AMERICAN NATIONAL STANDARD
FOR
POWER AND MANUAL OPERATED REVOLVING PEDESTRIAN DOORS

SPONSOR
BUILDERS HARDWARE MANUFACTURERS ASSOCIATION, INC.

AMERICAN NATIONAL STANDARDS INSTITUTE, INC.
Approved June 5, 2003
AMERICAN NATIONAL STANDARD

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FOREWORD  (This Foreword is not a part of ANSI/BHMA A156.27)

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. Section P, Power Doors and Components 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. **SCOPE**

1.1 Requirements in this standard apply to power operated revolving type doors which rotate automatically when approached by pedestrians, some small vehicular use, and manual revolving type doors for pedestrians. Included are provisions to reduce the chance of user injury and entrapment. Revolving doors for industrial or trained traffic are not covered in this Standard.

1.2 Where this standard contains specifications relating to maximum and minimum dimensions of various components of revolving 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 attempt to assess any factors that exist with respect to custom installations.

2. **DEFINITIONS**

2.1 **Active area** An area where sensors detect presence or motion.

2.2 **Automatic Door Operator** A power operated mechanism that is attached to a revolving door for the purpose of mechanically opening a door upon the receipt of an activating signal. (Also called a power operated door.)

2.3 **Bookfold Position** When each wing has been released from its fixed position permitting wings to pivot in the direction of egress.

2.4 **Bottom rail** The lower horizontal member of the door wing.

2.5 **Break out** A process whereby wings can be pushed open manually in the swing mode for emergency egress with all wings positioned beside each other in the direction of egress (codes refer to this as bookfold).

2.6 **Canopy** The area above the wings and enclosure comprised of a ceiling (soffit), fascia, and roof (optional).

2.7 **Center shaft** The rotating center, 12 in. (150 mm) or less in diameter, of revolving doors to which the wings are attached.

2.8 **Clearance** The minimum gap around the wing to the ceiling, enclosure, and floor, not including the weather stripping, at any point in its rotation.

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

2.10 **Core** The rotating central portion, greater than 12 in. (150 mm) in diameter, of a large diameter revolving door to which the wings are attached.

2.11 **Emergency stop** Any action or signal that causes the door to stop rotation.

2.12 **Enclosure** The walls in which the wings operate. Also known as Drum.

2.13 **Fascia** The vertical surface(s) of the canopy.

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

2.15 **Manual operation** The capability of rotating the revolving door by a person applying a force to a door wing.

2.16 **Manual speed control** A device used to regulate revolving door speed.

2.17 **Motion sensor** A sensor designed to detect the movement of a person or equivalent at the point of entry to the door that gives a control signal to the power operated door.
2.18 **Power operated door**  A power operated mechanism that is attached to a revolving door for the purpose of mechanically opening a door upon the receipt of an activating signal. (Also called Automatic Door.)

2.19 **Peripheral speed**  The rotating speed of a revolving door measured at the outer edge of the wing.

2.20 **Presence sensor**  A sensor designed to detect the presence of a person or equivalent at the point of entry of the door or leading face of the wing that gives a control signal to the power operated door.

2.21 **Control mat**  A presence sensing mat that detects people or objects at the point of entry to the door, inside the enclosure, or the leading face of the wing that gives a control signal to the automatic revolving door. Used as an activating device, it causes the door to open, and when used as a detection device, it verifies the presence of a person and signals the door operator.

2.22 **Push bar**  A bar attached to the wing upon which pressure is applied to set a manual revolving door in motion. A push bar is not required on automatic revolving doors.

2.23 **Push to slow device**  A switch used to signal the reduction of speed of the revolving door.

2.24 **Safety glass**  Comprised of either fully tempered or laminated glass to prevent injuries from breakage.

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

2.26 **Slow speed**  The reduced speed from the normal speed when a signal is given.

2.27 **Small vehicular**  Carts used to transport people or objects.

2.28 **Starting force, automatic**  The amount of force generated by a power operated door from a stopped position to place it in motion.

2.29 **Starting force, manual**  The manual force required to set a manual revolving door in motion.

2.30 **Stile**  A vertical edge member of the door wing.

