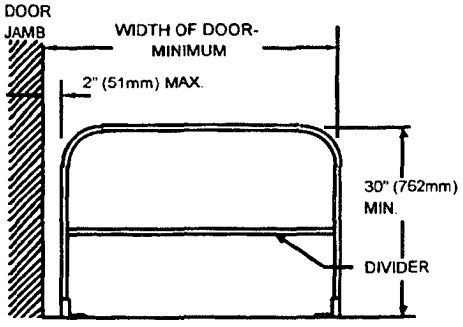
PLAN VIEW- ONE-WAY TRAFFIC DOUBLE SWING DOORS.

REFER TO FIGURE A-2 FOR GUIDERAIL LAYOUT IN TWO-WAY TRAFFIC (INGRESS/ EGRESS) APPLICATION (REF. A-12A and 6.1.1, EXCEPTION #2).



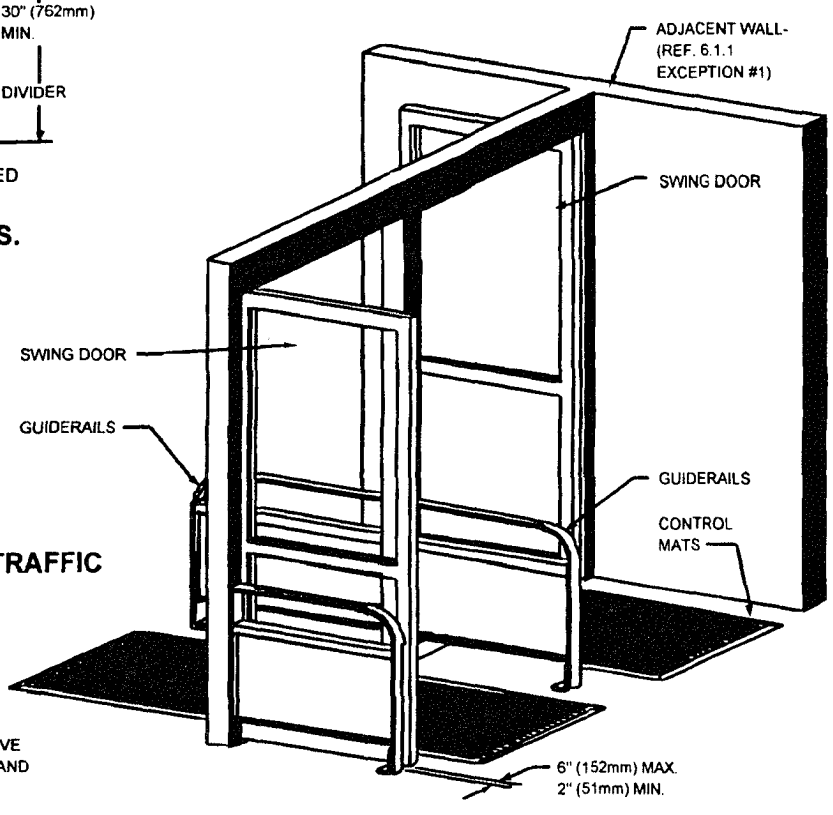


JAMB / FLOOR MOUNTED



FREE STANDING / FLOOR MOUNTED

GUIDERAIL ELEVATIONS.

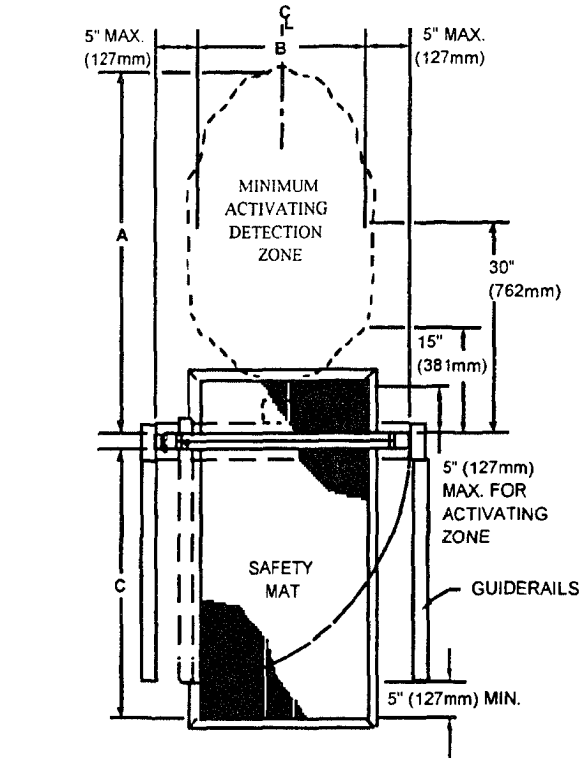


ISOMETRIC VIEW- ONE-WAY TRAFFIC DOUBLE SWING DOORS.

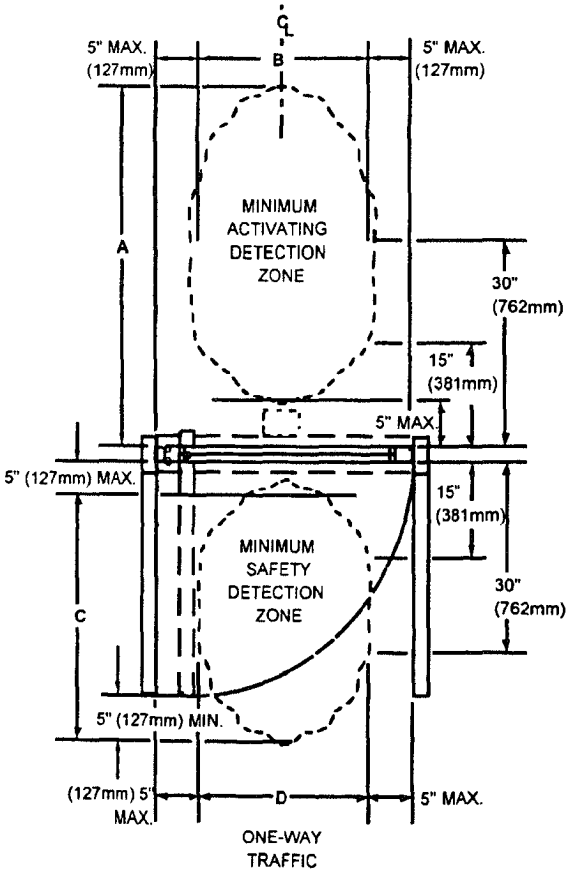
NOTE: DETECTION ZONES DEPICTED IN THE ABOVE DRAWINGS ARE APPROXIMATE (NOT TO SCALE) AND FOR ILLUSTRATION PURPOSES ONLY.

APPENDIX A (Continued)

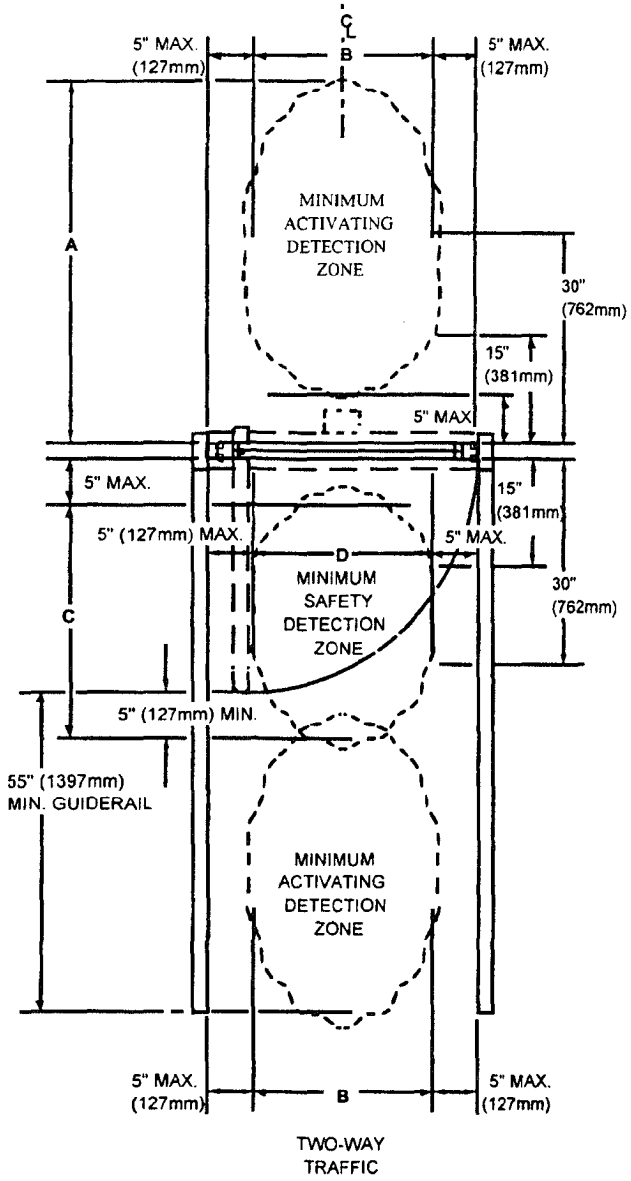
FIGURE A-12A (Ref. 8.1)
ACTIVATING AND SAFETY DETECTION ZONES - SWING DOORS.



