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Building hardware — Door fittings for use by children, elderly and disabled people in domestic and public buildings — A guide for specifiers

ICS 91.190

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National foreword

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Building hardware - Door fittings for use by children, elderly and disabled people in domestic and public buildings - A guide for specifiers

Quincaillerie pour le bâtiment - Accessoires de portes pour enfants, personnes âgées ou personnes handicapées dans les habitations et bâtiments publics - Guide destiné aux prescripteurs

Schlösser und Baubeschläge - Türbeschläge zur Nutzung durch Kinder, ältere und behinderte Menschen in privaten und öffentlichen Gebäuden - Ein Leitfaden für Planer

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Foreword

This document (CEN/TR 15894:2009) has been prepared by Technical Committee CEN/TC 33 “Doors, windows, shutters, building hardware and curtain walling”, the secretariat of which is held by AFNOR.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

Europe has a population of 800 million of whom over 100 million are children and elderly people and 50 million are declared as disabled (the latter figure includes many people who are also elderly). The European Union has 77 million elderly people and 43 million people registered as disabled. These consumers with special needs constitute a major (and growing) part of the population who daily come into contact with the numerous barriers that exist in and outside of buildings.

This European guidance document aims to help designers, specifiers and building managers or owners to identify and include the needs of children, elderly and disabled persons, by enabling people with low physical strength, dexterity and manipulative impairment, to be able to open, close and lock doors.

It includes general guidelines for selecting hardware products and guidelines for product specifications. It also includes the following annexes:

— Annex A - Guidelines for suitability assessment of hardware products;

— Annex B – Guidelines for hardware product specification.

Ultimately the intention of this guidance document is to make existing hardware products and standards more suitable with regard to their use by children, the elderly and disabled.

NOTE If needed, these guidelines may be included as informative annexes in future revisions of suitable hardware product standards.

Introduction

The essential function of building hardware is to provide easy access to all users regardless of their ability or disability. Doors should be of a minimum clear opening width to accommodate wheelchairs and should be easy to use. For example, this requires low friction hinges and carefully selected door controls, possibly using low energy door operators, powered or automatic operators or electromagnetic devices.

The correct choice of door furniture with easy-to-use locking systems and good signage all add up to an acceptable combination. Generally, this is no more than would be asked of any responsible specification. This guide is intended to enable installers to correctly follow building specifications and to make sure that buildings are correctly equipped for their intended use.

One of the main challenges to specifiers, architects, manufacturers and builders is to ensure that the specification, design and construction do not result in the environment of an elderly or disabled person appearing different from the rest of the community.

This European guidance document is people-based and it is essential that specifiers recognize that the individual needs of users can vary. Users should be consulted frequently in the specification and installation processes. The specification should recognize that buildings are often occupied by non-disabled and younger people, as well as elderly and disabled people. Similarly, these members of the community need to move freely and safely in the wider environment.

Where dimensions/measurements are given for guidance purposes, they are subject to the tolerances incorporated in any appropriate product or construction standard. National regulations, where applicable, should take precedence.

It is recognized that local regulations and certain types of door construction (such as aluminium) may prevent specifiers from achieving all the recommendations in this document. In these circumstances, the needs of the building occupants should be considered and the best possible compromise should be achieved.

This European guidance document refers to the following mandates: M/273-ICT, M/283-Elderly and Disabled, M/292-Product information, M/293-Child safety and CEN Guide 6.

This European guidance document does not refer to EN 12217 which contains selected maximum operating forces considered unsuitable for children, elderly and disabled people to use and does not take into consideration doors fitted with emergency and panic exit devices and systems, or door closing devices.

1 Scope

This European guidance document provides guidance on the selection of existing building hardware for manually and power operated pedestrian doors and associated products whose integration into the design of buildings will make them more safe, secure and convenient for the occupants inclusive of children, elderly and disabled people to use ("design for all"). Although it is intended for people with reduced physical and sensorial capabilities, it may not cover all specific individual needs. For example, it may not cover all needs of blind people or those not able to move unassisted.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

N/A

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
C.E.D.
abbreviation for Children, Elderly and Disabled people

3.2
clear opening width
horizontal distance, measured parallel to door frame, between nearest points on door frame and leaf, less the protrusion of any hardware mounted less than 1 800 mm above nominal floor height, with door at maximum opening position

NOTE National regulations may accept deviations or tolerances.

4 How to use this guidance document

The following steps should be undertaken by specifiers (architects, etc.) to select the suitable product to specify for the intended application, and by manufacturers to offer the appropriate product:

- **Step 1. Specifier: define users' environmental situation**

  Refer to Clause 5, Annex A and Table A.1 to define needs.

- **Step 2. Specifier: define hardware product functions**

  Refer to Table B.1 to determine relevant product category and hence appropriate Annex.

- **Step 3. Specifier: define users' needs**

  Refer to appropriate part of Annex B for recommended suitable products.

- **Step 4. Manufacturer: define product offer**

  Refer to appropriate part of Annex B to list for recommended product specifications.

– **Step 5. Specifier: match users' needs and product offer**

Select suitable product to be specified for intended application.

5 Guidelines for selecting hardware products

5.1 General

The objective with this part of the document is to help specifiers assess what the application requires. It provides guidelines for selecting hardware products.

Specifiers should be aware that building hardware standards cover only hardware products and do not specify maximum manual operating forces for the complete door. The door manufacturers should inform the market about the test results for the forces to operate the hardware in their door construction, for example to open/close doors and to engage/release and lock/unlock the hardware using a key or handle.

5.2 Building category

For selecting hardware products, specifiers should define the purpose of the building such as:

— residential, commercial, industrial, public building, etc.;

— location of the door: internal door, external door;

— alternative use, day and night use, use by various groups, etc.

5.3 Purpose of the door

For selecting hardware products, specifiers should define the purpose of the door, such as:

— fire/smoke resistance;

— burglar resistance;

— access/egress/flow control;

— thermal insulation, energy saving, etc.;

— wind/water penetration resistance;

— noise reduction;

— smell reduction;

— light reduction.

5.4 Interface between users and door

For selecting hardware products, specifiers should define the interface between users and the door. The following types of user should be taken into account:

— all public;

— children;

— elderly;

— mobility impaired.

For selecting hardware products, specifiers should also define the limitation on ability to operate the hardware, such as:

— height/reach restriction (applies mainly to children);

— strength/grip restriction;

— mental restriction (relates to “mental age”);

— one hand only;

— no hands;

— sight impairment;

— hearing impairment;

— confined to wheelchair (manually operated or powered).

5.5 Product functions

Although the ergonomic function is the primary concern for children, elderly and disabled people (C.E.D.), other functions are particularly important and should also be provided by the products to meet other user’s needs with regards to:

— **convenience**: ergonomics, usage and durability, privacy, aesthetic design, see-through, etc.;

— **safety**: escape and ability to release in case of emergency and panic situations, self closing and safety in case of fire, safety in use or risk of injury, personal safety;

— **security**: protection against burglary or attack, from inside/both sides, access/flow control, protection against vandalism, abuse, etc.

5.6 Economic aspects

When considering economic aspects of a product specification, it is important to take into account the followings factors:

— cost of product;

— cost of installation;

— cost of maintenance (all costs to maintain intended product functions).

Where conflicting aspects may affect a product specification, alternative solutions should be considered according to a priority order. As an example, one may consider the following priority order:

1) escape and ability to release in case of emergency and panic situations;

2) self closing and safety in case of fire;

3) risk of injury;

4) personal safety;

5) ergonomics;

6) protection against burglary;

7) access/flow control;

8) protection against vandalism, abuse;

9) usage and durability;

10) privacy;

11) aesthetic design;

12) etc.

5.7 Suitability assessment of hardware products

This guide provides to specifiers a model scheme for suitability assessment of hardware products as necessary to meet the user's need in a specific application.

NOTE See Annex A.

6 Guidelines for product specifications

6.1 General

This clause offers general recommendations for manufacturers for each product category with regard to:

— purpose of the hardware;

— different types and accessories;

— product standards;

— installation and maintenance;

— requirements with regard to safety, security, convenience and cost.