2.31 **Throat opening**  The width between the sidewalls that creates the entry point.

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

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

2.34 **Weather stripping**  The material used to fill the clearance.

2.35 **Wing**  A panel which rotates within and seals the enclosure. (Sometimes called a leaf.)

3. **GENERAL**

3.1 Required dimensions are expressed in U.S. units first. SI metric values, given in parentheses, are approximate.

3.2 Referenced American National Standards are available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036 or www.buildershardware.com.

3.3 **Tolerances**  Where only minus tolerances are given, the dimensions are permitted to be exceeded at the option of the manufacturers. Linear dimensions shall be ± 1/4 in. (6mm) unless otherwise specified.

3.4 Measuring equipment shall consist of linear measuring devices, commercial torque measuring devices, force meters, load dynamometers and tension loading devices capable of a combined calibration and reading accuracy within 5% to obtain test data as specified in the applicable Performance Tests.

4. **MANUAL REVOLVING DOORS**
4.0 Manual revolving door systems have a variety of configurations. This section of the standard deals with manual revolving door systems with a center shaft. This is a small diameter revolving door with 3 or 4 wings. The wings are attached to a center shaft and surrounded by an enclosure. A manual revolving door shall include manual speed control and breakout for the safety and convenience of the user.

4.1 **Enclosure Size** Maximum inside diameter 10ft (3048mm). Maximum height under canopy 10ft (3048mm). To limit the total door mass, the diameter added to the height shall not exceed 17ft (5185mm).

4.2 **Acceptable Door RPM** The maximum allowable RPM of the door shall be:

<table>
<thead>
<tr>
<th>Inside Diameter (Maximum)</th>
<th>6ft (1828mm)</th>
<th>7ft (2133mm)</th>
<th>8ft (2438mm)</th>
<th>9ft (2743mm)</th>
<th>10ft (3048mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual Speed Control (RPM)</td>
<td>12</td>
<td>11</td>
<td>10</td>
<td>9</td>
<td>8</td>
</tr>
</tbody>
</table>

4.3 **Egress** shall be in accordance with Section 10.

4.4 **Signage** Not applicable.

4.5 **Glazing** shall be in accordance with Section 12.

4.6 **Clearances** shall be in accordance with Section 13.

5. **AUTOMATIC REVOLVING DOORS WITH A CENTER SHAFT**

5.0 Automatic revolving door systems have a variety of configurations. This section of the standard deals with automatic revolving door systems with a center shaft. This is a small diameter revolving door with 3 or 4 wings. The wings are attached to a center shaft and surrounded by an enclosure. An automatic revolving door shall include safety systems, other control devices and proper signage for the safety and convenience of the user.

5.1 **Enclosure Size** Maximum inside diameter shall be 12 ft. 6 in. (3810mm). The maximum height under the canopy shall be 8 ft. 6 in. (2590mm).

5.2 **Acceptable Door RPM** The maximum allowable RPM of the door shall be:

<table>
<thead>
<tr>
<th>Inside Diameter (Maximum)</th>
<th>8ft (2438mm)</th>
<th>9ft (2743mm)</th>
<th>10ft (3048mm)</th>
<th>11ft (3352mm)</th>
<th>12ft (3657mm)</th>
<th>12ft 6in. (3810mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Driven-type Speed Control (RPM)</td>
<td>7.2</td>
<td>6.4</td>
<td>5.7</td>
<td>5.2</td>
<td>4.8</td>
<td>4.6</td>
</tr>
</tbody>
</table>

5.3 **Egress** shall be in accordance with Section 10.

5.4 **Signage** shall be in accordance with Section 11.

5.5 **Glazing** shall be in accordance with Section 12.

5.6 **Clearances** shall be in accordance with Section 13.

5.7 **Starting Force** shall be in accordance with Section 14.

5.8 **Slow Speed Operation** shall be in accordance with Section 15.

5.9 **Wing Sensors** shall be in accordance with Section 16.
5.10 **End Wall and Bottom Rail Sensors** shall be in accordance with Section 17, except bottom rail sensors are not required on doors with an operator sensing device or circuit, provided they provide equivalent performance of 17.2.