ONE-WAY TRAFFIC



ONE-WAY TRAFFIC

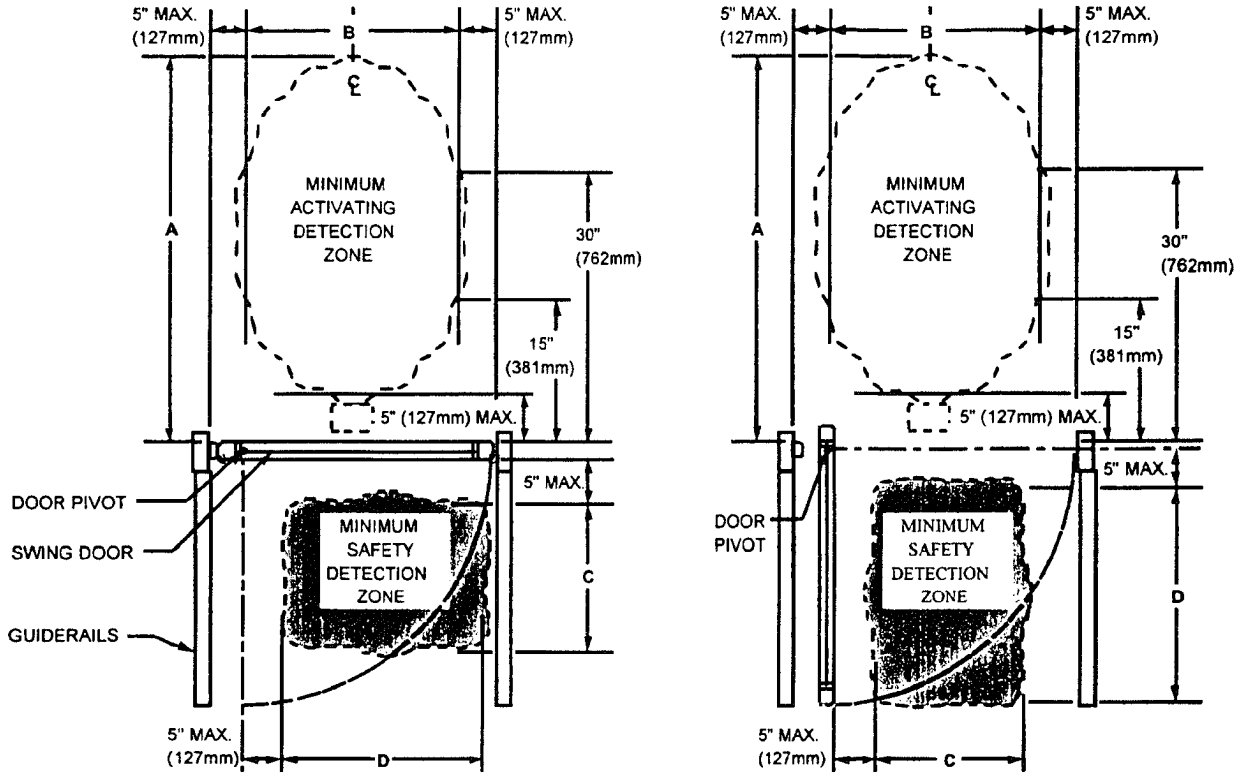


TWO-WAY TRAFFIC

A = MINIMUM ACTIVATING DETECTION ZONE LENGTH.
B = MINIMUM ACTIVATING DETECTION ZONE WIDTH.
C = MINIMUM SAFETY DETECTION ZONE LENGTH
D = MINIMUM SAFETY DETECTION ZONE WIDTH

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

FIGURE A-12B (Ref. 8.1)
ACTIVATING AND SAFETY DETECTION ZONES - SWING DOORS WITH DOOR MOUNTED SENSORS.

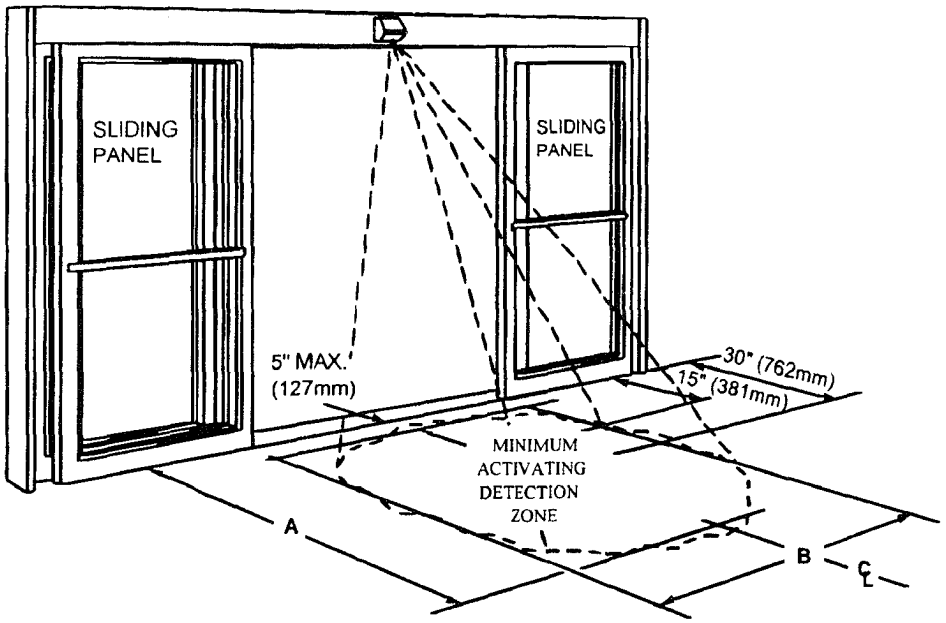


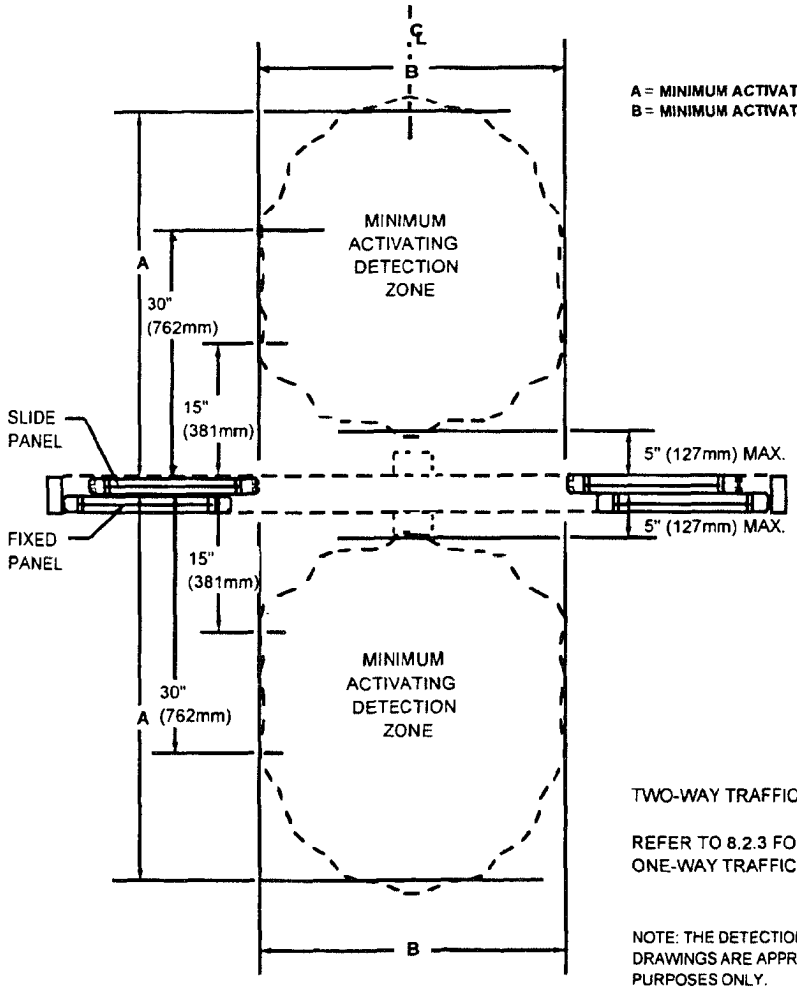
SAFETY DETECTION ZONES ARE SHOWN WITH THE SWING DOOR IN THE FULL CLOSED AND FULL OPEN POSITIONS ONLY.

