

Australian Standard[®]

Powered doors for pedestrian access and egress



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 - Australian Auto-Door Industry Forum
 - Australian Industry Group
 - Australian Shop and Office Fitting Industry Association
 - Australian Specialist Contractors Association
 - Glass and Aluminium Association of Queensland
 - Master Builders Australia
-

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Australian Standard[®]

Powered doors for pedestrian access and egress

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PREFACE

This Standard was prepared by the Standards Australia Committee BD-055, Powered revolving door assemblies and supersedes AS 4085—1992, *Automatic sliding door assemblies* and AS 4290—2000, *Design and installation of revolving doors*. During the preparation of this Standard the Committee considered work emanating from the European Community (CEN). Since many European Standards are becoming de facto international Standards, or are being adopted as International Standards by ISO, the Committee decided to use the draft European Standard as the basis for this revision.

The objective of this edition is to standardize the design, installation, test and safety requirements of all automatic pedestrian door assemblies; to include changes that reflect recent advances in technology and to refine content for clarity and conciseness.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

Statements expressed in mandatory terms in footnotes to tables are deemed to be requirements of this Standard.

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STANDARDS AUSTRALIA

Australian Standard **Powered doors for pedestrian access and egress**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard sets out the requirements for design and test methods for drive units, leaves and components of powered pedestrian doors. Such door constructions may be operated electro-mechanically, electro-hydraulically or pneumatically.

This Standard also provides requirements for design of the installation, verification/testing, marking and commissioning of the complete powered pedestrian door installation.

This Standard does not apply to the following:

- (a) Powered doors where the door leaves move vertically.
- (b) Powered doors mainly intended for vehicular traffic or access for goods.
- (c) Powered pedestrian gates or barriers.
- (d) Powered pedestrian turnstiles.
- (e) Powered doors used on lifts.
- (f) Power operated in environments where there is risk of explosion.

1.2 APPLICATION

This Standard applies to all powered pedestrian doors used in all types of buildings as classified in the BCA and other building legislation as appropriate. Doors can be of sliding, folding, swing and revolving type with a horizontally moved leaf.

Powered pedestrian doors can be used in all types of entrances including escape or rescue routes and emergency exits, as well as on smoke and fire doors.

Powered pedestrian doors with specific security needs to override the requirements of this Standard. Refer to Clause 3.3.4 for specialized operations.

Compliance with this Standard does not in any way preclude the use of any alternative solution which can be shown to satisfy the requirements.

1.3 REFERENCED DOCUMENTS

The normative documents referenced in this Standard are listed in Appendix A.

Documents referenced for informative purposes are listed in Appendix G.

1.4 DEFINITIONS

For the purpose of this Standard the following definitions apply:

1.4.1 Activation devices

A device which gives a signal to the control system.

Activation devices are subdivided into:

- (a) Manual signal sources, e.g. switches, push-buttons, radio control, code card.
- (b) Automatic signal sources, e.g. radar motion sensors and other automatic motion sensors, infra-red motion sensors, photoelectric beams, contact mats etc.

1.4.2 Air lock

Air space between two or more doors such as in a lobby. Different arrangements are required for particular emergency situations.

1.4.3 Ancillary devices

A device which is used in conjunction with the control system such as activation devices and safety devices.

1.4.4 Arc-of-swing

The area through which a swing door travels.

1.4.5 Arm

A device connecting the drive to the door. May be concealed, semi-concealed, or surface applied.

1.4.6 Automatic activation

Hands free activation achieved automatically without the user needing to perform any function except approaching the door, e.g. radar, infra-red sensors, and contact mats.

1.4.7 Automatic re-opening

A system where doors automatically reverse on the closing cycle upon obstruction.

1.4.8 Battery back up

A rechargeable battery module which is self monitoring in case of a mains power supply failure to the door operating equipment.

1.4.9 Bi-parting doors

Sliding door leafs that part on the same track in opposed directions when opening and meet when closed. See Figure 1.4.4(b).

1.4.10 Break-out

System whereby door leaves and/or hinged sidelights can be pushed open manually in the swing mode to allow emergency escape. See Figure 1.4.2(g) and 1.4.2(h).

1.4.11 Canopy

The whole of the construction of a revolving door above the doors and curved screens including fascia, ceiling and roof.

1.4.12 Check-speed

Reduced operating speed at which a powered door completes its final opening or closing motion.

1.4.13 Clear opening height

The distance between finished floor level and the lowest part of a canopy, drive cover, lintel or transom.

1.4.14 Clear opening width

Distance between two main closing edges, or one closing edge and one opposing closing edge.

1.4.15 Closing cycle

Movement of a door from the open position to the closed position.