5.11 **Kinetic Energy Requirements** shall be in accordance with Section 18.

5.12 **Door out of Position** shall be in accordance with Section 19.

5.13 **Emergency Stop Switch** shall be in accordance with Section 20.

5.14 **Activating Device** shall be in accordance with Section 21.

6. **AUTOMATIC REVOLVING DOORS WITH A CORE**

6.0 Automatic revolving door systems have a variety of configurations. This section of the standard deals with automatic revolving door systems with a core. This is a large diameter revolving door with 3 or 4 wings. The wings are attached to a center core and surrounded by an enclosure. An automatic revolving door shall include safety systems, other control devices and proper signage for the safety and convenience of the user.

6.1 **Enclosure Size**: Minimum inside diameter 10 ft. (3048mm), maximum inner diameter 24 ft. (7315mm), maximum height under the canopy 8 ft (2438mm).

6.2 **Acceptable Door RPM** The maximum allowable RPM of the door shall be

<table>
<thead>
<tr>
<th>Inside Diameter (Maximum)</th>
<th>10 to 14 ft (4267mm)</th>
<th>15 ft (4572mm)</th>
<th>16 ft (4876mm)</th>
<th>17 ft (5181mm)</th>
<th>20 ft (5486mm)</th>
<th>24 ft (7315mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Driven-Type Speed Control (RPM)</td>
<td>4.1</td>
<td>3.8</td>
<td>3.6</td>
<td>3.4</td>
<td>2.9</td>
<td>2.4</td>
</tr>
</tbody>
</table>

6.3 **Egress** shall be in accordance with Section 10.

6.4 **Signage** shall be in accordance with Section 11.

6.5 **Glazing** shall be in accordance with Section 12.

6.6 **Clearances** shall be in accordance with Section 13.

6.7 **Starting Force** shall be in accordance with Section 14.

6.8 **Slow Speed Operation** shall be in accordance with Section 15.

6.9 **Wing Sensors** shall be in accordance with Section 16.

6.10 **End Wall and Bottom Rail Sensors** shall be in accordance with Section 17.

6.11 **Kinetic Energy Requirements** shall be in accordance with Section 18.

6.12 **Door out of Position** shall be in accordance with Section 19.

6.13 **Emergency Stop Switch** shall be in accordance with Section 20.

6.14 **Activating Device** shall be in accordance with Section 21.

7. **AUTOMATIC TWO WING REVOLVING DOORS**
7.0 Automatic revolving door systems have a variety of configurations. This section of the standard deals with automatic revolving door with 2 wings. The wings have panels at the perimeter to seal off the throat and the wings are surrounded by an enclosure. A revolving door shall include safety systems, other control devices and proper signage for the safety and convenience of the user.

7.1 **Enclosure Size:** Minimum inside diameter 7 ft. (2135mm), maximum inside diameter 18 ft. (5490mm) maximum height under the canopy 8 ft (2438mm).

7.2 **Acceptable Door RPM:** The maximum allowable RPM of the door shall be (typical sizes shown, see appendix for formulas for other sizes):

<table>
<thead>
<tr>
<th>Inside Diameter (Maximum)</th>
<th>12ft (4267mm)</th>
<th>14ft (4572mm)</th>
<th>16ft (4876mm)</th>
<th>17ft (5181mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Driven-type Speed Control (RPM)</td>
<td>4.8</td>
<td>4.1</td>
<td>3.6</td>
<td>3.4</td>
</tr>
</tbody>
</table>

7.3 **Egress** shall be in accordance with Section 10.

7.4 **Signage** shall be in accordance with Section 11.

7.5 **Glazing** shall be in accordance with Section 12.

7.6 **Clearances** shall be in accordance with Section 13.

7.7 **Starting Force** shall be in accordance with Section 14.

7.8 **Slow Speed Operation** shall be in accordance with Section 15.

7.9 **Wing Sensors** shall be in accordance with Section 16.

7.10 **End Wall and Bottom Rail Sensors** shall be in accordance with Section 17.

7.11 **Kinetic Energy Requirements** shall be in accordance with Section 18.

7.12 **Door out of Position** shall be in accordance with Section 19.

7.13 **Emergency Stop Switch** shall be in accordance with Section 20.