6.2 Proposed scheme for suitability assessment of products for particular applications

This guide provides to specifiers a model scheme for hardware product specification, as required for each product category.

NOTE See relevant parts of Annex B for each product group.

Annex A
(informative)

Guidelines for suitability assessment of hardware products

A.1 General

There are three basic areas to consider.

— Who has to use the door, or “Interface between users and door”?

— What is the reason for the door, or “Purpose of door”?

— What functions are expected of the door and/or its fittings, or “Additional functions”?

Furthermore, these areas can be examined under two headings:

1. what the intended application requires;

2. what the product offers.

Items 1 and 2 can then be compared to determine the suitability of a product for a particular application. This is described in more detail below.

NOTE The risk assessment is part of the evaluation and should be used to determine the priority order.

A.2 What the intended application requires

There are three basic areas to consider.

a) Interface between users and door. In this context, limitations on ability to operate are considered (irrespective of cause), such as:

— height/reach restriction (applies mainly to children);

— strength/grip restriction;

— mental restriction (relates to “mental age”);

— one hand only;

— no hands;

— sight impairment;

— hearing impairment;

— confined to wheelchair (manually operated or powered);

— others.

b) Purpose of door. Specifiers should also define the purpose of the door, such as:

— to ensure privacy/access/egress/flow control;

— to resist attack by intruders/burglars;

— to resist wind/water penetration;

— to provide thermal/noise/smell/light insulation;

— to resist the spread of smoke/fire.

c) Additional door functions/requirements. Specifiers should also define additional functions and/or need, such as:

— to withstand heavy usage (high number of operating cycles);

— to resist abuse/vandalism;

— to allow emergency egress at all times, but be key lockable from outside;

— to be key locking from both sides;

— to be safe for the user;

— to meet mandatory regulations (fire and escape);

— to take into account product material when specific allergies are identified.

A.3 What the product offers

There are three basic areas to consider.

a) Interface between users and door hardware. In this context, usability of the product is considered, such as:

— simple and clear to use (user friendly);

— operating elements and controls within easy reach;

— operable by hand, or fingers at low forces/torques;

— operable one-handed;

— operable without any hands;

— operable in total or partly darkness (for visually impaired people);

— operable without the need for audio visual feedback;

— operable from a wheelchair.

b) Purpose of the door hardware. Specifiers should define the contribution of the hardware to the purpose of the door, such as:

— contributes to make the use simple and clear;

— contributes to burglary resistance;

— contributes to wind/water resistance;

— contributes to thermal insulation;

— contributes to the smoke and fire resistance;

— contributes to safe and convenient use.

c) Additional hardware functions/requirements. Specifiers should define the contribution of the hardware to additional functions and/or requirements, such as:

— to withstand heavy usage (high number of operating cycles);

— to resist abuse/vandalism;

— to allow emergency egress at all times, but be lockable by key from outside;

— to be key lockable from both sides.

NOTE See Table A.1.

Table A.1 — Checklist for specifying hardware products for use by children, elderly and disabled persons

	Potential user's requirements that are relevant in the building	Comments by specifier
	General requirements	
	Provide audio/visual feedback	
	Visual recognition of operating element	
	Rounded corners	
	Accessible from a wheelchair	
	Operational requirements	
	Single action to operate	
	Operable with one hand	
	Operable without need to grip	
	No need to insert a key	
	Self-latching action	
	Maximum torque on handle	
	Maximum torque on key	
	Maximum force on thumb slide	
	Maximum manual door opening force	
	Maximum manual door closing force	
	Controlled door closing with adjustable speed	
	Delayed closing function	
	Free swing function with maximum opening force	
	Dimensional requirements	
	Good clearance around finger-operated element	
	Good clearance around hand-operated element	
	Low projection into the clear opening of the door	
	Suitability for use on fire- / smoke-resisting doorsets	
	Suitability for use on fire-resisting doorsets	
	Suitability for use on smoke-resisting doorsets	

Annex B
(informative)

Guidelines for hardware product specification

B.1 General

This Annex covers the following for each product category:

— purpose of the hardware;

— different types and accessories;

— product standards;

— installation and maintenance;

— advantages/disadvantages of specific hardware products according to safety, security, convenience and cost.

Table B.1 will help specifiers find the relevant annexes for basic door hardware functions, in accordance with EN standards and product categories.

Table B.1 — Checklist for defining hardware product category and standard, and relevant parts of Annex B

Relevant part of Annex B	**B.2**	**B.2**	**B.2**	**B.2**	**B.2**	**B.3**	**B.3**	**B.3**	**B.3**	**B.4**	**B.4**	**B.4**	**B.4**	**B.5**	**B.6**	**B.6**	**B.6**	**B.6**	**B.6 & B.7**	**B.8**	
Product category	**Locks**	**Multipoint locks**	**Electrical locking devices**	**Bolts**	**Cylinder and key**	**Lever handles**	**Pull handle**	**Push plates**	**Door protection hardware**	**Panic exit devices**	**Emergency exit devices**	**Panic exit systems**	**Exit systems**	**Hinges**	**Door closers**	**Hold open devices**	**Door coordinators**	**Uncontrolled door closing devices**	**Pedestrian doors**	**Sliding door gear**	
EN standards applicable ➔ **➧ Basic door hardware functions**	**EN 12209**	**prEN 15685**	**EN 14846**	**EN 12051**	**EN 1303**	**EN 1906**	**N/A**	**N/A**	**N/A**	**EN 1125**	**EN 179**	**prEN 13633**	**prEN 13637**	**EN 1935**	**EN 1154**	**EN 1155**	**EN 1158**	**prEN 15887**	**N/A**	**EN 1527**	
Mechanical locking	X	X		X	X					X	X										
Electromechanical locking			X									X	X								
Outside electromechanical locking or release (for exit devices or systems)										X	X	X	X								
Uncontrolled door closing																		X			
Controlled door closing															X	X					
Controlled closing and automatic opening																					
Door hold open																X					
Free swing closing															X	X					
Delayed closing															X						
Ability to release / Mechanical escape										X	X										
Ability to release / Electrically controlled escape												X	X								
Pivoting door support														X							
Sliding door support																				X	
Self closing / fire safety	X	X	X							X	X	X	X	X	X	X	X				
X Function covered by that particular standard.																					

B.2 Locks, bolts, cylinders and keys

B.2.1 Purpose of the hardware

Locks, bolts, cylinders and keys are intended to:

— latch and/or keep the door in a closed position; and/or

— lock the door in a closed position for privacy or security; and/or

— control authorized access (cylinder and key); and/or

— fulfil the requirements of fire and/or smoke resistance.

B.2.2 Different types and accessories, product standards

If products are manually operated by hand (lever handle, knob, etc.) and/or finger (key, etc.), reference can be made to EN 12209, prEN 15685, EN 1303 and EN 12051.

NOTE Although door bolts are included in this sub-clause, they may not always be appropriate in situations where access is required by children, elderly or disabled people. Where they are still considered necessary, however, the guidance in this Annex should be followed as closely as possible.

If products are manually operated with automatic locking function, refer to EN 12209 and prEN 15685.

If products are electromechanically operated to allow for assistance and/or remote control of latch and locking/unlocking functions, refer to EN 14846.

B.2.3 Installation and maintenance

B.2.3.1 Installation

Operating forces of lock assemblies (including cylinder and keys where applicable) should be kept within acceptable limits as follows.

— Choose a lock and/or a cylinder with a low operating force in accordance with the end use and the requirements of the specifier. Maximum torque should not exceed 5 Nm for hand operation (i.e. handle), and 0,8 Nm for finger operation, i.e. key or thumb-turn.

— Choose the door equipment (seals, weather stripping, hinges, etc.) to minimize forces required to operate the lock, or cylinder.

Use appropriate (preferably adjustable) locking plates and accessories recommended by the manufacturer to ensure proper operation. Don't modify the product, i.e. don't paint locking plates.

Accessibility of lock assemblies and ease of operating element should be considered as follows.