A = MINIMUM ACTIVATING DETECTION ZONE LENGTH.
B = MINIMUM ACTIVATING DETECTION ZONE WIDTH.
C = MINIMUM SAFETY DETECTION ZONE LENGTH.
D = MINIMUM SAFETY DETECTION ZONE WIDTH.

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

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





A = MINIMUM ACTIVATING DETECTION ZONE LENGTH.
B = MINIMUM ACTIVATING DETECTION ZONE WIDTH.

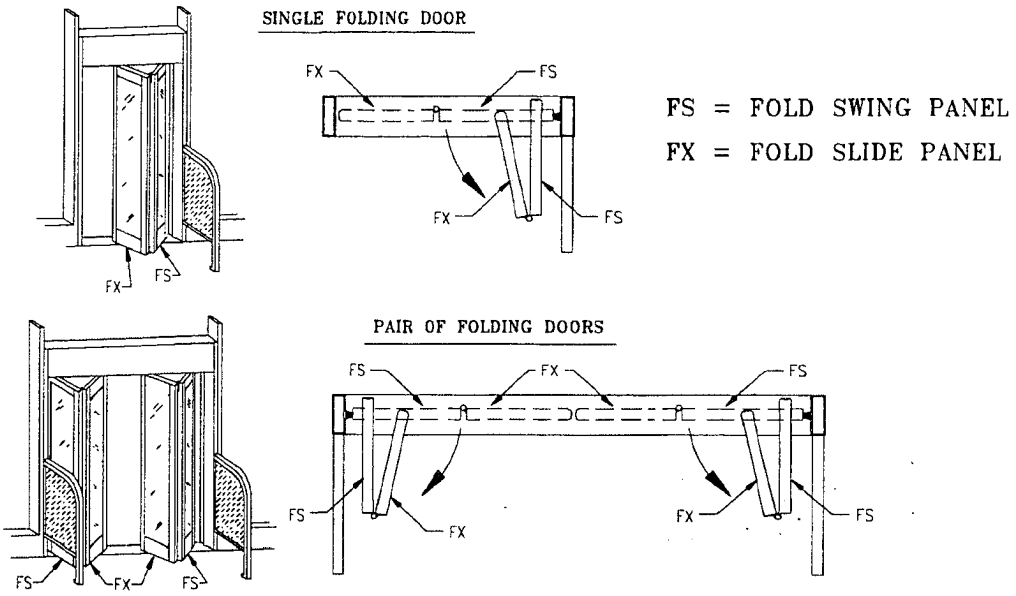
TWO-WAY TRAFFIC

REFER TO 8.2.3 FOR ONE-WAY TRAFFIC

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

FOLDING DOORS PANEL LAYOUT

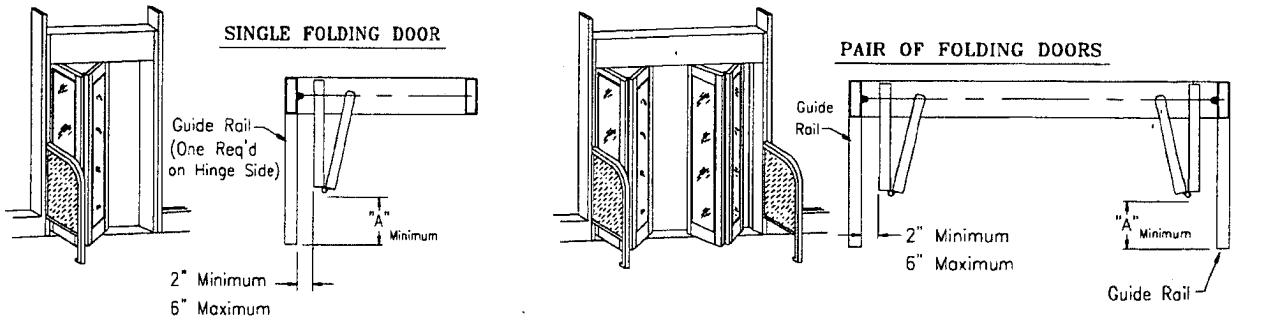
Figure A-14
(Ref. 5.0)



FS = FOLD SWING PANEL
FX = FOLD SLIDE PANEL

GUIDE RAIL LAYOUTS FOR FOLDING DOORS

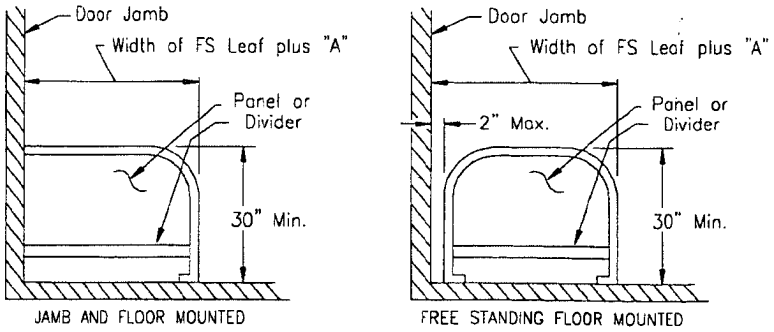
Figure A-15
(Ref. 6.2)



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

or

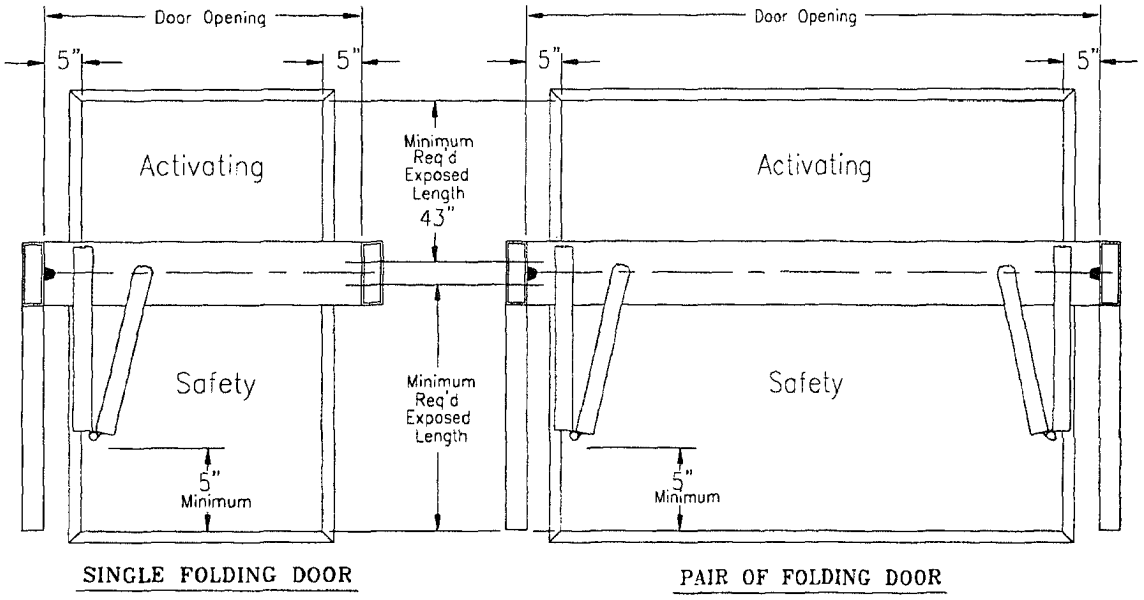
5 inches, (130 mm), for One Way Traffic approaching from the Non-Fold Side.



CONTROL MAT LAYOUTS FOR FOLDING DOORS

Figure A-16
(Ref. 7.5 through 7.5.4.)