7.14 **Activating Device** shall be in accordance with Section 21.

8. **ACCESS CONTROLLED REVOLVING DOORS**

Automatic revolving door systems have a variety of configurations. This section of the standard deals with automatic revolving door systems with wings that are surrounded by an enclosure. The primary application is access control by knowing act. An automatic revolving door shall include safety systems, other control devices and proper signage for the safety and convenience of the user.

8.1 **Enclosure Size:** maximum inside diameter 8 ft.6 in. (2590mm). Maximum height under the canopy 8ft 6 in (2590mm).

8.2 **Acceptable Door RPM:** The maximum allowable RPM of the door shall be 4.

8.3 **Egress** shall be in accordance with Section 10.

8.4 **Signage** shall be in accordance with Section 11.

8.5 **Glazing** shall be in accordance with Section 12.

8.6 **Clearances** shall be in accordance with Section 13.
8.7 **Starting Force** shall be in accordance with Section 14.

8.8 **Slow Speed Operation and Activation** is Not Applicable.

8.9 **Wing Sensors** are Not Applicable.

8.10 **End Wall and Bottom Rail Sensors** shall be in accordance with Section 17 for End Wall Sensors only.

8.11 **Kinetic Energy Requirements.** These doors shall not be operated with an RPM that results in greater than 7 ft.lb kinetic energy.

8.12 **Door out of Position** is Not Applicable.

8.13 **Emergency Stop Switch** shall be in accordance with Section 20.

8.14. **Unauthorized Entry.** A blocking mat or sensor is permitted to stop, or stop and reverse a door upon unauthorized entry. If reversing there shall be a delay of 2 seconds minimum. Reversing force shall be 2.5 ft.lb kinetic energy maximum.

9. **ACCESS CONTROLLED - ONE WAY FREE PASSAGE (AIRPORT ACCESS)**

9.0 Automatic revolving door systems have a variety of configurations. This section of the standard deals with automatic revolving door systems with 2, 3 or 4 wings that are surrounded by an enclosure. The primary application is one way free passage out of a controlled area and to block access into the controlled area. One Way Free Passage Revolving Doors shall meet the requirements for the door type. A revolving door shall include safety systems, other control devices and proper signage for the safety and convenience of the user.

9.1 **Enclosure Size.** Maximum inside diameter 12ft (3660mm), maximum height under the canopy 8ft 6 in. (2590mm).

9.2 **Acceptable Door RPM.**

<table>
<thead>
<tr>
<th>Inside Diameter (Maximum)</th>
<th>6ft (1829mm)</th>
<th>7ft (2134mm)</th>
<th>8ft (2438mm)</th>
<th>8.5ft (2590mm)</th>
<th>10ft (3048mm)</th>
<th>12ft (3660mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Driven Type Speed Control (RPM)</td>
<td>9.6</td>
<td>8.2</td>
<td>7.2</td>
<td>6.8</td>
<td>5.7</td>
<td>4.8</td>
</tr>
</tbody>
</table>

9.3 **Egress** shall be in accordance with Section 10.

9.4 **Signage** shall be in accordance with Section 11.

9.5 **Glazing** shall be in accordance with Section 12.

9.6 **Clearances** shall be in accordance with Section 13.

9.7 **Starting Force** shall be in accordance with Section 14.

9.8 **Slow Speed Operation** shall be in accordance with Section 15.

9.9 **Wing Sensors** shall be in accordance with Section 16.

9.10 **End Wall and Bottom Rail Sensors** shall be in accordance with Section 17 for End Wall Sensors only.

9.11 **Kinetic Energy Requirements** shall be in accordance with Section 18.

9.12 **Door out of Position** is Not Applicable.
9.13 **Emergency Stop Switch** shall be in accordance with Section 20.

9.14 **Unauthorized Entry** A blocking mat or sensor is permitted to stop, or stop and reverse a door upon unauthorized entry. If reversing there shall be a delay of 2 seconds minimum. Reversing force shall be or 2.5 ft.lb kinetic energy maximum.

9.15 **Activating Device** Shall be in accordance with Section 21.