— The position of all locks should be placed to make them easy to operate (height from the floor etc.). The operating element should normally be installed at a height of between 900 mm and 1 100 mm from the finished floor level, when the door is in the secured position.

— Where it is known that the majority of the occupants of the premises will be young children, specifiers should reduce the height of the operating element.

Choose appropriate lever handle to optimize operating forces.

NOTE See B.3.

B.2.3.2 Maintenance

Lubricate in accordance with the manufacturer's instructions.

Check tightness of the screws to ensure low operating forces and security conditions are maintained.

B.2.4 Advantages/disadvantages of locks, bolts, cylinders and keys

B.2.4.1 General

When choosing a lock or latch, specifiers should define:

a) hand operation: i.e. lever handle, knob, etc.

— force, torque, angle to rotate the follower;

— hand space, follower back set, distance between follower and key;

— ergonomic design;

— position of follower in relation to key position;

— power assistance and/or remote control through electromechanical means;

b) finger operation, i.e. key, snib, privacy knob, etc.

— number of turns/rotation angle;

— size of key, snib, etc;

— ergonomic design;

— automatic latching and/or deadlocking;

— power assistance and/or remote control through electromechanical means.

B.2.4.2 Lock or bolt operation

Where fitted with a latch, locks should be operated with one hand using a closed fist, e.g. lever handles, bars or pull/push means. Round knobs should not be used. Whilst it is desirable that all locking devices should be easy to use by the authorized user, there should be no compromise on security.

When selecting locks, specifiers should verify the accessibility of the keyway, for both keys and cylinders and privacy turns. Ideally, there should be sufficient distance between the lever handle and the locking mechanism for those with poor sight or manual dexterity to be able to have clear access.

Locks which have the cylinder above the lever handle or vice versa need to be evaluated regarding to the manufacturer's installation instructions.

NOTE 1 The distance between the centres of the keyway and follower should preferably be greater than the minimum distance shown in Figure B.1.

NOTE 2 Where door construction (such as aluminium frames) or other reasons do not permit the use of wide backset (50 mm and over), it is possible to use offset lever handle furniture so that it does not restrict the hand movement.

Bolts should be operable with one hand, and there should be sufficient space around the operating device to enable use by people with reduced manual dexterity.

NOTE 3 Multipoint locks with central control are preferable to separate individually controlled units.

B.2.4.3 Operation of keys, thumb turns and snib

The turn of the key, thumb turn or snib to operate deadbolts and latches should be minimized.

a) Keys

Keys with larger bows and ergonomic design should be used. The provision of a larger key bow on both lever and cylinder keys enables the user to have greater control. This facility also enables those with poor vision to see the object more clearly. Key fobs may also be added to standard key bows to assist with the operation of the key.

b) Thumb turns

The choice of large and/or asymmetric thumb turns and with ergonomic design on cylinders is desirable to assist with the locking operation. The turn angle for operation should be minimized.

c) Privacy bolts

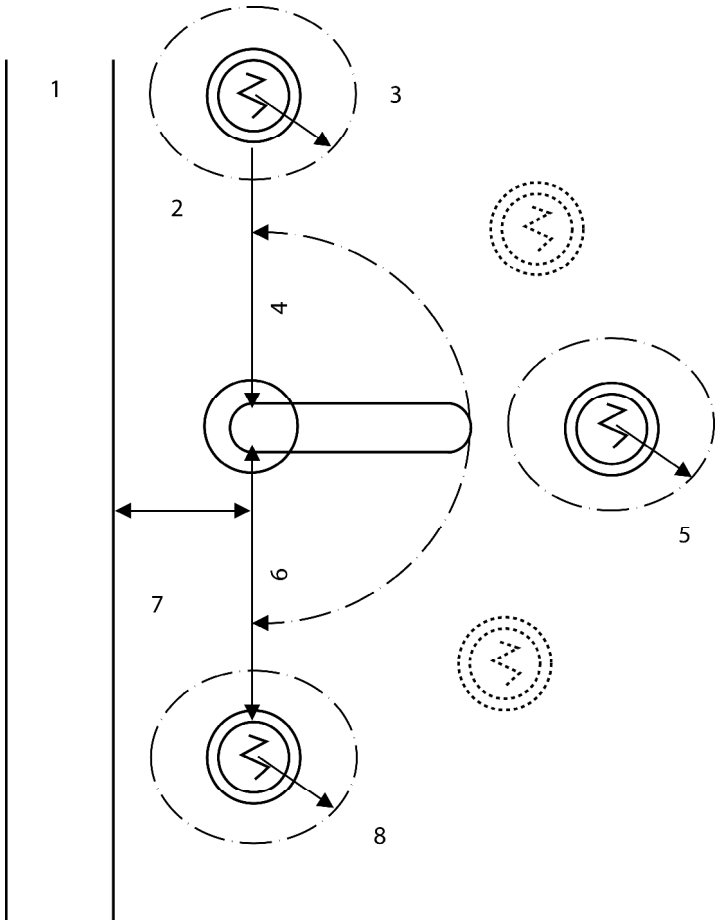
Privacy bolts should have coin slot or similar provision to enable them to be released from outside in an emergency.

d) Additional bolts

When required for security reasons, inside turns are preferable to keys as they are easy to operate.

B.2.4.4 Recognition of operating element

Vision impaired people may have difficulty in recognizing the exit door and/or its operating element. Specifiers should assure a minimum contrast between the operating element and the surface of the door leaf, which should be of a colour/finish which makes them contrast visually with the door onto which they are mounted.



Key

1	Door Frame	5	Free space for key (50 mm minimum)
2	Door	6	Distance (70 mm minimum)
3	Free space for key (50 mm minimum)	7	Backset (50 mm minimum)
4	Distance (50 mm minimum)	8	Free space for key (50 mm minimum)

NOTE Wherever there is a need for narrow stile backset of less than 50 mm, it is recommended to use offset lever handles. See B.2.4.2. Specifiers should define adequate clearance around the keyhole on narrow style doors (i.e. by selective removal of the door stop, etc.).

Figure B.1. - Minimum distances between the centres of keyway and follower

B.2.5 Assessment and example of product selection

The following tables will provide an assessment scheme and an example of product selection scheme related to the above products.

See Table B.2 and Table B.3.

Table B.2 — Assessment scheme for locks, bolts, cylinders and keys

Door and user application							
	Potential user's requirements		**Relevant requirements for product category**				
			EN 12209	**prEN 15685**	**EN 14846**	**EN 1303**	**EN 12051**
	General requirements						
	Provide audio/visual feedback		✓	✓	✓	✓	✓
	Visual recognition of operating element		✓	✓	✓	✓	✓
	Rounded corners		✓	✓	✓	✓	✓
	Accessible from a wheelchair		✓	✓	✓	✓	✓
	Operational requirements						
	Single action to operate		✓	✓	✓	✓	✓
	Operable with one hand		✓	✓	✓	✓	✓
	Operable without need to grip		✓	✓	✓	✓	#
	No need to insert a key		✓	✓	✓	#	#
	Self-latching action [d]		✓	✓	✓	#	#
	Maximum torque on handle: 5 Nm		✓	✓	✓	#	#
	Maximum torque on key: 0,8 Nm		✓	✓	✓	✓	✓
	Maximum force on thumb slide: 50 N		✓	✓	✓	#	✓
	Maximum manual door opening force with adjustable power size		#	#	#	#	#
	Maximum manual door closing force		#	#	#	#	#
	Controlled door closing with adjustable speed		#	#	#	#	#
	Delayed closing function		#	#	#	#	#
	Free swing function		#	#	#	#	#
	Maximum pull force to manual release						
	Dimensional requirements						
	Good clearance around finger-operated element		✓	✓	✓	✓	✓
	Good clearance around hand-operated element		✓	✓	✓	#	✓
	Low projection into the clear opening of the door		✓	✓	✓	#	✓
	Suitability for use on fire- / smoke-resisting doorsets						
	Suitability for use on fire-resisting doorsets		✓	✓	✓		
	Suitability for use on smoke-resisting doorsets		✓	✓	✓		

✓ Requirement can be relevant to the product category.

0 Does not conform to requirement.

Requirement not relevant to the product category.