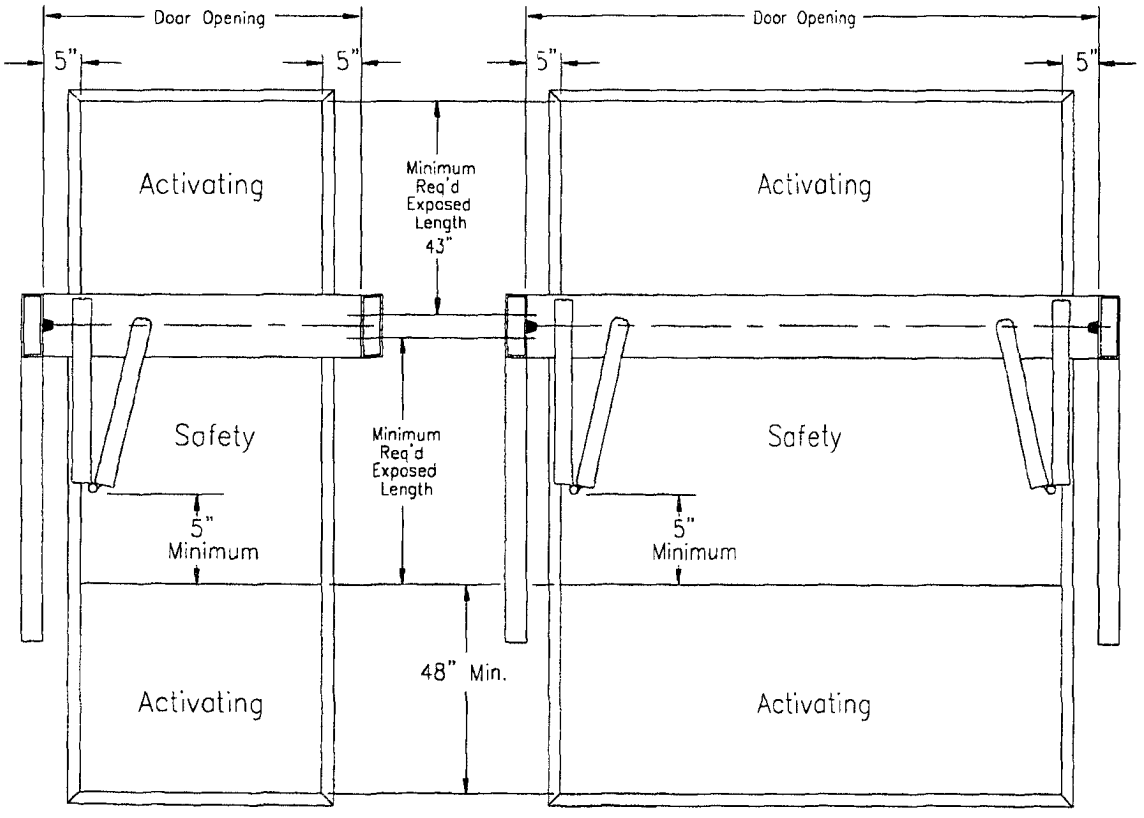
CONTROL MAT LAYOUT FOR ONE-WAY TRAFFIC FOLDING DOORS



SINGLE FOLDING DOOR

PAIR OF FOLDING DOOR

CONTROL MAT LAYOUT FOR TWO-WAY TRAFFIC FOLDING DOORS

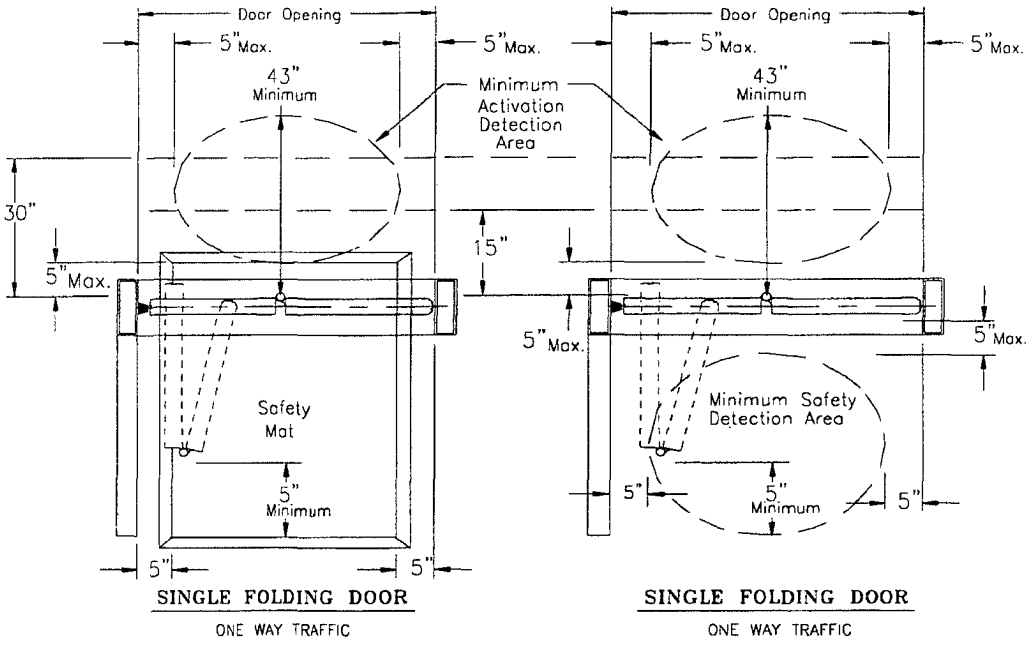


DETECTION PATTERN LAYOUTS FOR FOLDING DOORS

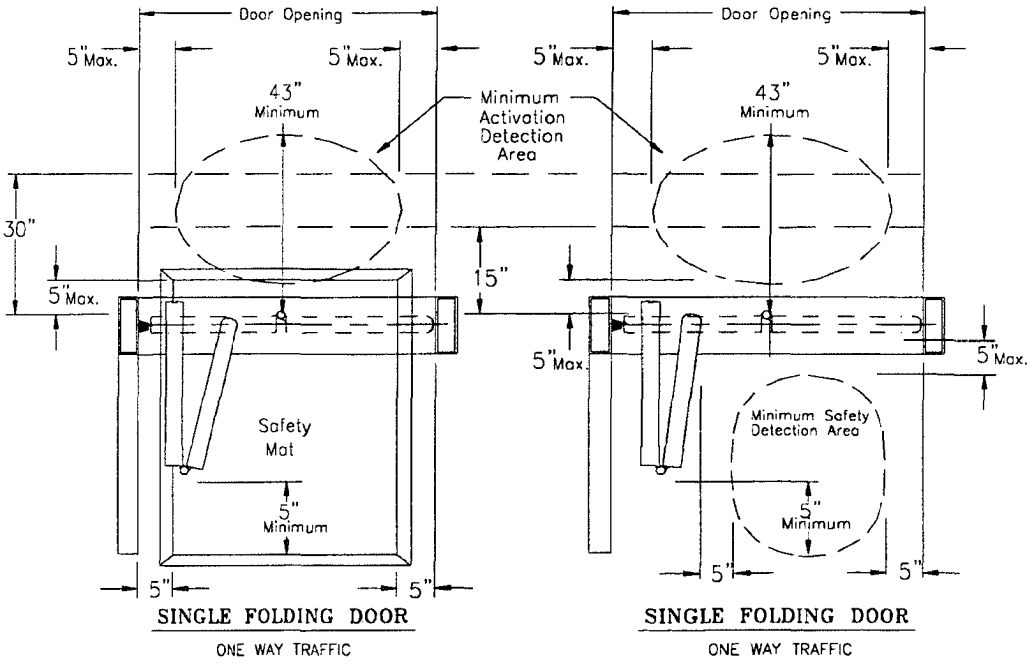
Figure A-17A

(Ref. 8.3 through 8.3.6.)