10. **REVOLVING DOOR EGRESS REQUIREMENTS**

10.1 **Egress Width Requirements.** When required under the applicable sections in this standard, a revolving door shall be capable of breakout with an egress path providing a 36in. (910mm) aggregate minimum width. Use of doors that do not breakout shall be approved by the authority having jurisdiction.

10.1.1 Two wing doors with automatic center panels shall automatically open in the absence of line power, activation of fire detection systems, or emergency stop functions. In the absence of line power or the activation of the fire detection system, the door shall position for egress. (see figures 2 and 3).

10.2 **Breakout Force Requirements.**

10.2.1 **Egress Component Force Requirements** Each revolving door wing shall be capable of breakout when a force 130 lb. (570 N) is applied at a point 3 in. (75 mm) from the outer edge of the outer wing stile and 40 in. (1020 mm) above the floor. Exception: Two wing doors with automatic center panels per 7.3 are excluded.

10.2.2 **Other than Egress Component Force Requirements** - Each revolving door wing used other than as a component of a means of egress shall be capable of breakout when a force of 180 lb. (790 N) is applied at a point 3 in. (75 mm) from the outer edge of the outer wing stile and 40 in. (1020 mm) above the floor.

**Exception:** A breakout force in excess of 180 lb. (790 N) is permitted if the breakout force is reduced to a maximum of 130 lb. (570 N) when at least one of the following conditions is satisfied.

1. When the power to the device holding the door wings in place is removed;
2. The revolving door is capable of receiving and responding to a signal that indicates the actuation of the automatic sprinkler system;
3. The revolving door is capable of receiving and responding to a signal that indicates the actuation of a smoke detection system that is within 75 ft. (22,860 mm) of the revolving door;
4. A signal from a manual control reduces the holding force to a maximum 130 lb. (570 N) force.

11. **SIGNAGE**

11.1 **Automatic Door Sign:** Automatic revolving doors shall be marked with a visible sign. The sign shall include the words “Automatic Door”, minimum 1”(25mm) tall black letters placed at 50” +/- 12” (1270mm +/- 305mm) from the floor to the centerline of the sign. Additional information may be included.

11.2 **Slow Speed Activation Sign:** The sign shall read one of the following: “Activate to Slow”, “Push to Slow”, or “Press to Slow”. The letters shall be 5/8 in. (16 mm) minimum tall and located within 12 in. (305 mm) of the device.

11.3 **Emergency Stop Sign:** The sign shall read “Emergency Stop”. The letters shall be 5/8 in. minimum (16 mm) tall and located at within 12 in. (305 mm) of the emergency stop switch.

12. **GLAZING**
12.1 **Wing and Sidewall Glazing:** When glazing is used in the wings and sidewalls it shall be 0.25 in. (6mm) minimum safety glass in wings, and 0.25 in. (6 mm) minimum curved safety glass in sidewalls.

12.2 **Ceiling Glazing:** When glazing is used in the ceiling, it shall be 0.5 in. (13 mm) minimum safety glass.

13. **CLEARANCES**

13.1 **Clearances:** The side clearance shall be a minimum of 1.5in. (38mm) and a maximum of 3in. (75mm) between the rotating wing and the leading edge of the enclosure wall. The top clearance shall be a minimum of ½ in. (12mm) except when the ceiling rotates with the wings. The bottom clearance shall be a minimum of ½ in. (12mm) and a maximum of 1 ¾ in. (31mm). Exception: Security Revolving Doors require tighter side clearances.

14. **STARTING FORCE**

14.1 **Starting Force.** In the initial 1.5 seconds, the force required to prevent a stopped revolving door from rotating shall not exceed 50 lbf (222 N) applied 1 in. (25 mm) from the outer edge of the outer wing stile. The force to prevent the door from revolving after the 1.5 second initial start up shall not exceed 40 lbf (178 N).

15. **SLOW SPEED OPERATION AND ACTIVATION**

15.1 **Slow Speed Operation Activation:** One device on the interior and one device on the exterior sides of the door shall be placed within 48 in. (1220mm) of the right hand entry to the door. The device shall be located between 24 and 48 in. (610 to 1220mm) from the floor. The activation area of the button shall be a minimum of 1 in. (25 mm) diameter.