[b] Requirement relevant to the operating element (lever handle, knob of a cylinder or bolt, etc.)

[d] Requirement relevant to the fire regulation.

Table B.3 — Example of product selection scheme for locks, bolts, cylinders and keys

Entrance door, residential, daily use, elderly person, not using a wheelchair							
	Potential user's requirements	**Relevant requirements for this application**	**Products**				
			A	**B**	**C**	**D**	**E**
	General requirements						
	Provide audio/visual feedback	✓	✓	✓	✓	✓	#
	Visual recognition of operating element	✓	✓	✓	✓	✓	✓
	Rounded corners	✓	✓	✓	✓	✓	✓
	Accessible from a wheelchair						
	Operational requirements						
	Single action to operate	✓	✓	✓	✓	✓	✓
	Operable with one hand	✓	✓	✓	✓	✓	✓
	Operable without need to grip	✓	✓	✓	**0**	✓	✓
	No need to insert a key						✓
	Self-latching action [d]		✓	✓	✓	✓	✓
	Maximum torque on handle: 5 Nm	✓	✓	✓	✓	✓	✓
	Maximum torque on key: 0,8 Nm	✓	✓	✓	✓	✓	#
	Maximum force on thumb slide: 50 N	✓	#	✓	#	#	#
	Maximum manual door opening force with adjustable power size		#	#	#	#	#
	Maximum manual door closing force		#	#	#	#	#
	Controlled door closing with adjustable speed		#	#	#	#	#
	Delayed closing function		#	#	#	#	#
	Free swing function		#	#	#	#	#
	Maximum pull force to manual release		#	#	#	#	#
	Dimensional requirements						
	Good clearance around finger-operated element	✓	✓	**0**	✓	✓	✓
	Good clearance around hand-operated element	✓	✓	✓	✓	✓	✓
	Low projection into the clear opening of the door						
	Suitability for use on fire- / smoke-resisting doorsets						
	Suitability for use on fire-resisting doorsets						
	Suitability for use on smoke-resisting doorsets						
Products acceptable for this particular application			✓	**0**	**0**	✓	✓

Product A: Mortise lock (latch and deadbolt) with metal lever handle operating element
Product B: Rim night latch (front door lock) with cylinder and metal lever operating element
Product C: Cylindrical lock with cylinder with metal bored or tubular operating element
Product D: Multipoint mortise lock with automatic deadbolt with cylinder and metal lever operating element
Product E: Electric lock (solenoid operated) with proximity card reader and metal lever operating element

✓ Conforms to requirement.
0 Does not conform to requirement.
Requirement not relevant to the product category.

[b] Requirement relevant to the operating element (lever handle, knob of a cylinder, etc.)
[d] Requirement relevant to the fire regulation.

B.3 Door furniture, handles, handrails, and door protection hardware

B.3.1 Purpose of the hardware

These products are intended to:

— manually operate the door, and any lock or latch fixed to it;

— identify the operating point.

B.3.2 Different types and accessories, product standards

For door furniture (e.g. lever handles and knobs), reference can be made to EN 1906.

For pull handles, push plates and door protection, there is no EN standard available.

NOTE For emergency use of push pads, reference can be made to EN 179.

B.3.3 Installation and maintenance

Lock and latch furniture should be secured using bolt through and spindle fixing to reduce the risk of accidental abuse or damage.

B.3.4 Advantages/disadvantages of door furniture, handles, handrails, and door protection hardware

B.3.4.1 Door furniture

B.3.4.1.1 General

The smooth operation of door furniture, which is easily reached and provides a secure grip is of critical importance for elderly and disabled people. It should be capable of use by people with poor manual dexterity or manipulative problems.

Door furniture should be clearly distinguishable from the door using tonal contrast. Door furniture should have rounded ends to ensure the minimum risk of injury.

Lever handle and knob furniture should conform to the requirements of EN 1906 in accordance with the grade selected.

Lever handles or push pads should preferably be used instead of rotating knobs. It should be possible to operate door furniture with one hand, without tightly grasping it or twisting the wrist.

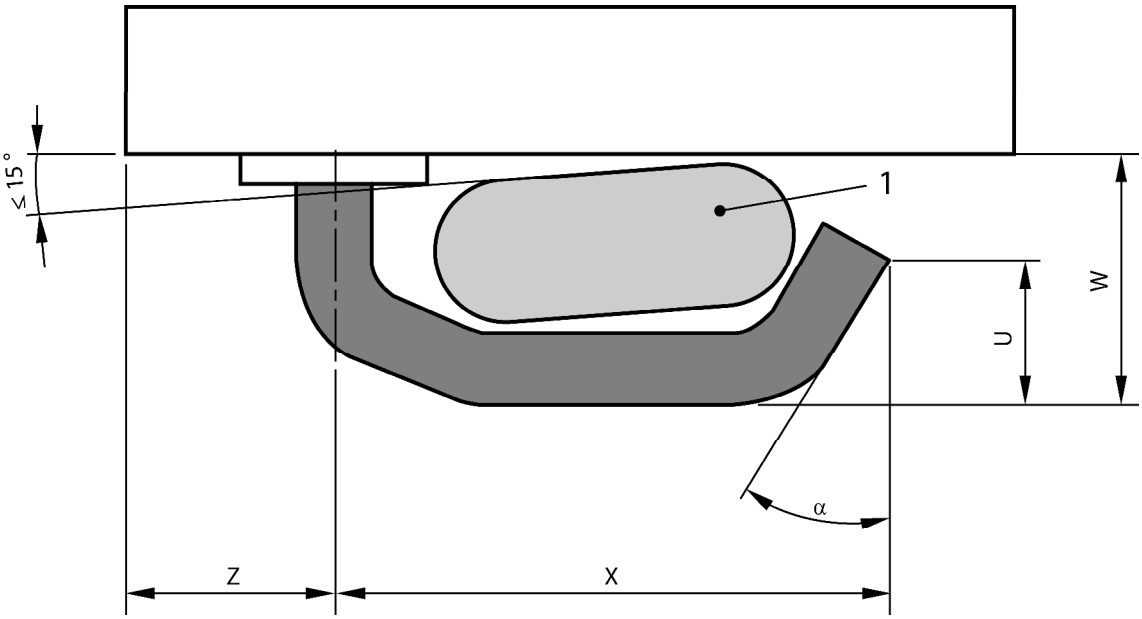
Lever handles should be designed to have a minimum length (dimension X) of 120 mm, measured from the axis of rotation to the free end, and the axis of rotation no more than 150 mm (dimension Z) from the leading edge of the door.

To minimize the risk of injury or of trapping clothes, the free end of a lever handle shall point towards the door such that the dimension “U” is not less than 40 mm, the dimension “W” is not more than 100 mm (standard projection) and the angle α between the free end of the lever handle perpendicular to the surface of the door is not more than 30°.

To allow sufficient room for hand operation, lever handles should be designed such that a rounded (17,5 mm radius) test block of 35 mm width and 95 mm length held at an angle of not more than 15° to the surface of the door can be passed freely between the lever handle and the surface of the door. This requirement shall be fulfilled at any position of the lever handle.

See Figure B.2.

They should be fixed at a maximum height of 1 060 mm from finished floor level.



Key

U Minimum dimension of lever end return
W Maximum projection
X Minimum length
Z Distance from the leading edge of the door
α Angle between the free end and the perpendicular to the door face
1 Test block

Figure B.2 — Critical dimensions of lever handles

B.3.4.1.2 Lever handles designs with special features

Certain manufacturers have introduced lever handle designs with special features specifically for use by those who need to use the elbow, forearm or palm of the hand.

Where suitably enlarged lever handles are fitted, it is essential that the chosen lock is compatible and will fully support the door furniture.

In addition to a lever handle on the face of the door it may be desirable to provide a horizontal pull handle to allow a disabled person to close the door, once through, where there is less room for manoeuvre.

For use of lever handles in combination with narrow stile locks having a small backset, preference should be given to offset lever handles, featuring less risk of injuries.