ONE WAY TRAFFIC WITH APPROACH FROM NON-FOLD SIDE



WITH DOORS CLOSED



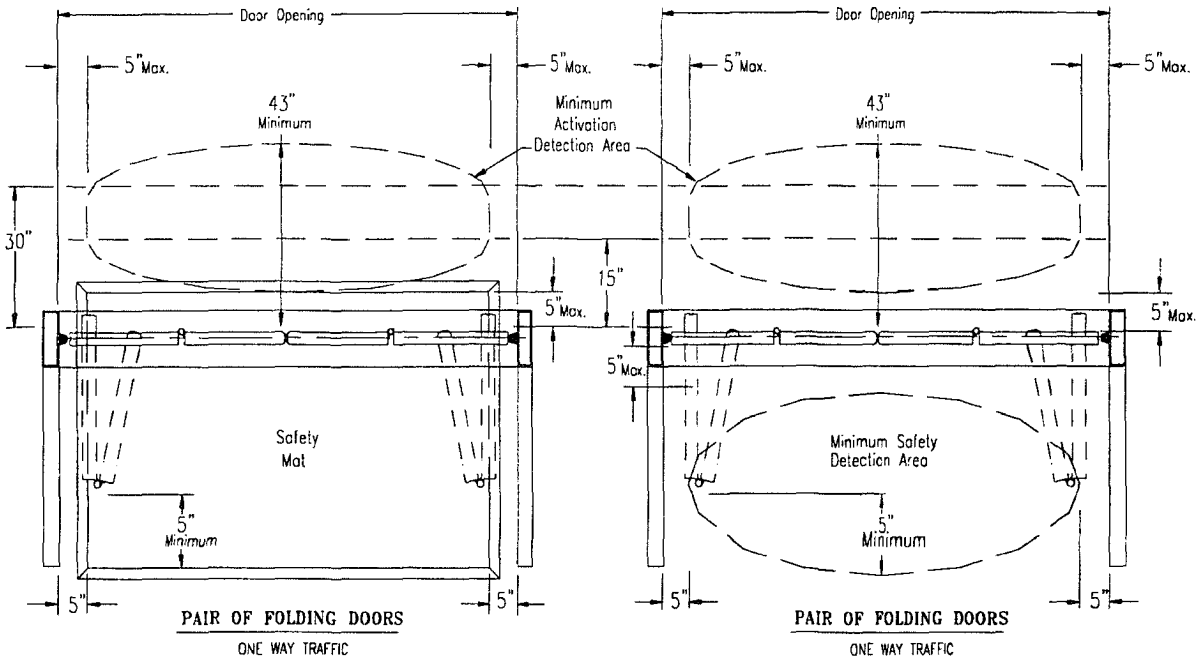
WITH DOORS OPEN

APPENDIX A (Continued)

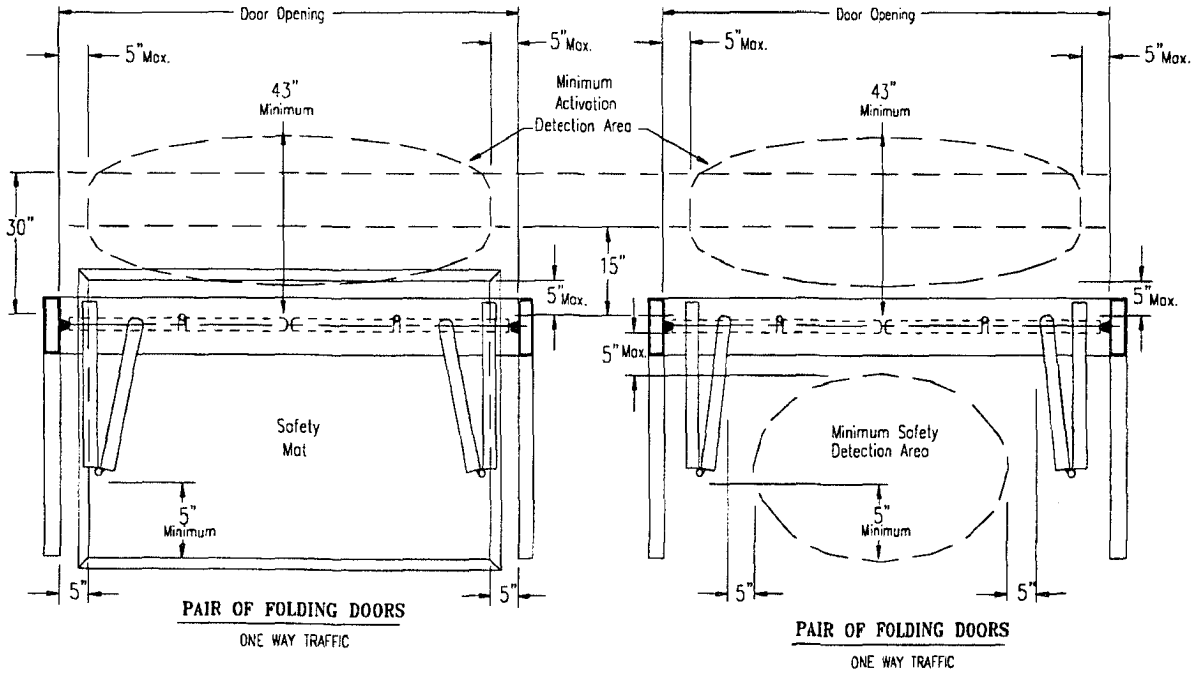
DETECTION PATTERN LAYOUTS FOR FOLDING DOORS

Figure A-17B

(Ref. 8.3 through 8.3.6.)