15.2 **Slow Speed Operation Requirements:** Shall be a maximum of ½ the RPM specified by the applicable door type for a minimum of one revolution.

16. **WING SENSORS**

16.1 **Wing Sensor:** When wing sensors are required (see Section 18.1), the sensor shall detect a 28in. (710mm) minimum high person or equivalent in the rotating path 10 in. (254mm) minimum from the face of the wing, and shall cause the door to stop or slow to the maximum allowed kinetic energy speed. The sensor shall provide an active area for the width of the wing less 15 in. from the center shaft and 5 in. from the outer edge of the outer stile.
17. END WALL AND BOTTOM RAIL SENSORS

17.1 End Wall / Leading Edge Sensor: A sensing device shall detect interference between the rotating wings and the leading edge of the enclosure. It shall be active within 2 in. (50mm) of the floor and shall be active for at least 60 in. (1520 mm) from the floor. Contact switches shall require no more than 10 lbf. (45N) pressure to activate. Upon receipt of a signal from the sensor, the door shall stop rotating.

17.2 Bottom Rail Sensor: A contact switch or optical sensing device shall be active in the rotating path of the wing. It shall be active within 2 in. (50 mm) from outer edge of the outer stile end and 6 in. (150 mm) from the center of the door and not higher than 4 in. (100 mm) from the finished floor. Contact switches shall require no more than 10 lbf. (45N) pressure to activate. Upon receipt of a signal, the door shall stop rotating.

17.3 End Wall and Bottom Rail Sensor Sensitivity Test

17.3.1 The circuit shall be activated when a solid test fixture 3 in. by 2 in. is depressed with 10 lbf (110 N) applied perpendicular to the sensor strip being tested. 17.3.2. The sensor strip shall be tested in three locations 12 in. (305mm) apart covering the active area.

17.3.3 The test shall be conducted at 68 degrees ± 5 degrees F (20 degrees ± 2 degrees C).

18. KINETIC ENERGY REQUIREMENTS

18.1 Kinetic energy Doors which operate in the acceptable RPM range and generate greater than 2.5 ft pounds of KE, must be equipped with wing sensors that reduce the kinetic energy of the door to less than 2.5 foot pounds before contact.

19. DOOR OUT OF POSITION

19.1 Door out of position: The door operator shall stop when a door wing is out of position a maximum of 15 degrees.

20. EMERGENCY STOP SWITCH

20.1 Emergency Stop Switch: An emergency stop switch shall be provided that will stop the door’s operation. The door will not restart until someone resets the switch. A minimum of one emergency stop switch button shall be installed within 48 in. (1220mm) of the door and not more than 48 in. (1220 mm) above the floor. The activation area of the button shall be a minimum of 1 in. (25 mm) diameter and shall be red.

21. ACTIVATING DEVICES

Select 21.1 or 21.2 as the desired activating device.

21.1 Motion sensors shall detect a 28 inch (710MM) minimum high person or equivalent and moving at a rate of 6 inches (150MM) per second minimum toward the center of the throat opening within the detection areas described. Electronic presence sensors shall detect a stationary 28 inch (710) minimum high person or equivalent within the detection area described. Activating detection areas shall have a minimum width equal to the width of the throat opening. The length shall be 43” (1092mm) minimum measured at the center of the throat opening. Refer to figures 5 and 6.
21.2 Control mats shall conform to paragraph 7.7 Performance Requirements in ANSI/BHMA A156.10-1999 Standard for Power Operated Doors. When used as an activating device for an automatic revolving door, the detection area width shall be as wide as the throat opening less 5 inches (127mm) inactive area on each side, and have a length of 43 inches (1092mm) from the center of the throat opening. Refer to Figures 5 and 6 for the placement of presence detection areas. Refer to Figure 11.
### TABLE 1 REVOLVING DOOR KINETIC ENERGY