B.3.4.2 Pull handles, push plates, and door protection

B.3.4.2.1 Pull handles

Pull handles should be a minimum 400 mm length and fitted to provide the maximum assistance with opening and/or closing a door.

Full height pull handles are to be discouraged as they may restrict the clear opening. In addition, wheelchair users may find it difficult to negotiate around them causing unnecessary inconvenience.

The lower fixing point for vertically fixed pull handles should be no more than a maximum height of 1 000 mm from finished floor level, unless special situations require a lower height (i.e. kindergartens). A similar height should be used for horizontally fixed grab rails and pull handles.

B.3.4.2.2 Push plates

Push plates should be a minimum 400 mm with a minimum width of 100 mm (to suit hand width) suitable to fit between the edge of the any panel and the edge of the door. In all instances the length of the push plate should be sufficient to cover any bolt fixings used to secure the pull handle.

B.3.4.2.3 Door protection

Doors in openings through which elderly and disabled people manoeuvre may sustain a greater risk of damage from wheelchairs, foot rests, walking sticks, walking frames and other appliances. It is therefore essential that adequate protection is provided for the door and frame.

For door protection, it is recommended that a kick plate is fitted to both faces for the full width of the door, less the margin for frame stops and edge tolerances. The recommended height of plate is 400 mm. Protection may also be provided for the leading edge of the door.

Where appropriate, mid-rail plates may also be fitted if the door is likely to be damaged by traffic, e.g. where stretchers or service trolleys are present.

Sharp corners and edges should be avoided. For safety reasons, all protection and push plates should be finished with radiused edges and corners.

B.3.4.3 Handrails, guard rails and support grab rails

B.3.4.3.1 Handrails

Handrails whether for ramps, steps, internal or external staircases and corridors, should be designed to support the user, provide adequate grip and also serve as safety barrier rails.

Handrails should be of circular or oval profile, easy and comfortable to grip, and smooth. Handrails should have a minimum cross section radius of 14 mm and a maximum cross section radius of 20 mm. The cross sectional area of an oval profile shall be equal to those of circular profile with the above mentioned radii. The handrail bracket should provide a minimum clear projection of 50 mm in all directions. The top edge of the handrail should be not less than 900 mm and not more than 1 000 mm from finished floor level, unless special situations require a lower height (i.e. kindergartens).

B.3.4.3.2 Guard rails

Guard rails should be provided to guide wheelchair users and the partially sighted around projections and obstructions such as radiators and fire hoses in corridors. They may be required at floor level and/or handrail height.

B.3.4.3.3 Support grab rails

B.3.4.3.3.1 General

Individual support rails may be required in certain locations where a continuous handrail is not appropriate. These rails should have a "return to wall" fixing.

B.3.4.3.3.2 Fixing requirements

Since the purpose of these rails is to give support to those who need it, it is essential that all support/grab rails have a firm fixing. The majority of these items are fixed to walls or partitions, therefore it is imperative that the supporting structure is suitable to support the load.

Fixing devices should be adequate both in strength and length for the application. Where fixings are to tiling or partitions other than solid structures it is essential that a rigid fixing position is provided within the wall and that the screw length is sufficient to ensure a full engagement.

Support rails are required, primarily, in WC compartments of public buildings for wheelchair users and ambulant disabled people. The provision of grab and support rails should be in accordance with the details set out in Approved Document 'M' Access to and Use of Buildings, (UK Building Regulations) or the appropriate National Regulations of each Member Country. Such rails should have a minimum cross section radius of 14 and a maximum cross section of 20 mm. The cross sectional area of an oval profile shall be equal to those of circular profile with the above mentioned radii. See Bibliography.

Similar requirements apply in respect of facilities such as "accessible" hotel bedrooms, shower compartments and dressing cubicles. In bathrooms, there may be a need for additional support rails in the form of basin rails, corner bath rails, bath support rails or vertical grab poles. For shower areas, the requirements may include shower surround rails, vertical poles and shower seats.

B.3.4.3.3.3 Surface finish of support and grab rails

A choice of materials and finishes is offered by specialist manufacturers. Stainless steel forms the basis of the majority of support rails which are then finished in a variety of ways.

The choice of the correct grade of stainless steel provides the inherent corrosion resistance which ensures a long service life and maintained appearance which is essential in bathrooms and toilet areas where there is the possibility of continual damp conditions. Wherever possible, the surface should preferably be, for partially sighted people, of a contrasting colour to the background.

Finishes include polished stainless steel, colour powder coated and applied textured non-slip finishes. In addition, some may be nylon sleeved or a solid moulded plastic section.

B.3.4.3.3.4 Earthing requirements

Certain metal rails may be supplied with bonding kits to ensure a good earth contact, thus avoiding the effects of static electricity. This has become less necessary due to the improvement of floor coverings which do not generate high levels of static electricity.

B.3.5 Assessment and example of product selection

The following tables will provide an assessment scheme and an example of product selection scheme related to the above products.

See Table B.4 and Table B.5.

B.4 Panic and emergency exit devices and systems

B.4.1 Purpose of the hardware

B.4.1.1 General

The purpose of exit devices and systems is to enable for immediate release of exits in case of emergency or panic situations, without the need of a key.

Experience relating to general safety as well as to fire and/or smoke hazards has made it desirable for doors in circulation areas, or those that have to be operated in an emergency situation, to be fitted with suitable exit devices to common European Standard specifications.

B.4.1.2 Panic exit device, operated by a horizontal bar, for use on escape routes

The main purpose of the performance requirements contained in EN 1125 is to give safe and effective escape through a doorway, with minimum effort and without prior knowledge of the exit device. Priority is given in this standard to the panic operation rather than pressure and resistance to the door opening from seals, weather-stripping, multiple bolt heads, etc. Precedence is given to the importance of ease of opening by the young, elderly and infirm.

In a panic situation, a group of people will react differently from an individual. When two or more people are rushing to an exit door located on an escape route, probably in darkness and/or smoke, it is possible that the first one to reach the door will not necessarily operate the panic exit device, but might push the surface of the door (door under pressure) while other people will be trying to operate the horizontal bar by hand or body pressure.

Whilst reasonable external security will be provided by the panic exit devices covered in this standard, the main objective is to enable a door to be opened at all times by hand or body pressure along its inside face on the panic exit device and not requiring the use of a key or any other object.

B.4.1.3 Emergency exit device, operated by a lever handle or push pad, for use on escape routes

The main purpose of the performance requirements contained in EN 179 is to give safe and effective escape through a doorway with one single operation to release the emergency exit device, although this may require prior knowledge of the door situation (e.g. inwardly opening). EN 179 deals with emergency exit devices designed to be used in emergency situations, where people are familiar with the emergency exit and its hardware and therefore a panic situation is most unlikely to develop.

B.4.2 Different types and accessories, product standards

For emergency exit devices operated by a lever handle or push pad, reference can be made to EN 179.

For panic exit devices operated by a horizontal bar, refer to EN 1125.

NOTE Panic exit devices are also suitable for outwardly opening emergency exits.

For electrically controlled exit systems, refer to prEN 13633 and prEN 13637.

Table B.4 — Assessment scheme for door furniture, pull handles, push plates and door protection hardware

	Door and user application					
	Potential user's requirements		**Relevant requirements for product category**			
			EN 1906	**Pull handles**	**Push plates**	**Door protection hardware**
	General requirements					
	Provide audio/visual feedback		✓	✓	✓	#
	Visual recognition of operating element		✓	✓	✓	✓
	Rounded corners		✓	✓	✓	✓
	Accessible from a wheelchair		✓	✓	✓	✓
	Operational requirements					
	Single action to operate		✓	✓	✓	✓
	Operable with one hand		✓	✓	✓	✓
	Operable without need to grip		✓	✓	✓	✓
	No need to insert a key		✓	✓	✓	#
	Self-latching action [d]		✓	✓	✓	#
	Maximum torque on handle: 5 Nm		✓	✓	✓	#
	Maximum torque on key: 0,8 Nm		✓	✓	✓	✓
	Maximum force on thumb slide: 50 N		✓	✓	✓	#
	Maximum manual door opening force with adjustable power		#	#	#	#
	Maximum manual door closing force		#	#	#	#
	Controlled door closing with adjustable speed		#	#	#	#
	Delayed closing function		#	#	#	#
	Free swing function		#	#	#	#
	Maximum pull force to manual release					
	Dimensional requirements					
	Good clearance around finger-operated element		✓	✓	✓	✓
	Good clearance around hand-operated element		✓	✓	✓	#
	Low projection into the clear opening of the door		#	#	#	#
	Suitability for use on fire- / smoke-resisting doorsets					
	Suitability for use on fire-resisting doorsets					
	Suitability for use on smoke-resisting doorsets					

✓ Requirement can be relevant to the product category.
0 Does not conform to requirement.
Requirement not relevant to the product category.