1.4.16 Concealed mounting

Where an object, device, or door drive is concealed from view such as drives mounted immediately above (acting as a transom or in ceiling) or below (in the floor) the door and powering the door through the pivot, arm or drive elements.

1.4.17 Control system

Part of a drive of a door which accepts and processes signals from ancillary devices which generate output signals to control the drive.

1.4.18 Controller

A person, such as a security guard or receptionist, who has control (usually remote) over the operation of a powered pedestrian door.

1.4.19 Curved screens

Screens of curved constructions which form the outer enclosures of a door.

1.4.20 Curved sliding door

Door with a curved leaf which is moved horizontally in a curve. Refer to Figure 1.4.4(f), (g), (h) and (i).

1.4.21 Cycle

Complete cycle from fully closed, to fully open, to fully closed for all door types except for revolving doors where a cycle means 360 degrees of rotation.

1.4.22 Danger point

An area of potential harm.

1.4.23 Door

Spatial closing assembly comprising fixed and moving elements, allowing access or passage.

1.4.24 Door carrier

The component connecting the door to the drive on powered sliding doors.

1.4.25 Door leaf

Movable element, which closes and opens doorways.

1.4.26 Door size

The actual height and width of the door leaf.

NOTE: For revolving doors, *see* Internal diameter.

1.4.27 Doorway opening

Dimensions between jambs, finished floor level and the head, transom or lintel.

1.4.28 Double acting drive

Powered swing door drive, which opens at least 90° in both directions from the closed position.

1.4.29 Drive

Motor and any other component incorporated or attached to the motor (such as gearing, control system, solenoid brakes etc.)

1.4.30 Electro-sensitive protective equipment (ESPE)

Equipment which switches when an optical or other field is changed, for example photocells, light curtains, light detectors.

1.4.31 Emergency automatic closing

An emergency system for powered pedestrian doors whereby the doors are brought to the closed position when the main power supply is interrupted.

1.4.32 Emergency automatic opening

An emergency escape system for powered pedestrian doors whereby the doors are brought to the fully open position when the main power supply is interrupted.

1.4.33 Emergency systems

Emergency systems that override the normal automatic activity of the doors in an appropriate manner. Emergency systems use devices such as—

- (a) fire and smoke detectors;
- (b) release mechanism;
- (c) power supply monitoring system;
- (d) fail open or closed facilities; or
- (e) other monitoring systems.

1.4.34 External diameter

Distance between the external faces of the curved screens on revolving doors.

1.4.35 Fail secure

In the event of a mains power supply failure, the equipment will ensure a building is secure from entry from outside.

1.4.36 Failsafe

Where applied to automatic door operators, a function that fully opens a door in a power failure.

Where applied to sensors, a function where information provided by the sensors will cause the operation of the doors to default to a pre-determined safe mode.

Where applied to electric lock, a function that will cause the electric lock to unlock under total power failure (mains and battery) condition.

1.4.37 Finger guard

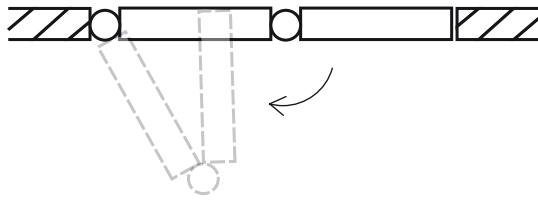
A device (usually a rubber extrusion) applied to the door and/or frame to prevent injury to hands and fingers.

1.4.38 Fixed leaves

Revolving door leaves (or part of leaves) without break-out function between the central column and the curved screens which have no pivoting movement at their hinge stiles.

1.4.39 Folding door

Door with two or more leaves hinged together with one door leaf side hinged to a door frame. See Figure 1.4.1.



(a) Single folding

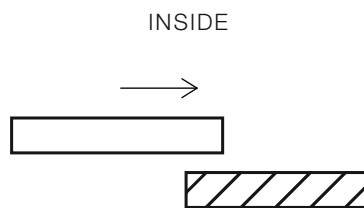


(b) Bi-folding

FIGURE 1.4.1 FOLDING DOOR

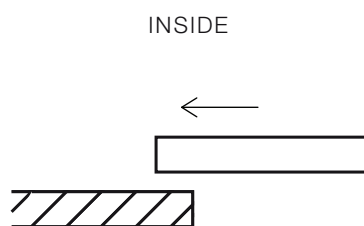
1.4.40 Hand

A term used to define the direction of door travel (swing or sliding) and the locking/security side of a door, e.g. right hand (opening out), left hand (opening out). Handing of door is generally determined by standing on the outside/access side of the door and indicating in which direction the door leaf opens. Left hand (LH) or Right hand (RH) opening in or opening out (see Figure 1.4.2).