<table>
<thead>
<tr>
<th>Diameter (inches)</th>
<th>Wings</th>
<th>Wing Width</th>
<th>Metal Wing Weight</th>
<th>Glass Wing Weight</th>
<th>Total per Wing</th>
<th>Extended Wing Weight</th>
<th>Core Weight</th>
<th>Total Weight</th>
<th>Max RPM at 2.5 ft lb</th>
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The chart is shown as an example of the maximum RPM the door can operate under conditions specified in the standard. Maximum RPM at 2.5 ft lb. can vary depending on the weight of the door. The weight shown in this chart is typical aluminium door with 1/4" glass. Weight will vary by manufacturer, type of glazing and type of metal construction of the door. The individual manufactures installation instructions and owners manual should provide a chart for the door as it is installed so the installer will know how to adjust the door. Acceptable RPM is the maximum speed the door can rotate. If the door exceeds the maximum RPM, it must be equipped with a wing sensor to slow the door to the RPM shown under Max. RPM at 2.5 ft lb. (exception is Access Controlled Doors which are majority trained traffic users and in high security).
Kinetic Energy of a Revolving Door
At 2 1/2 ft lbs and 7 ft lbs

\[
K = \frac{1}{2} I w^2
\]

\[
I = \sum m_i r_i^2
\]

\[
\Omega = \text{Door Speed (RPM)}
\]

\[
K = \text{Kinetic Energy (FT-lb)}
\]

\[
I = \text{Rotational Inertia (SLUG-FT}^2\)
\]

\[
w = \text{Angular Speed (}\frac{\text{RAD}}{S})
\]

\[
m = \text{Mass of each Door Panel (SLUGS)}
\]

\[
x = \# \text{ of door panels}
\]

\[
r = \text{Distance from center shaft to door panel center of mass (ft)}
\]

\[
D = \text{Diameter of Rev. Door (ft)}
\]

\[
W = \text{Total weight} = X \cdot M \cdot 32
\]

\[
\Omega_{MAX}^{2.5 \text{ ft lb}} = \left(\frac{483}{D}\right) \cdot \sqrt{\frac{1}{W}}
\]

\[
\Omega_{MAX}^{7 \text{ ft lb}} = \left(\frac{808}{D}\right) \cdot \sqrt{\frac{1}{W}}
\]

ASSUMPTIONS:
1. Mass of all panels are equal and distributed evenly over the door width.
2. Only door panel mass is considered.
3. Door panels are evenly spaced.

Max RPM at 7 ft lbs KE

\[
\Rightarrow I = x(m \cdot r^2)r = 1/4 D
\]

\[
\Rightarrow I = x \cdot m \cdot D^2 / 16
\]

\[
\Rightarrow K = 1/2(x \cdot m \cdot D^2 / 16) w^2, w = \Omega \cdot 6.3 \cdot \frac{\text{RAD}}{\text{REV}} \cdot \frac{1}{60} m/s = 0.105 \Omega
\]

\[
\Rightarrow K = 1/2(x \cdot m \cdot D^2 / 16)(0.011 \Omega^2) = 3.43 \times 10^{-4} x \cdot m \cdot D^2 \cdot \Omega^2
\]

Maximum Allowable kinetic energy – 7 ft. lb \(\Rightarrow\)

\[
\therefore K = 3.43 \times 10^{-4} x \cdot m \cdot D^2 \cdot \Omega^2
\]

\[
\Rightarrow \Omega_{MAX} = \sqrt{\frac{7}{3.43 \times 10^{-2} x \cdot m \cdot D^2}} \Rightarrow \Omega_{MAX} = \sqrt{\frac{20.400}{x \cdot m \cdot D^2}}, x \cdot m = \frac{w}{32}
\]

\[
\Rightarrow \Omega_{MAX} = \frac{808}{D} \cdot \sqrt{\frac{1}{W}}
\]

Example: 5753, 8ft. 4 wing

\[
\Omega_{MAX} = \frac{808}{8} \cdot \sqrt{\frac{1}{575}} = 4.2 \text{ rpm}
\]

Max RPM at 2.5 ft lbs KE

For Max K = 2.5 ft. Hf

\[
K = 2.5 = 3.43 \times 10^{-4} (x m) D^2 \Omega_{MAX}^2
\]

\[
\sqrt[3]{\frac{2.5}{3.43 \times 10^{-4} (x M)(D^2)}} = \Omega_{MAX}, x M = \frac{w}{32}
\]

\[
\sqrt[3]{\frac{7289}{w^3 (D^2)}} = \sqrt[3]{\frac{233248}{WD^3}} = \frac{483}{D \sqrt{w^3}}
\]