[b] Requirement relevant to the operating element (lever handle, knob of a cylinder, etc.)

[d] Requirement relevant to the fire regulation.

Table B.5 — Example of product selection scheme for door furniture, pull handles, push plates and door protection hardware

Entrance door, residential, daily use, elderly person, not using a wheelchair							
	Potential user's requirements	**Relevant requirements for this application**	**Products**				
			A	**B**	**C**	**D**	**E**
	General requirements						
	Provide audio/visual feedback	✓	✓	✓	✓	✓	
	Visual recognition of operating element	✓	✓	✓	✓	✓	✓
	Rounded corners	✓	✓	✓	✓	✓	✓
	Accessible from a wheelchair						
	Operational requirements						
	Single action to operate	✓	✓	✓	✓	✓	✓
	Operable with one hand	✓	✓	✓	✓	✓	✓
	Operable without need to grip	✓	✓	✓	**0**	✓	✓
	No need to insert a key						✓
	Self-latching action [d]		✓	✓	✓	✓	✓
	Maximum torque on handle: 5 Nm	✓	✓	✓	✓	✓	✓
	Maximum torque on key: 0,8 Nm	✓	✓	✓	✓	✓	#
	Maximum force on thumb slide: 50 N	✓	#	✓	#	#	#
	Maximum manual door opening force with adjustable		#	#	#	#	#
	Maximum manual door closing force		#	#	#	#	#
	Controlled door closing with adjustable speed		#	#	#	#	#
	Delayed closing function		#	#	#	#	#
	Free swing function		#	#	#	#	#
	Maximum pull force to manual release		#	#	#	#	#
	Dimensional requirements						
	Good clearance around finger-operated element	✓	✓	**0**	✓	✓	✓
	Good clearance around hand-operated element	✓	✓	✓	✓	✓	✓
	Low projection into the clear opening of the door						
	Suitability for use on fire- / smoke-resisting doorsets						
	Suitability for use on fire-resisting doorsets						
	Suitability for use on smoke-resisting doorsets						
Products acceptable for this particular application			✓	**0**	**0**	✓	✓

Product A: Product B: Product C:	Product D: Product E:
✓ Conforms to requirement. 0 Does not conform to requirement. **#** Requirement not relevant to the product category.	[b] Requirement relevant to the operating element (lever handle, knob of a cylinder, etc.) [d] Requirement relevant to the fire regulation.

B.4.3 Different types and accessories, product standards

For emergency exit devices operated by a lever handle or push pad, reference can be made to EN 179.

For panic exit devices operated by a horizontal bar, refer to EN 1125.

NOTE Panic exit devices are also suitable for outwardly opening emergency exits.

For electrically controlled exit systems, refer to prEN 13633 and prEN 13637.

B.4.4 Installation and maintenance

B.4.4.1 Installation

Care should be taken that any seals or weather-stripping fitted to the complete door assembly do not inhibit the correct operations of the panic or emergency exit device.

On double doorsets with rebated meeting stiles, and where both leaves are fitted with exit devices, it is essential to check that either leaf will open when its exit device is activated and also that both leaves will open freely when both exit devices are operated simultaneously.

The operating element should normally be installed at a height of between 900 mm and 1 100 mm from the finished floor level, when the door is in the secured position. Where it is known that the majority of the occupants of the premises will be young children, specifiers should reduce the height of the operating element.

The bar of a panic exit device should be installed so as to provide the maximum effective length.

Where exit devices are to be fitted to double doorsets with rebated meeting stiles and self closing devices, a door coordinator device conforming to EN 1158 and a carry bar should be fitted to ensure the correct closing sequence of the doors.

NOTE This recommendation is particularly important with regard to fire/smoke-resisting door assemblies.

If a door closing device is to be used to return the door to the closed position, care should be taken not to impair the use of the doorway by the young, elderly and infirm (see the recommendations relevant to automatic door operators and to door closing devices).

When installing lever or push pad operated emergency exit devices, particularly on doors with raised or recessed surfaces, specifiers should minimize any potential safety risks, such as the trapping of fingers or clothing.

B.4.4.2 Maintenance

As stated in manufacturers' installation and fixing instructions, it is recommended that the following routine maintenance checks should be undertaken at intervals of not more than 1 month by the occupier or an approved representative:

— inspect and operate the exit device to ensure that all components are in a satisfactory working condition;

— ensure that the keeper(s) is (are) free from obstruction;

— check that the exit device is lubricated in accordance with the manufacturer's instructions;

— check that no additional locking devices have been added to the door since its original installation;

— check that the doorway is without any obstruction preventing the door from being fully opened.

A check should be made yearly that all components of the panic or emergency exit device are still correct in accordance with the list of approved components originally supplied with the system. Repair or replace the device as appropriate.

B.4.5 Advantages/disadvantages of panic and emergency exit devices and systems

B.4.5.1 Design of operating elements

Design of operating elements of exit devices, such as horizontal bars, lever handles or push pads may help the "less able". Specifiers should define the ergonomics of the exit device.

For EN 1125 exit devices operated by horizontal bars, type A bars may allow a better grip for the hand, especially when the door is not equipped with a door closing device, whereas type B bars may be more suitable for use in places where abuse may be more likely to occur.

NOTE According to the situation, it may be advisable to install the horizontal bar at a lower position than normal to allow for operation by young children (i.e. in kindergartens) or people in wheelchairs; alternatively, a device with two horizontal bars may also be chosen.

For EN 179 exit devices operated by lever handles or push pads, type A lever handle operated devices might be easier to operate by small children simply by hanging onto the lever handle. Type B push pad operated devices may be more suitable for use in places where abuse may be more likely to occur.

B.4.5.2 Design of outside access device

Specifiers should define the ergonomics of any outside access device. Also, the use of electronic outside access systems, such as transponder, proximity technology, etc. may prevent the need for mechanical cylinder key operations.

B.4.5.3 Low operating forces

An exit device will operate, with no load condition, with operating forces not exceeding 80 N for a bar operated panic exit device, 70 N for a lever handle operated emergency exit device or 150 N for a push pad operated emergency exit device. Although this may be sufficient in most cases, it may not be sufficient with loaded door conditions.

Door operating forces not only depend on the exit device but also on the construction of the door and its equipment, especially with the use of compression seals, door closing devices, etc.

When choosing an appropriate exit device, it may be necessary to seek advice from the manufacturer about release forces of the device and its durability in test conditions with a 25 N load and/or with different loads applied to the door.

Table B.6 is intended to give guidelines for choosing the appropriate exit device.

Table B.6 — Operating forces

	Maximum operating force requirements in the standards		Maximum recommended operating force by C.E.D.
Exit device	Emergency situation no load on test door)	Panic situation (1 000 N load on test door)	Normal situation (especially when using seals and weather strippings, etc.)
EN 1125 – type A or B (with horizontal bar)	Maximum 80 N	Maximum 220 N	Choose an exit device with a low operating force.
EN 179 – type A (with lever handle)	Maximum 70 N	Not applicable	
EN 179 – type B (with push pad)	Maximum 150 N	Not applicable	
NOTE 1 Recommended operating force by children, elderly and disabled people should not exceed the shown maximum values for an emergency situation even with 25 N load applied to the door leaf (see durability test). NOTE 2 The load of 25 N on the test door simulates in the durability test any influence caused by seals, weather stripping, etc.			