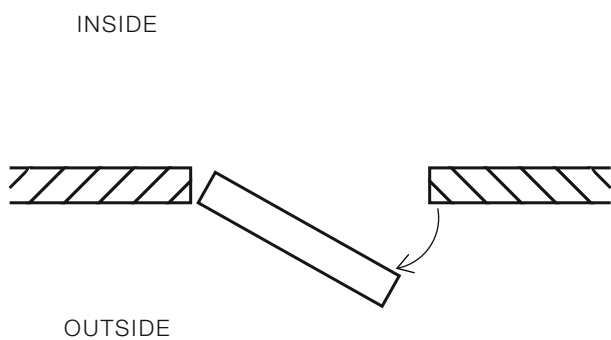
OUTSIDE

(a) Right hand sliding door



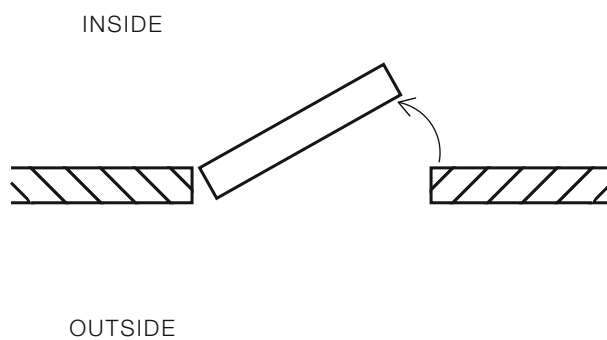
OUTSIDE

(b) Left hand sliding door

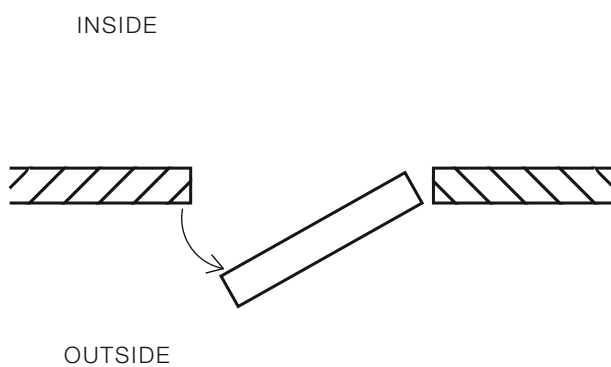


OUTSIDE

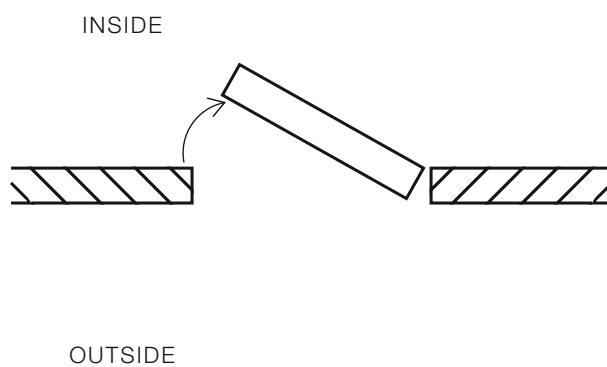
(c) Left hand swinging door



OUTSIDE



OUTSIDE



OUTSIDE

(d) Right hand swinging door

FIGURE 1.4.2 (in part) HAND



(e) Left hand folding door

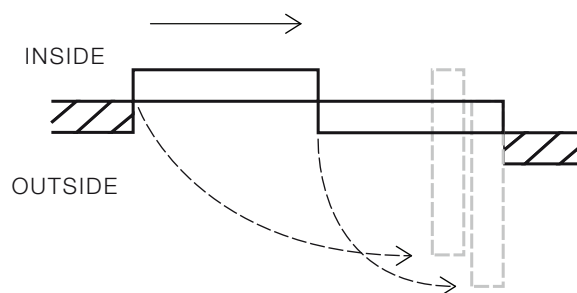


(f) Right hand folding door

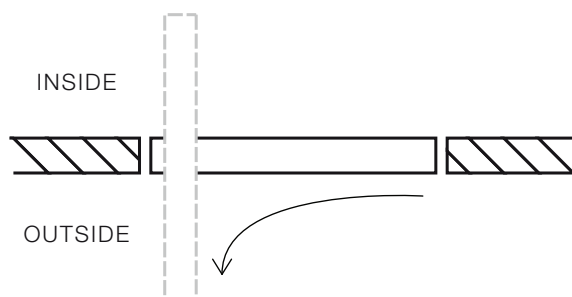


(g) Left hand sliding door with breakout capability

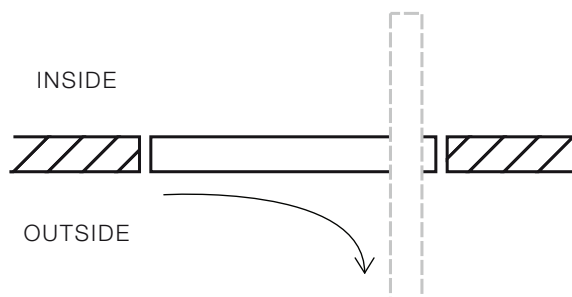
FIGURE 1.4.2 (in part) HAND



(h) Right hand sliding door with breakout capability



(i) Left hand sliding swing door



(j) Right hand sliding swing door

FIGURE 1.4.2 (in part) HAND

1.4.41 Handicap speed

The speed of rotation of a revolving door whilst activated by a handicap switch.

1.4.42 Handicap switch

A switch used to periodically modify the speed of rotation of a revolving door to allow use by a handicap person.

1.4.43 High speed

Maximum speed at which a powered door moves when it is being used.

1.4.44 Hinge stile

The vertical edge of a door leaf which is adjacent to the pivot point.

1.4.45 Hold-open beam

A photocell produced light beam installed across the door opening (usually between mullions) which, if interrupted prevents a powered door from closing or re-opens the door during the closing cycle.

1.4.46 'In' door

A powered pedestrian door installation for one way traffic into a building, room or space.

1.4.47 Ingress protection (IP)

It is a series of protection ratings as defined in AS 60529—2004, *Degrees of protection provided by enclosures (IP Code)*.

1.4.48 Internal diameter

The distance between the internal faces of the curved screens.

1.4.49 Leading edge safety device

Any safety device which prevents persons or objects being struck by the outer stile of a door as the door operates. See Appendix B.

1.4.50 Leading mullion

Mullion at the first point where a powered revolving door leaf passes the curved screens. See Appendix B.

1.4.51 Leading mullion safety

Safety provisions designed to prevent persons and objects being trapped between the outer stiles and leading mullion of a powered revolving door.

1.4.52 Leading stile

The vertical edge of a single door adjacent to the locking jamb.

1.4.53 Left hand sliding door

See Hand.

1.4.54 Left hand swing door

See Hand.

1.4.55 Limiting device

Device that restricts the travel of a door leaf, or leaves, to the design range of operating parameters.

1.4.56 Lintel

Horizontal structural member spanning an opening at its head to carry a load above the opening.