For Example: 575#, 8' 4 wing: \(\frac{483}{8 \sqrt{575^3}} = 2.52 \text{ rpm}\)

KE at given RPM

\[
K = \frac{1}{2} (x m D \frac{2}{16})(0.011 \Omega^2) \Rightarrow x m = \frac{W}{32}
\]

\[
K = \frac{1}{2} \left(\frac{W}{32} D^2 \right)(0.011 \Omega^2)
\]

\[
KE = \frac{W D^2 \Omega^2}{93091} = \frac{575 \cdot (8)^2 \cdot (7)^2}{93091} = 13.5 \text{ ft lb}
\]
FIGURE 2

Revolving Door Types

Manual and Automatic Revolving Doors with a Center Shaft

Automatic Revolving Doors with a Core

Automatic 2-Wing Revolving Doors

Aggregate Parallel Egress = A^1 + A^2
FIGURE 3

ACTIVATING
DEVICE

CANOPY

FASCIA

SLOW SPEED
ACTIVATION
SIGN

EMERGENCY
STOP SWITCH
4' (1219mm)
FROM FLOOR
MAX.

SLOW SPEED
OPERATION
ACTIVATION

WING
PRESENCE SENSOR
ACTIVE AREA

FIGURE 4

CLEARANCE
1/2" (12.7mm) MIN
(A)
WING
PRESENCE SENSOR
ACTIVE AREA

OR

(B)
WING
PRESENCE SENSOR
ACTIVE AREA

CLEARANCE
1/2" (12.7mm) MIN
1 3/4" (44mm) MAX

BOTTOM RAIL

FOOT GUARD

28" (711mm) MIN.

10" (254mm) MIN.

4" (102mm) MIN.

CEILING

WING

GLAZING

THROAT OPENING
ALSO ENTRY POINT

CENTER SHAFT

BOTTOM RAIL

END WALL SENSOR

NCLOSURE

1/2" (12.7mm) MIN.

1/2" (12.7mm) MIN.

1 3/4" (44mm) MAX.

18
APPENDIX
PLAN VIEW OF 3 AND 4 WING AUTOMATIC REVOLVING DOORS

SLOW SPEED OPERATION ACTIVATION

MOTION SENSOR DETECTION AREA

EGRESS

END WALL SENSOR

WING SENSOR SAFETY ZONE (TYP: AT EACH WING)

CENTER SHAFT

ENCLOSURE

DOOR OUT OF POSITION 15° + MUST DEACTIVATE OPERATOR

SLOW SPEED OPERATION ACTIVATION

END WALL SENSOR

LEADING EDGE OF THE ENCLOSURE WALL

ENTRY

THROAT OPENING ALSO ENTRY POINT

Automatic revolving door with center shaft can be 3 or 4 wing.

ROTATION

CORE

BREAKOUT

THROAT OPENING ALSO ENTRY POINT

INSIDE DIAMETER

Automatic revolving door with core can be 3 or 4 wing. See doors with center shaft shown above for features as required in the standard.
FIGURE 7
Plan View of Two Wing Automatic Revolving Door

FIGURE 8
Plan View of Two Wing Automatic Revolving Door

NOTE:
PANEL CONSTRUCTION VARIES BY DOOR DESIGN

THROAT OPENING
ALSO ENTRY POINT
FIGURE 9
Plan View of Two Wing Automatic Revolving Door

FIGURE 10
FIGURE 11
Presence Sensing Mats Used on Revolving Doors

ADDITIONAL APPENDIX INFORMATION

Installation  Automatic revolving doors should be adjusted by factory authorized installers before placing into operation.

Glass “signage”  Some type of marking on the enclosure when glass is used.

Acceptable Door RPM (Automatic)  A walkspeed of 3 feet per second was used to calculate acceptable door RPM in automatic doors in this Standard. This is more conservative than the building code requirements in affect at the time of publication.

Acceptable Door RPM (Manual)  RPM for for manual doors coincides with the building code requirements in affect at the time of publication.