B.4.5.4 Bottom vertical rods and projecting floor sockets

Surface applied bottom vertical rods and projecting floor sockets should be avoided to prevent abuse by wheelchairs. Alternatively, bottom vertical rods protected by strong cover or guard can be used.

B.4.5.5 Automatic locking

Specifiers should select an automatic locking feature that allows for automatic deadbolting of the device which does not require any manual operation to relock a door.

B.4.5.6 Dogging mechanism

When a door does not need to be locked all the time, specifiers should select a dogging mechanism, which makes it easier to use the door by holding the bolt heads in their withdrawn position until manually reset.

NOTE This may be in conflict with the suitability of the exit device for use on fire- / smoke-resisting doorsets.

B.4.5.7 Electrically controlled functions

Panic and emergency exit systems conforming to prEN 13633 and prEN 13637 are primarily designed to control egress and access and provide higher security while conforming to safety requirements (linked to fire detection and alarm system of the building).

Specifiers should select such systems to ease access and egress.

B.4.5.8 Projection of the exit device

It is recommended to use exit devices with low projecting operating elements (horizontal bar, lever handle, push pad) to allow wider door openings, thus facilitating the passage of wheelchairs.

B.4.5.9 Recognition of operating element

Visually impaired people may have difficulty in recognizing the exit door and/or its operating element. Specifiers should assure a minimum contrast between the operating element and the surface of the door leaf. Minimum recommended contrast should be 30 % on a grey scale.

B.4.6 Assessment and example of product selection

The following tables will provide an assessment scheme and an example of product selection scheme related to the above products.

See Table B.7 and Table B.8.

B.5 Hinges and pivots

B.5.1 Purpose of the hardware

These products are intended to support the door and allow its swinging operation.

B.5.2 Different types and accessories, product standards

For single axis hinges, reference can be made to EN 1935. These cover:

— swing-clear (offset) hinges (give a definition);

— projecting hinges;

— rising butt hinges.

B.5.3 Installation and maintenance

Hinges and pivots with low friction should be selected to minimize the resistance of the door to opening and closing. Care should be taken during installation to ensure proper alignment and rigidity of installation to reduce the risk of increased friction. Regular maintenance may be required in accordance with the manufacturer's instructions, especially with regards to lubrication.

B.5.4 Advantages/disadvantages of hinges and pivots

B.5.4.1 General

All hinges and pivots should be selected to carry the appropriate mass and width of the door. Specifiers should verify the presence of any door closing devices.

Specifiers should assure that the door and its environment do not trap fingers.

Table B.7 — Assessment scheme for exit devices and systems

Requirements related to EN standards				
Potential user's requirements	**Relevant requirements for product categories**			
	EN 1125	**EN 179**	**prEN 13633**	**prEN 13637**
General requirements				
Provide audio/visual feedback	-	-	✓	✓
Visual recognition of operating element	✓	✓	✓	✓
Rounded corners	✓	✓	✓	✓
Accessible from a wheelchair	✓	✓	✓	✓
Operational requirements				
Single action to achieve exit without use of a key	✓	✓	✓	✓
Operable with one hand	✓	✓	✓	✓
Operable with body pressure	✓		✓	
Operable without need to grip	✓	✓	✓	✓
No need to insert a key from inside	✓	✓	✓	✓
Self-latching action [d]	✓	✓	✓	✓
Maximum force by hand on horizontal bar to exit	✓	#	✓	✓
Maximum force by hand on lever handle or push pad to exit	#	✓	#	✓
Suitability for inwardly opening exit doors	#	✓	#	✓
Automatic locking feature	✓	✓	✓	✓
Maximum torque on outside handle (or other element)	✓	✓	✓	✓
Maximum torque on outside key	✓	✓	✓	✓
Dogging mechanism to keep bolts in retracted position [d]	✓	✓	✓	✓
Free swing function	✓	✓	✓	✓
Dimensional requirements				
Low projection into the clear opening of the door	✓	✓	✓	✓
Suitability for use on fire- / smoke-resisting doorsets				
Suitability for use on fire-resisting doorsets	✓	✓	✓	✓
Suitability for use on smoke-resisting doorsets	✓	✓	✓	✓

✓ Requirement can be relevant to the product category.
0 Does not conform to requirement.
Requirement not relevant to the product category.

[b] Requirement relevant to the operating element (lever handle, knob of a cylinder, etc.)

[d] Requirement relevant to the fire regulation. This may be in conflict with the suitability for fire- / smoke-resisting

Table B.8 — Example of product selection scheme for exit devices and systems

Products fulfilling the user's requirements							
	Potential user's requirements	**Relevant requirements for this application**	**Product references in accordance with EN 179 or EN 1125**				
			A	**B**	**C**	**D**	**E**
	General requirements						
	Provide audio/visual feedback						
	Visual recognition of operating element						
	Rounded corners						
	Accessible from a wheelchair						
	Operational requirements						
	Single action to achieve exit without use of a key						
	Operable with one hand						
	Operable with body pressure						
	Operable without need to grip						
	No need to insert a key from inside						
	Self-latching action [d]						
	Maximum force by hand on horizontal bar to exit						
	Maximum force by hand on lever handle or push pad to exit						
	Suitability for inwardly opening exit doors						
	Automatic locking feature						
	Maximum torque on outside handle (or other element)						
	Maximum torque on outside key						
	Dogging mechanism to keep bolts in retracted position [d]						
	Free swing function						
	Dimensional requirements						
	Low projection into the clear opening of the door						
	Suitability for use on fire- / smoke-resisting doorsets						
	Suitability for use on fire-resisting doorsets						
	Suitability for use on smoke-resisting doorsets						
Products acceptable for this particular application							
Product A: Product B: Product C:		Product D: Product E:					
✓ Conforms to requirement. 0 Does not conform to requirement. **#** Requirement not relevant to the product category.		[b] Requirement relevant to the operating element (lever handle, knob of a cylinder, etc.) [d] Requirement relevant to the fire regulation. This may be in conflict with the suitability for fire- / smoke-resisting doorsets.					

B.5.4.2 Fixing positions

— Hinges

The fixing position for hinges on standard doors should correspond to existing standards for doors and frames. Where the door width or mass are increased, it may be more appropriate to adopt the alternative positioning of the hinges to supply additional leverage.

— Swing-clear (offset) hinges

Where the clear opening width is uncertain due to the door aperture being restricted, specifiers should use "swing clear" (offset) hinges. These allow the door to align with the door stop when opened to 90°. They also ensure that the door can open sufficiently to reduce the projection of the door furniture into the opening space (use of “carry bar” and door coordinator on double doors), especially for escape use.

— Projecting hinges

Projecting hinges should not be specified unless it is essential to achieve more than 90° round and exceptionally deep door frame. Wheelchairs require the minimum number of obstructions, especially in doorways.

NOTE When used on double escape doors, care should be taken to ensure proper opening of both leaves at the same time.

— Rising butt hinges

Good quality rising butt hinges can be used as a means of partially closing a door in lieu of a spring door closing device. They would not be used on fire-resisting doors, except where permitted in accordance with local regulations. When fitted, they should be correctly lubricated and maintained.

— Pivots

The fixing position for pivots follows the same discipline as that employed for floor springs. The pivots may be either edge mounted for single action or centrally mounted for single or double action. Due attention should be given to the added restrictions imposed on clear opening widths when pivots are used.

B.6 Door closing/opening devices and systems for swing doors

B.6.1 Purpose of the hardware

Door closing/opening devices allow the door to close automatically after any opening operation, and where appropriate, to open automatically.

B.6.2 Different types and accessories, product standards

— For controlled door closing devices (door closers), reference can be made to EN 1154.

— For double action door closing devices, reference can be made to EN 1154.

— For electrically powered hold-open/free swing devices, reference can be made to EN 1155.

B.6.3 Installation and maintenance

Correct selection of door closer power size according to door size is essential to minimize opening forces. Care should be taken to choose a door closing device with high efficiency and decreasing opening force. Proper power adjustment will reduce opening/closing forces.