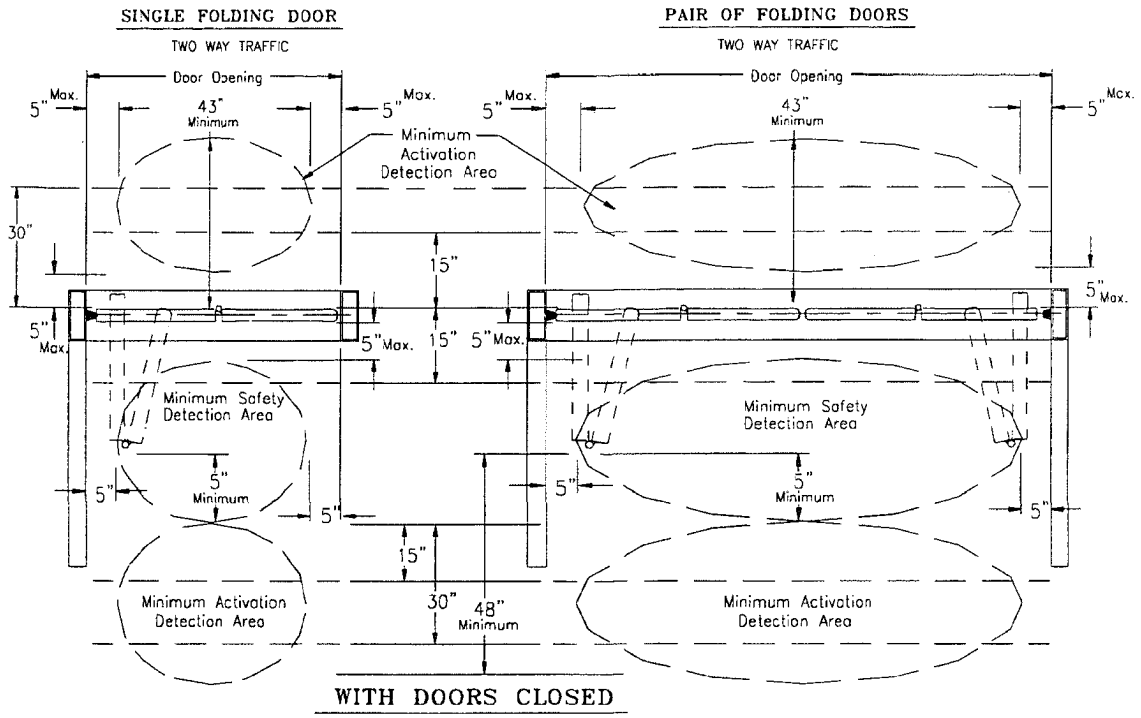
WITH DOORS CLOSED



WITH DOORS OPEN

DETECTION PATTERN LAYOUTS FOR FOLDING DOORS

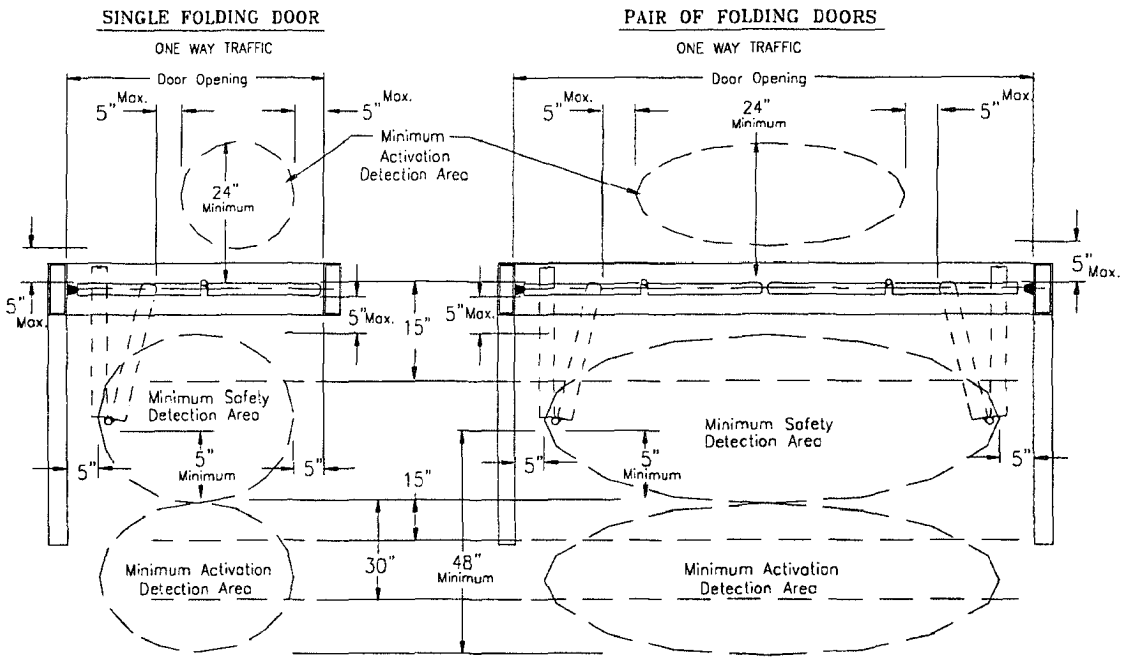
Figure A-17C (Ref. 8.3 through 8.3.6.)



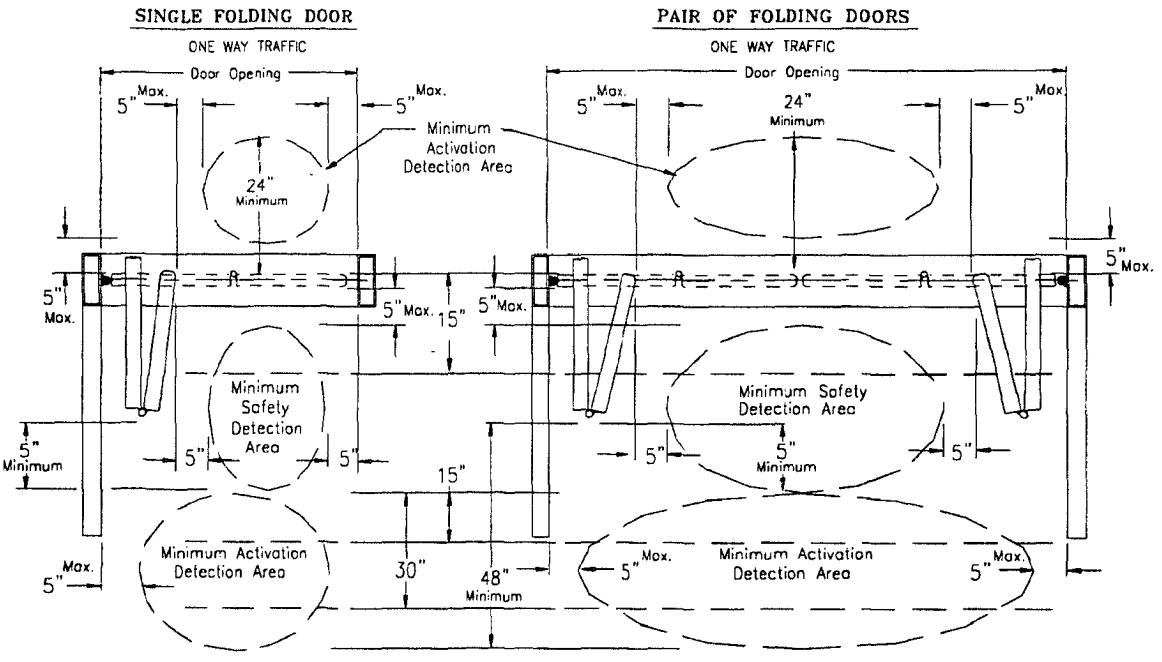
DETECTION PATTERN LAYOUTS FOR FOLDING DOORS

Figure A-17D (Ref. 8.3.2.1)

ONE WAY TRAFFIC WITH APPROACH FROM FOLD SIDE

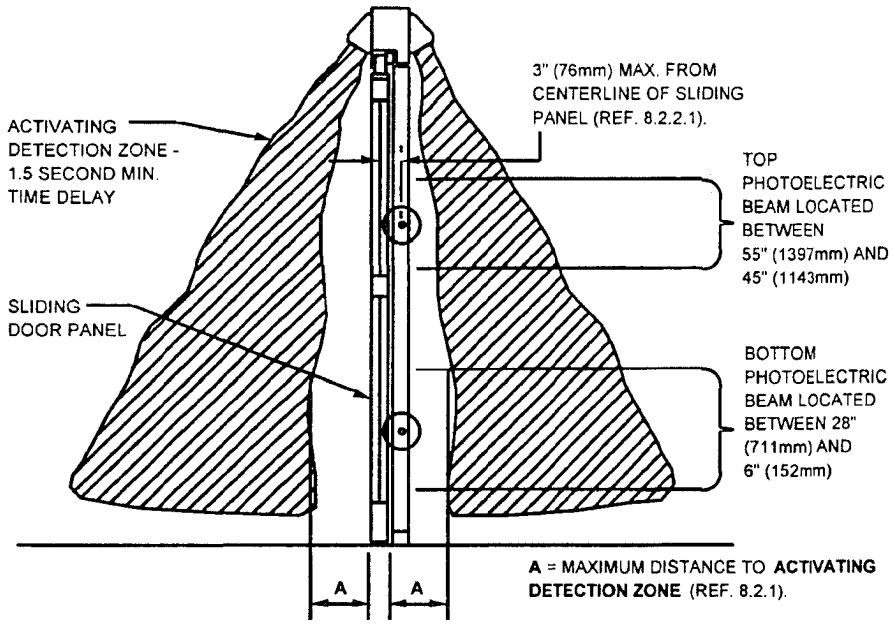


WITH DOORS CLOSED

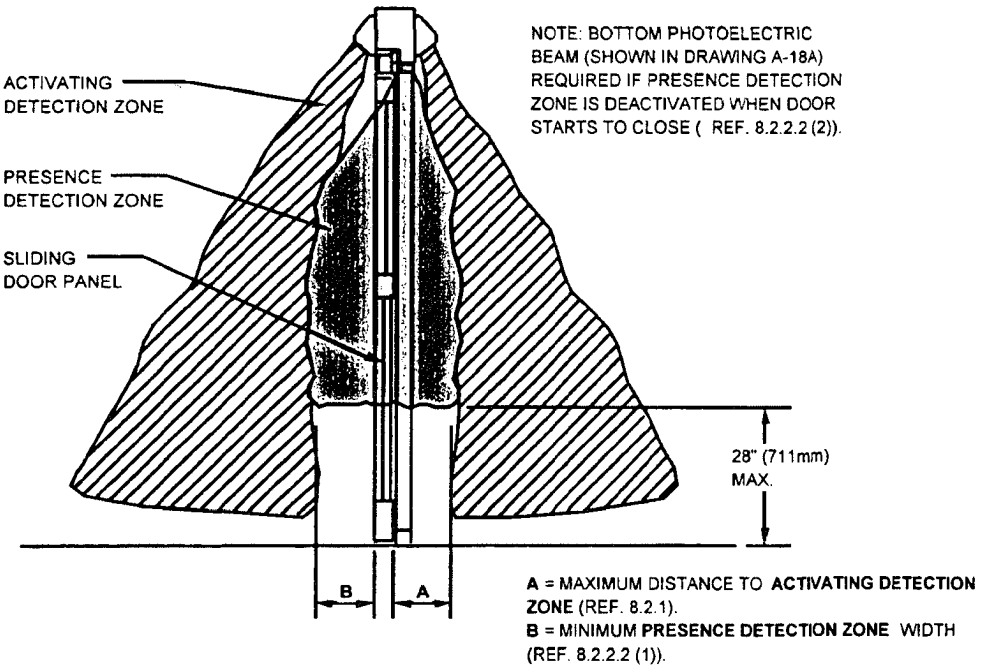


WITH DOORS OPEN

A-18A (Ref. 8.2.1 and 8.2.2.1) VERTICAL SECTION - SLIDE DOOR SHOWING ACTIVATING DETECTION AND PHOTOELECTRIC BEAM ZONES.