1.4.57 Locking system

Locking systems prevent the door leaf from unauthorized powered and/or manual movement.

1.4.58 Low energy powered swing door

Powered swing door which has restricted momentum, so that kinetic energy does not exceed 1.6 J at any point in its travel.

1.4.59 Low speed

The minimum speed at which a powered revolving door might rotate when not activated.

1.4.60 Main closing edge

Any closing edge of the door leaf which, under normal operating conditions, is parallel to the opposing closing edge.

1.4.61 Manual activation

Activation achieved by the user having to perform a function, e.g. push-button, pull-switch, elbow switch, key switch, card-key, or other access control devices.

1.4.62 Manual operation

Movement of a door leaf using manual effort only.

1.4.63 Meeting stile

The vertical and meeting edges of doors in pairs which are adjacent to each other.

1.4.64 Monitoring system

System (circuit) that checks and verifies the correct function of another system (circuit), and in case of malfunction of this system, switches the control system to operate in a selected safe mode.

1.4.65 Motion sensor

Device designed to detect movement of objects or persons and to give a signal to the control system.

1.4.66 Opening cycle

Movement of a door from the fully closed to the fully open position.

1.4.67 Opposing closing edge

Opposing closing edge is any closing edge which is opposite a main closing edge or a secondary closing edge when the leaf closes the door opening. See Appendix B.

1.4.68 'Out' door

A powered pedestrian door installation for one way traffic out of a building, room or space.

1.4.69 Outer stile

Vertical edge of a powered revolving door leaf which is adjacent to the curved screens. See Appendix B.

1.4.70 Passive safety

Any safety device which reduces the effect of impact (e.g. rubber buffers, break-out).

1.4.71 Phase-out

Phase-out in relation to presence sensors, is the phenomenon of adjusting itself within its detection area, over a period of time such as to cause the sensor to not detect a reference object.

1.4.72 Photocell/photoelectric

A sensor device using an infrared light beam.

1.4.73 Pivot point

The centre around which door leaves are rotated.

1.4.74 Powered pedestrian door

Door to permit the passage of persons with door leaves which are moved by a drive.

1.4.75 Presence sensor

Sensor designed to detect the presence of stationary objects or persons and give a signal to the control system.

1.4.76 Pressure-sensitive protective equipment

Equipment which causes a switching when mechanical pressure is applied to the surface, e.g. pressure sensitive edges, trip bars.

