

STANDARD
FOR
POWER OPERATED PEDESTRIAN DOORS

SPONSOR



BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.



American National Standards Institute
Approved August 2, 2011

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, www.ansi.org.

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** 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** 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 Swing Doors** A pair of doors with no mullion that swing in opposite directions
- 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 **Telescoping Sliding Doors** A type of sliding door with two or more leaves that slide in the same direction, and arrive at the full open position at the same time.
- 2.36 **Threshold** A floor mounted horizontal member installed beneath a closed door or in a clear door opening.
- 2.37 **Trained Traffic** People trained in the safe use and operation of a particular automatic door installation.
- 2.38 **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, A12-A,B,C, A19-A,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 finished 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.

Exception: A wall 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.

6.2.2 Guide rails shall comply with 6.1.2 through 6.1.5.

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 4 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 4 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 $N = 15 \text{ lb. (7 kg)}$ weight (See 7.6.3.2) and $F = 10 \text{ lbf (44 N)}$ 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 4 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. **Exception:** If the 43" activating zone length is not practical due to physical or environmental conditions, it shall be permissible to be reduced to 30 inches, along with an additional sign, visible from the side the zone has been reduced on, stating "AUTOMATIC CAUTION DOOR" as described in 11.2.3.

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 presence 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 presence sensor** on the swing side is prevented from providing a safety signal to the control during the **closing** cycle, an additional sensor, sensors, or photo beam shall be used on the swing side to

- 1) stop the door, or
- 2) continue to close the door, or
- 3) slow the reopening door to a maximum latch edge speed of 4 in. per second measured within 1 in. of the latch edge before any contact is made.

8.2.2.2.1 When using a photo beam, the detection width shall be not less than the clear opening; the beam shall be located between 6 and 28 in. above the finish floor, and not more than 8 in. from the lead edge of the door panel in the full open position (See Figure A-12A).

8.2.2.2.2 When using a door mounted presence sensor, the detection area shall be effective to within 5 in. from the face of the door, for one half of the width of the door, and to within 1 in. of the lead edge, and shall detect a 28 in. minimum high person fully in the defined area. (See Figure A-12A).

8.2.2.3 If a **door mounted presence 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 inches 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&D tbd.) 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 4 seconds minimum after the activating zone is clear; or
- 4) be equipped with a door mounted **presence** 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 **presence** 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 fully 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 45-55 in. 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 an overhead presence sensor active area within 3 in. from the face of the door or, 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.
- (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.
- (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.

8.3.4 **Telescoping Sliding Doors** Activating sensors, overhead presence sensors, and beams are measured to the closest sliding panel on the side they are installed. If overhead presence sensors or beams are used, they shall not have an inactive area more than three inches from the face of the closest sliding panel, and not create an inactive area greater than 10 inches between the two non overlapping zones, and shall comply with the methods listed in 8.3.2.1 through 8.3.3. If the inactive area between the two non-overlapping zones exceeds 8 inches, the door shall remain fully open for 2.5 seconds minimum after loss of detection.

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; 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/safety zone; or
- 3) the door closing cycle shall have a delay of 4 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; 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 activating zone is clear. (See Figure A-17A & A-17B.)

9. KNOWING ACT DOOR ACTIVATION

9.1 **Swinging** (except double egress), **Sliding, and Folding Doors**

Use of a **knowing act 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.

9.1.2 Have an installation height of a minimum of 36 in. and a maximum of 48 in., or as specified by the local building codes.

9.1.3 Shall 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.

9.1.4 The door shall remain fully open for a minimum **time delay** of five seconds after release of the knowing act device. If located more than 12 feet from the center of the door, there shall be an additional time delay of one second for each additional foot. For example, if the knowing act device is located 14 feet from the door, the delay shall be seven seconds.

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

9.1.6 **Sliding and folding doors** for one or two way traffic require a secondary activating zone on each side the door extending a minimum of 24 in. from the face of the door and 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, and shall be deactivated when the door (s) is (are) within 6 in. of the fully closed position.

9.1.7 **Swinging** (except double egress), doors for one or two way traffic require the secondary activating zone only on the non swing side of the door. The secondary activating zone must remain active while the door is closing and shall be deactivated within the last 10 degrees of closing. Also, one of the following requirements shall be met:

- 1) 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 closed door measured at the center of the door opening. The secondary activating zone shall have a minimum width equal to the clear door opening, or
- 2) Door mounted sensors complying with 8.2.2.3 are acceptable to be used as a secondary activating zone.

9.1.8 **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.

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 presense 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-19B, 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 and shall extend a minimum 24 in. from the face of the door.
- b. **Door mounted sensors** shall meet 8.2.2.3. (A-19B)
- c. When **control mats** are used they shall extend a minimum 24 in. from the face of the door.
- d. 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.
- e. 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 activated.