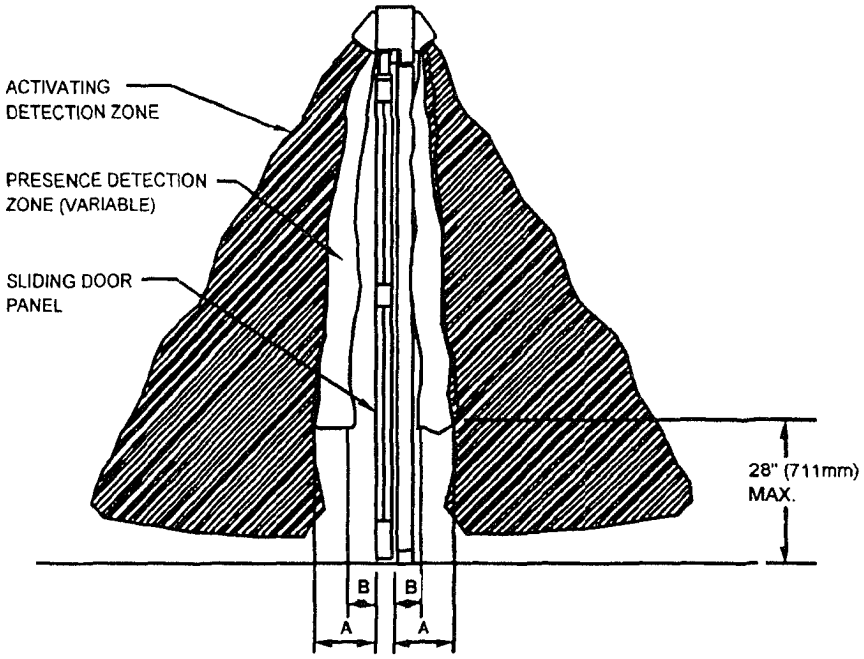


A-18B (Ref. 8.2.1 and 8.2.2.2) VERTICAL SECTION - SLIDE DOOR SHOWING ACTIVATING AND PRESENCE DETECTION ZONES.



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

A-18C (Ref. 8.2.1 & 8.2.2.3) VERTICAL SECTION - SLIDE DOOR SHOWING ACTIVATING AND PRESENCE DETECTION ZONES.



A = MAXIMUM DISTANCE TO **ACTIVATING DETECTION ZONE** (REF. 8.2.1).
B = MAXIMUM DISTANCE TO **PRESENCE DETECTION ZONE** (REF. 8.2.2.3 (1)).

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

APPENDIX B

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

DECAL FOR ALL AUTOMATIC DOORS

Ⓐ AUTOMATIC DOOR

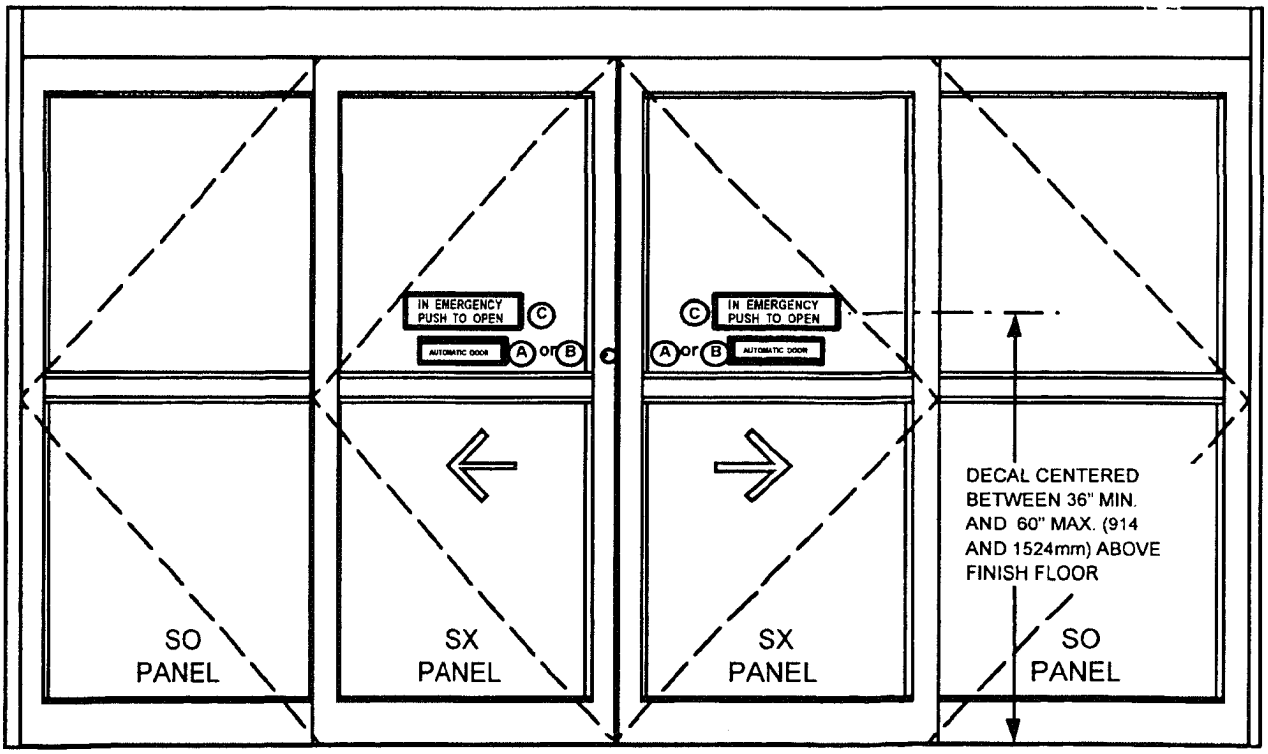
DECAL FOR 'KNOWING ACT DOORS'

Ⓑ AUTOMATIC DOOR
ACTIVATE SWITCH
TO OPERATE

DECAL FOR SLIDING DOORS WITH SWINGING PANELS

Ⓒ IN EMERGENCY
PUSH TO OPEN

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.