1.4.77 Prismatic

Sliding door leafs that part on different tracks at an angular configuration in opposed directions when opening and when closed. See Figure 1.4.4(e).

1.4.78 Protective device

A device designed to detect presence which gives a signal for safety purposes to prevent or interrupt powered door motion.

1.4.79 Recognized testing authority

Certified by a NATA approved testing authority.

1.4.80 Redundancy

A system to ensure alternative method of operation in case of product failure.

1.4.81 Reference object

A reference object is designed to simulate a human body or object, and used to test protective devices. Refer to Appendix C.

1.4.82 Remote activation

Activation by a remote command that is initiated some distance from the door, e.g. centralized control station, radio control.

1.4.83 Required exit

A doorway nominated for emergency egress.

1.4.84 Revolving door

Door that rotates around a common axis within an enclosure. There exist a great number of design variations for this product group. See Figure 1.4.3.

NOTE: Doors are shown with a clockwise rotation, as is common practice. However, anti-clockwise rotation is equally acceptable, and in no way precluded.

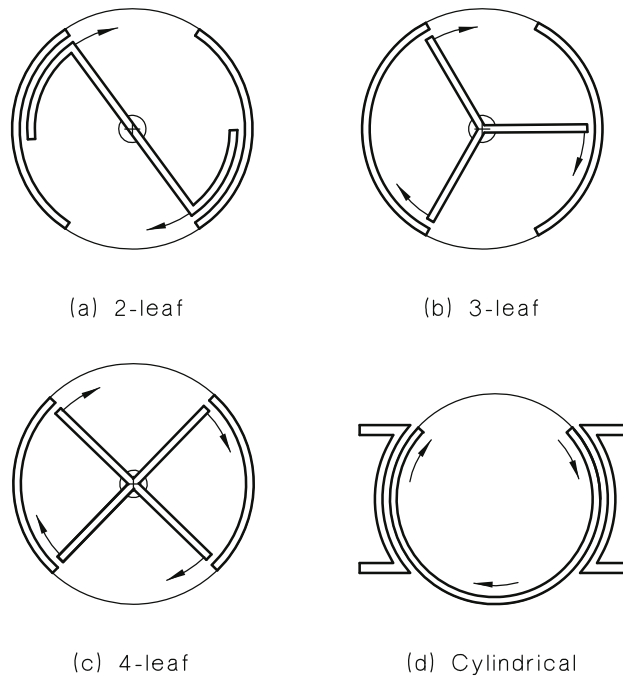


FIGURE 1.4.3 REVOLVING DOOR

1.4.85 Right hand sliding door*See Hand.***1.4.86 Right hand swing door***See Hand.***1.4.87 Safe mode**

Present programme designed to ensure a non-injurious condition.

1.4.88 Safety sensor

Device which is designed to give a signal to eliminate or reduce the risk of injury or damage to persons or objects.

1.4.89 Safety system

Any means provided for the prevention of injuries caused by compression, draw-in hazards and sharp or shearing edges.

1.4.90 Safety zone

Protected area through which the door will slow, stop or reverse, if it is occupied by persons or objects.

1.4.91 Secondary closing edge

Closing edge of the door leaf which is not the main closing edge. See Appendix B.

1.4.92 Side light

Fixed glass or panel adjacent to door leaves.

1.4.93 Side screen

Fixed construction adjacent to doorways parallel to the side light to which the door slides into.

1.4.94 Sliding door

Doors with one or more leaves moving horizontally in their own plane across an opening. Examples of sliding doors configurations are given in Figure 1.4.4.

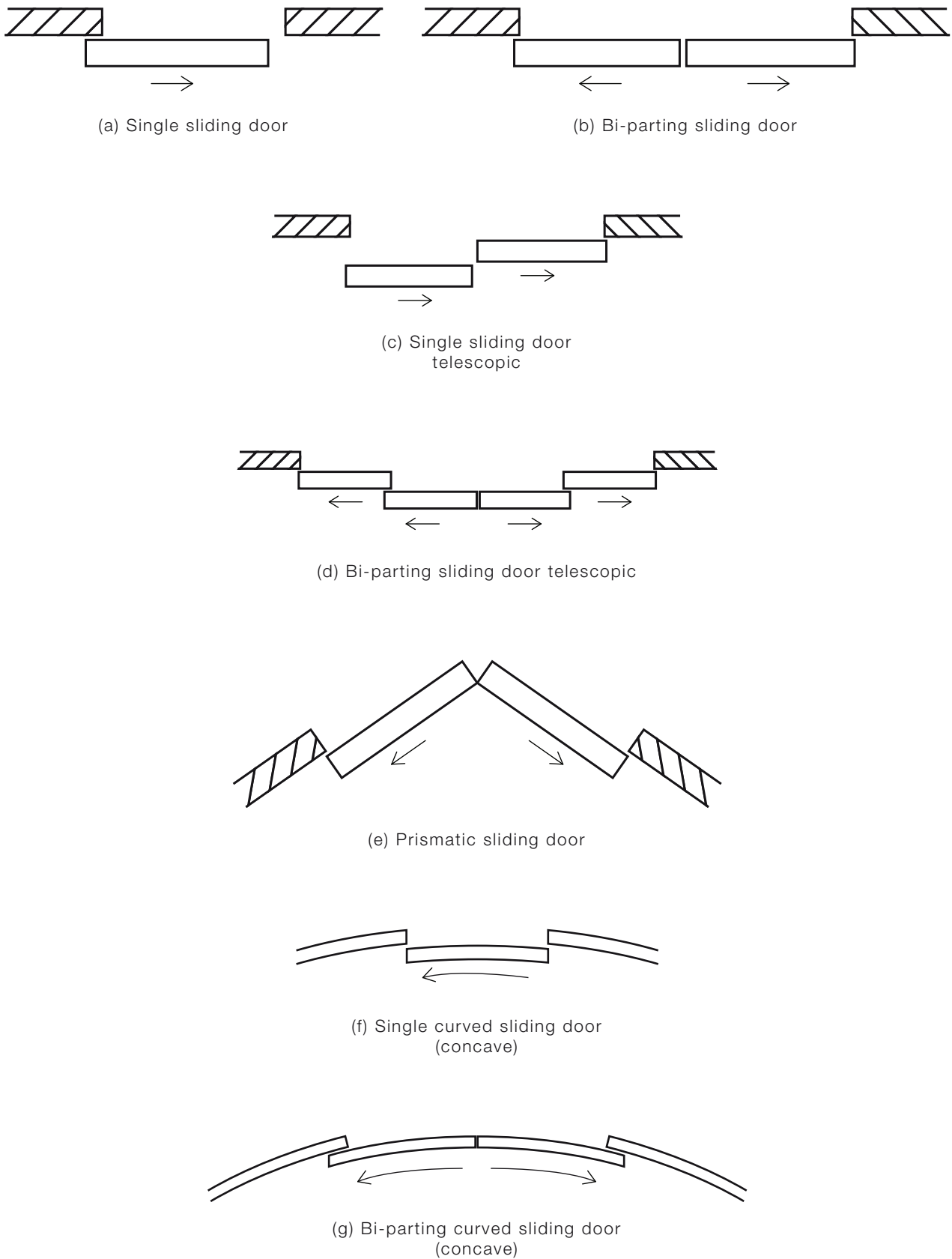
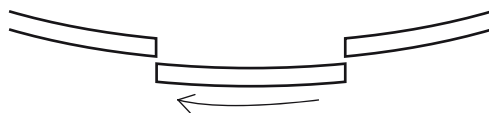
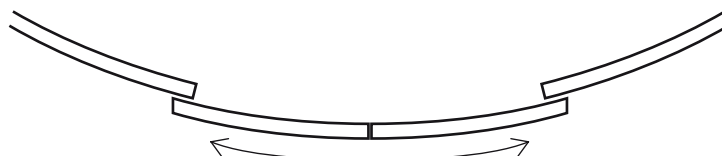


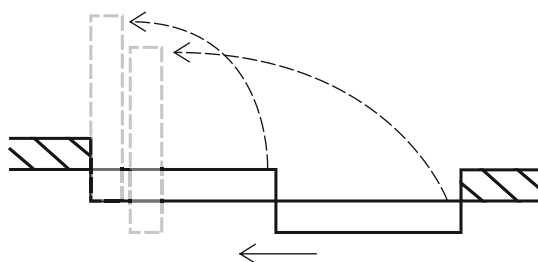
FIGURE 1.4.4 (in part) EXAMPLES OF SLIDING DOORS



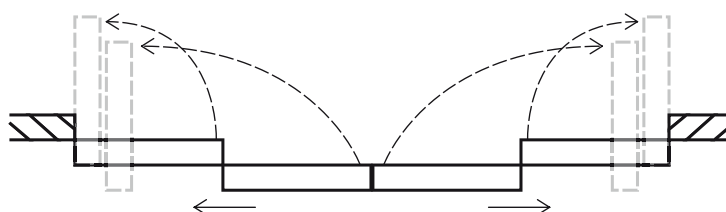
(h) Single curved sliding door
(convex)



(i) Bi-parting curved sliding door
(convex)



(j) Single sliding door with
breakout capability



(k) Bi-parting sliding door with
breakout capability

FIGURE 1.4.4 (in part) EXAMPLES OF SLIDING DOORS

1.4.95 Sliding door with break out capability

Doors with one or more leaves moving horizontally in their own plane across an opening with break out capability. See Figure 1.4.4.