APPENDIX B

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

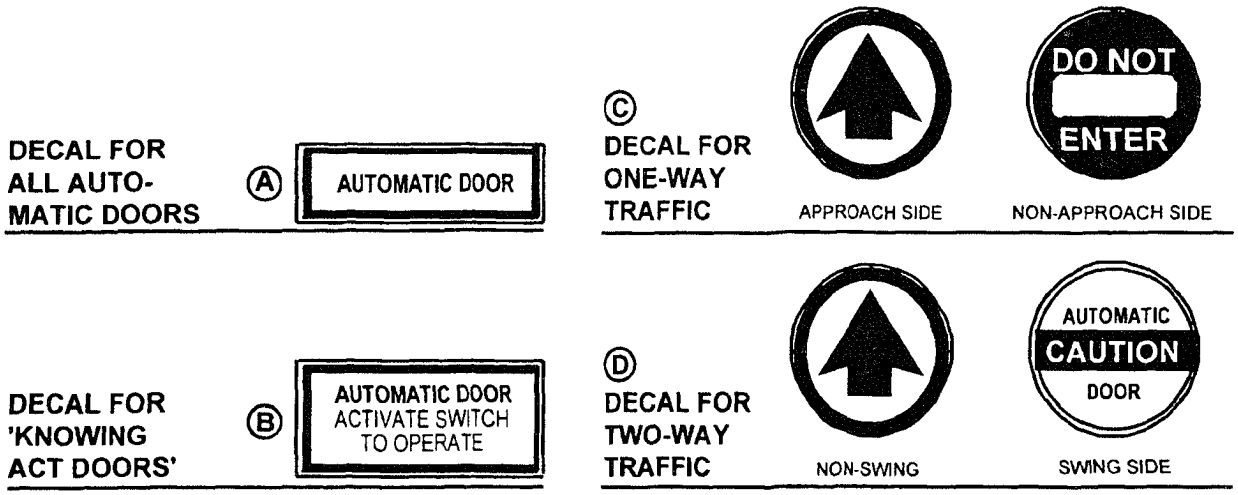
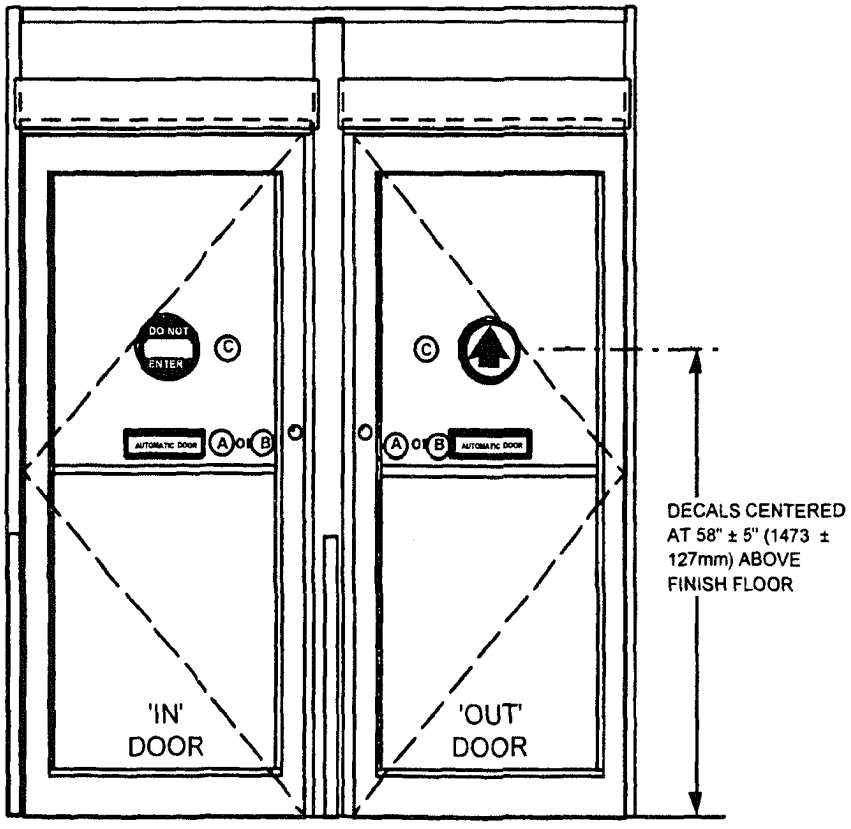


FIGURE B-4 (Ref. 11.)
INTERIOR VIEW - AUTOMATIC SWING DOORS WITH APPROPRIATE SIGNAGE FOR ONE-WAY TRAFFIC CONTROL.



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

APPENDIX B

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

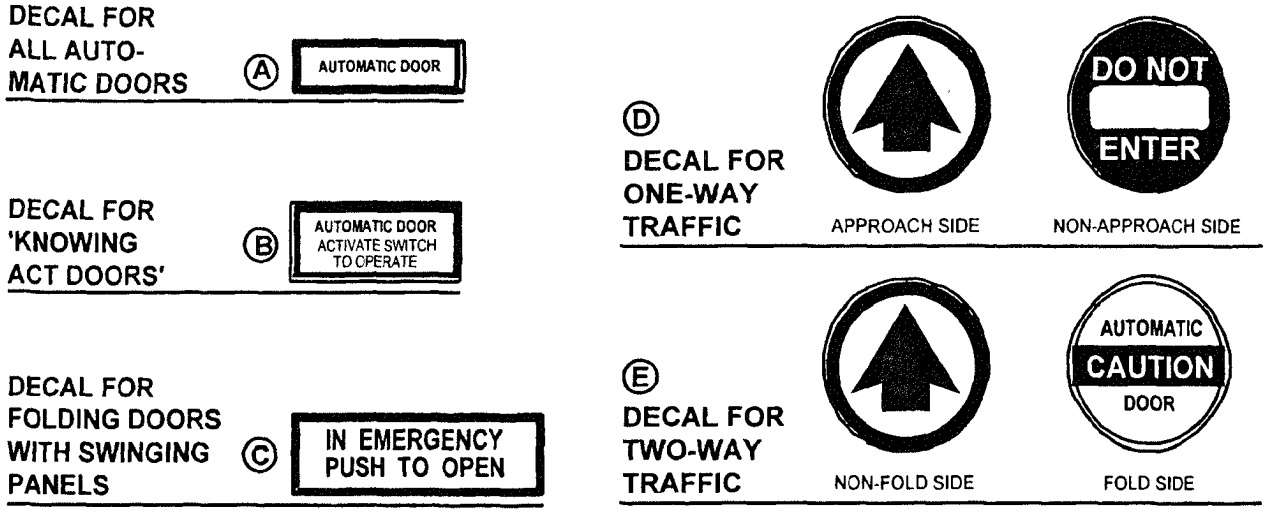
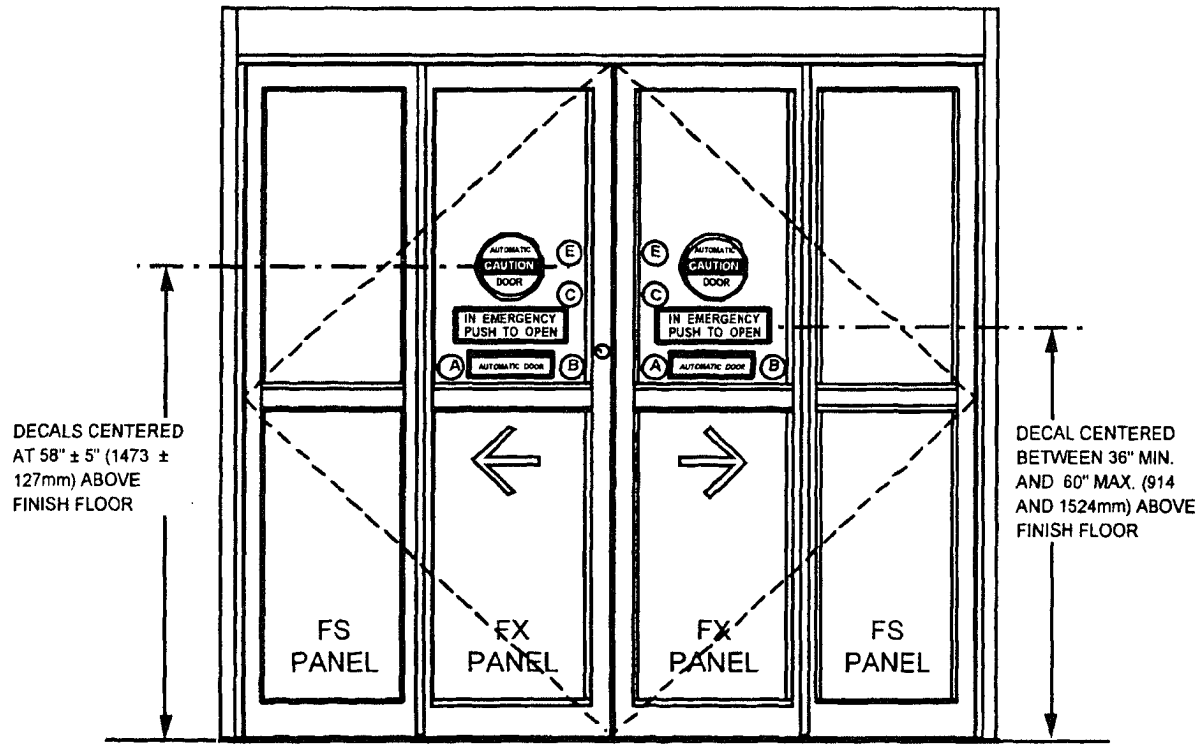


FIGURE B-6 (Ref. 11.)
INTERIOR VIEW (FOLD SIDE) - TYPICAL FOLDING DOOR WITH APPROPRIATE SIGNAGE FOR TWO-WAY TRAFFIC.



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 actuate an automatic door.

Arm. A device connecting the door operator to the door. It is concealed, semi-concealed or surface applied.

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.

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

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.

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 actuate 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. Actuating 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 open 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 A123.1 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 are also required to comply with Chapter 5, Means of Egress, of the Code for Safety from Fire in Buildings and Structures. ANSI/NFPA 101.*

D1.4 Where required by the authority having jurisdiction, products meeting the requirements of this Standard are required to comply with UL 325** and be listed or labeled by a nationally recognized independent testing laboratory and be under a periodic examination service.

D1.5 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.

* Available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, New York 10036.

**Available from Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60662.