1.4.96 Sliding swing door

Door with leaves with a pivot point which allows the leaf/leaves to slide sideways whilst also rotating. See Figure 1.4.5.

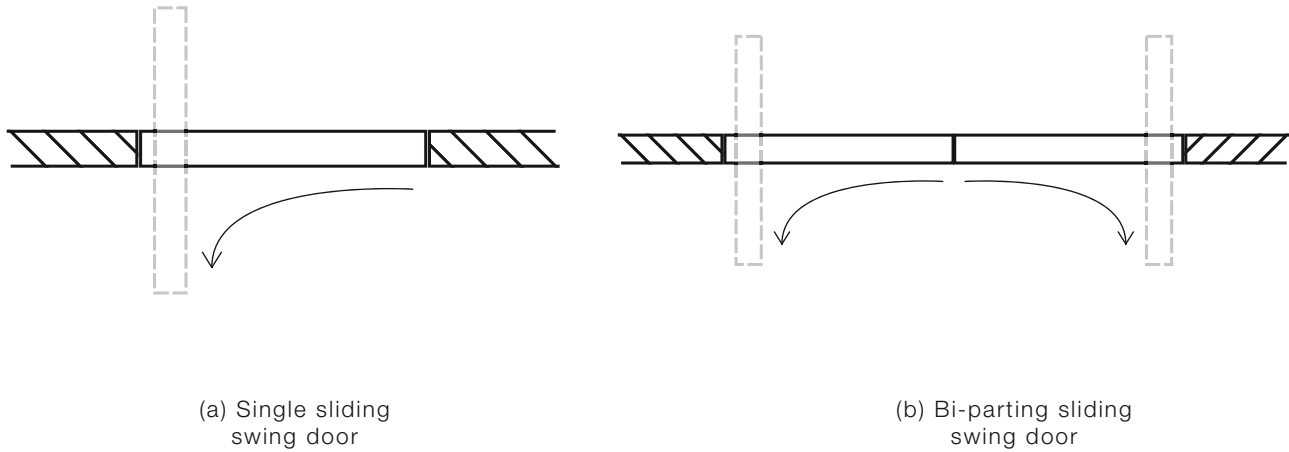


FIGURE 1.4.5 SLIDING SWING DOOR

1.4.97 Stile

Framed vertical edge member of a door leaf.

1.4.98 Storm lock

Lock to hold pivoted leaves in powered revolving doors in the normal operating position in adverse weather conditions.

1.4.99 Stroke

Is the distance at which the door will travel from fully open to fully closed position

1.4.100 Supervised system

A system whose function is checked and verified by a separate system (monitoring system).

1.4.101 Swing door

Door with leaf/leaves, hinged or pivoted. See Figure 1.4.6.

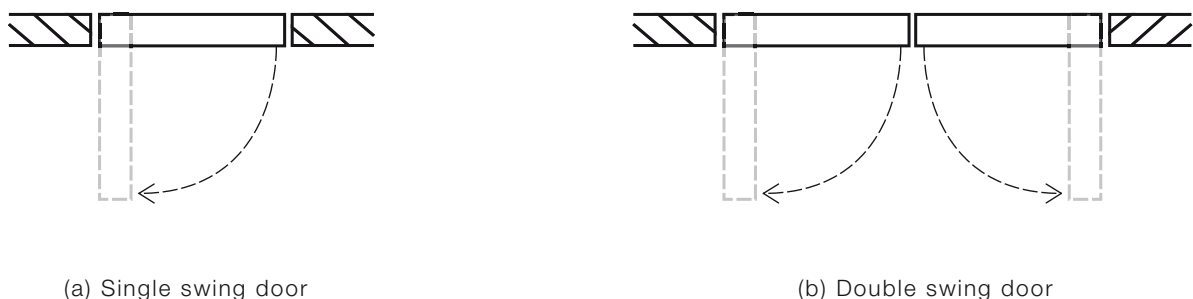


FIGURE 1.4.6 SWING DOOR

1.4.102 Telescopic door

Sliding door as defined in Clause 1.4.94 with leaves moving telescopically by one another or side by side by means of a side-by-side arrangement of supporting and guiding rail. See Figure 1.4.4 (c) and (d).

1.4.103 Test speed

The speed at which a door leaf moves when the control system is being programmed.

1.4.104 Track

Component or assembly designed to guide or support the door leaf during its movement.

1.4.105 Trailing face

The rear surface of the powered revolving door leaf or leaves.

1.4.106 Trailing mullion

Mullion at the last point where a revolving door leaf passes the curved screens. See Appendix B.

1.4.107 Trained traffic

Users (usually staff) trained in, and familiar with the safe use and operation of a powered pedestrian door.

SECTION 2 PRODUCT DESIGN REQUIREMENTS

2.1 GENERAL

Powered pedestrian doors shall be designed and constructed to operate in accordance with the requirements of this Standard.

All parts of the powered pedestrian door, whether fixed or movable, shall be suitably rated for the forces and moments occurring during normal operation and the limitation of leaf forces shall be designed to comply with Clause 2.3.2.

Powered pedestrian doors shall be designed so that they can be installed, used, inspected and maintained safely. The list of significant danger points identified and dealt with in this Standard is given in Clause 3.4.

The manufacturer should carry out a risk assessment to ensure that any potential risks associated with the powered door are minimized. Users should be warned of any residual risk. Warning signs shall be in accordance with Clause 3.5.

2.2 DRIVE

2.2.1 General

The drive shall move and stop the leaf (leaves) in a safe manner in normal conditions of use. It shall provide connection facilities for all relevant start, stop and safety devices.

The control system of the drive and safety systems shall be so designed that it meets the relevant electrical requirements described in AS/NZS 3100.

The parts of door control which are also parts of its safety system, specifically—

- (a) safety related control circuits;
- (b) control units and output signal switching devices of protective devices;
- (c) control devices for limitation of operating forces; and
- (d) control devices for limiting the leaf travel without mechanical fixed stop,

shall be designed so that in the event of their single-fault malfunction, either the safety function shall be maintained by redundancy or the door control shall automatically switch to a pre-determined safe mode consistent with security requirements prior to or after completion of the next cycle.

2.2.2 Devices for stopping the leaf movement

When the drive is switched off either by the user or by leaf travel-limit devices, the leaf movement shall stop, in a safe manner and shall remain stopped until another control command is given such as automatic re-opening.

The control system shall verify correct functioning of its safety system periodically simulating signal inputs from the safety sensor(s) and verifying that the control system responds correctly. This check shall be performed at least once per cycle in the case of entrapment protection safety system and at least every 10 minutes in the case of other safety systems. If the result of either check is not satisfactory, the door shall automatically switch to a predetermined safe mode, consistent with security requirements.

2.2.3 Activation of the drive

The drive shall activate leaf movement only by designated commands, impulses or by program control and only if the safeguarding devices such as presence sensors are not actuated.

2.2.4 Electrical equipment

Doors with electrical drives shall be connected to the mains supply in accordance with AS/NZS 3000. The means of disconnection from the mains supply should be located at a minimum height of 2 m from floor level to avoid unintentional or unauthorised operation. The electrical supply to the equipment should be on a dedicated circuit from the building distribution panel. If the electrical drive unit is connected via a plug-in system, a main switch is not necessary. The means of disconnection shall be designed so that it can be safeguarded against unintentional and unauthorized activation.

Where there is more than one source of power supply, each individual power source shall be capable of isolation to allow maintenance work to be carried out safely.

Where the door is required to operate under certain conditions, the purchaser shall specify the requirements for the manufacturer. For example, if the electrical equipment is intended to operate in an environment where there is a risk of explosion, electrical components and enclosures should be selected and installed in accordance with HB 13.

2.2.5 Hydraulic or pneumatic equipment (if fitted)

Units using sources of energy other than electricity shall conform to the requirements of this standard. Hydraulic system, components and pipework shall also conform with AS 2671. Pneumatic system, components and pipework shall also conform with AS 2788.

2.2.6 Locking devices

If fitted to doors or as part of the door operating equipment:

- (a) Mechanical locks shall comply with the requirements of AS 4145.2.
- (b) Electric locks can 'fail secure' if not part of required exit door. If the door forms part of a required exit path from a building, the lock shall failsafe.

2.3 POWERED OPERATION

2.3.1 General

Powered pedestrian doors shall be designed so that crushing, shearing and drawing-in hazards during the opening and closing movements are avoided or safeguarded. For safety requirements, refer to Clause 3.4.

2.3.2 Limitation of leaf forces

2.3.2.1 General

The drive shall be designed so that forces which are caused by the door leaf impacting the human body or parts of it, or objects, are limited to prescribed safe values.

The opening and closing forces shall be limited to the following:

- (a) Kinetic energy limitations in accordance with Clause 2.3.3 where protective devices shall be used.
- (b) The control system shall be constructed so that a static force not exceeding 130 N, applied horizontally in the plane of travel and at any point on the leading edge of a leaf, and at any time during the opening or closing portion of the operating cycle, shall stop the leaf if obstructed.