B.6.4 Advantages/disadvantages of door closing/opening devices and systems for swing doors

B.6.4.1 General

Two categories of products cover different functions:

— door closing devices, covering manual opening (force/torque to operate the locking device and to open the door) and automatic closing (controlled or uncontrolled) functions;

— automatic powered pedestrian swing doors, covering assisted or automatic opening (low or no force or torque to operate the locking device and open the door) and automatic closing functions.

Door closing devices may create problems for both the semi-ambulant and partially sighted.

Due to the requirements often imposed by fire precautions in buildings, it may be necessary to provide more door closing devices than would be chosen in an ideal situation. Similarly, the closing forces required for use on fire-resisting doors are greater than those recommended in areas where people with disabilities are present.

Wherever possible, doors used frequently by elderly and disabled people should be left free swinging except where designated as fire-resisting doors. For such fire-resisting doors, the use of electrically powered free swing door closers (see B.6.4.6.3) is recommended.

Door closing devices should be selected to provide the selected function and operating forces.

The resistance to opening created by a door closing device may cause concern and stress to some elderly or disabled people. Door closers with distinctly decreasing opening moment and high efficiency are always recommended.

Wherever costs are of less importance, low energy swing door operators (see B.6.4.5) or automatic swing door operators (see B.6.4.7) are recommended.

The provision of powered pedestrian door systems, or automatic door operators, should be considered for situations where there is heavy traffic and a need for larger doors which may cause inconvenience for semi-ambulant or less mobile individuals

All door closing/opening devices and systems should conform to harmonized European Standards. This ensures conformity to both the product performance specification and the electrical requirements stated under other EEC Directives.

Specifiers should define the various alternatives when upgrading or retrofitting an existing condition. For smaller, closer power sizes, closers with degreasing opening moments, delayed action door closing devices, free-swing door closing devices, door closing devices with integral electrically powered hold-open facilities, stand-alone electromagnets and for simple low energy swing door operators, no additional safety features are needed. All of these options are available as standard building hardware products.

Powered door operators and powered pedestrian door systems need much more expenditure, especially when upgrading or retrofitting an existing condition.

NOTE Users should be careful not to confuse the term "self-closing" devices with "power operated devices".

B.6.4.2 Door closing devices

B.6.4.2.1 Controlled door closing devices (door closers)

Selection should be made in accordance with EN 1154 or EN 1155 when incorporating an electrically powered hold-open device.

To achieve optimal opening/closing forces, door closers with adjustable closing force and latch control selected to the size of door should be used.

B.6.4.2.2 Uncontrolled door closing devices (spring closers)

Whilst requiring a lower opening force, it is essential to evaluate the installation of such door closing devices which do not control the closing speed of the door. Such devices may lead to possible serious injury as a result of the door closing too quickly.

B.6.4.2.3 Double action door closing devices

The usage of double action door closers gives the advantage that the door can be opened from each side simply by pushing, which makes opening more easy, e.g. for people carrying or moving bulky objects or for people in wheelchairs. Double action door closers should only be used where tightness (as for smoke control doors) and latching after each opening are not essential requirements.

Double action door closers may be controlled door closing devices in accordance with EN 1154 as well as uncontrolled spring closers (no European Standard available).

B.6.4.3 Opening/closing forces

B.6.4.3.1 General

The opening resistance of a door closer is always higher than its closing strength. This is because some of the energy stored in the spring during the opening cycle is used by the closers' own moving parts. Well engineered door closers will have minimum friction in their mechanisms (high efficiency, see B.6.4.3.3.2), ensuring that the majority of the energy stored in the spring is available to close the door.

B.6.4.3.2 Conflicting requirements in product selection

For easy access, opening forces should be kept as low as possible. This is sometimes in conflict with the requirements for door closing devices to be used on self closing fire/smoke control doors.

To open a door against the resistance of a door closer becomes more difficult with the angle of opening because of the increasing unfavourable lever position of the human elbow. For this reason, it is essential to select door closers with high efficiency (see B.6.4.3.3.2) and with a distinctly decreasing opening moment (see B.6.4.3.3.3).

In UK for example, the maximum opening force allowed for a door fitted with a closing device where disabled access is required is 30 N (in accordance with amendments 2005 to BS 8300:2001 and Doc. "M"). This equates to about a size 3 door closer on a 950 mm wide door leaf. This figure would conform the minimum closing force requirements of EN 1154 for a fire-resisting door of this width but would require an efficiency of the complete door set of 75 % to meet the opening force requirements according to EN 1154.

NOTE For power size 3 door closers, an efficiency of at least 55 % is required, but this figure does not include any friction of hinges and gaskets.

Small door closer power sizes should not be specified in areas where there are strong draughts or differential air pressures. The selection of adjustable power (see B.6.4.3.3.1) size devices with latch control (see B.6.4.4.6) will enable each door condition to be achieved without the confusion of a multiplicity of door closing devices.

In cases where lower opening forces than closing forces are required, power assisted closing devices or automatic door operators / systems should be considered.

B.6.4.3.3 Product characteristics

B.6.4.3.3.1 Adjustable power size

Door closers with adjustable power size allow setting on site of the closing force to the value defined by the specifier for the specific door assembly to close. This is the value expressed in N which is needed to overcome any resistance of e.g. gaskets, latches, other frictions, wind or what ever. This closing force may be lower than the closing force specified in EN 1154 for the specific door.

B.6.4.3.3.2 Efficiency

Efficiency is the closing force expressed as a percentage of opening resistance. A good door closer will typically have an efficiency of at least 65 %. The minimum values are given in EN 1154.

B.6.4.3.3.3 Decreasing opening moment

Door closers are normally designed to give their maximum closing/opening forces in the last few degrees of closing, at 0° to 4° door opening, decreasing continuously against 90° door opening. The usage of some arm linkages (e.g. slide channels) may lead to less decrease or even increase of this force, making manual door opening more difficult. It is recommended that manually operated closing devices and/or arm linkages should be selected which can provide an opening force decrease by about 40 % from 2° to 60° door opening.

B.6.4.4 Closing speeds

B.6.4.4.1 General

If the closing action of a door closer is not controlled the door will slam. For this reason, controlled closing speeds should be used in all areas available for access by the elderly and disabled. It is recommended to adjust any closing speed of the door to the lowest acceptable level in order to keep its dynamic forces as low as possible. So the closing speed from 90° door opening to the closed position should be adjusted somewhere between 7 s (small doors) and 15 s (large doors) but on fire doors should not exceed 30 s.

Various solutions of closing speed control are available including those specified in B.6.4.4.2 to B.6.4.4.4.

B.6.4.4.2 Closing speed control below 45° opening angle

Door closers with limited angle of speed control (usually crank type door closers) should not be used for doors to be used by elderly and disabled people. The uncontrolled closing of a fully opened door up to 45° and sometimes below may lead to those persons being hit by the closing door. This applies in particular to people in wheelchairs.

B.6.4.4.3 Fully controlled closing speed

Door closers with fully controlled closing speed, adjustable at least from 105° door opening (category of use 3 and 4 in accordance with EN 1154) should be the minimum requirement of closing speed

adjustability if the door is supposed to be secure and convenient for the occupants inclusive of children, elderly and disabled people to use ("design for all").

B.6.4.4.4 Sweep and latch speed control within fixed opening angles

Door closers with adjustable sweep and latch speed control are closers with two different, fully adjustable closing ranges, e.g. full door opening to 15° opening and 15° to fully closed position of the door. The closing speed of both ranges can be adjusted independently from each other. This gives the advantage of achieving a very slow closing of a door from full opening but also having the possibility of acceleration in order to engage any latch or locking device.

B.6.4.4.5 Delayed closing function

Door closers with adjustable delayed closing function are closers where a certain range of closing control (e.g. 120° to 80° door opening) can be adjusted independently from other speed settings to achieve a delayed hold-open function. Such a function is highly recommended where doors often may be used by people carrying or moving bulky objects or by people in wheelchairs. In case of such doors being fire doors, the setting of the delay time should not exceed 30 s.

B.6.4.4.6 Latch control by adjustment of effective angle

Door closers with adjustable latch control by adjustment of the effective angle of control allow a very precise setting of the latch function to overcome any resistance of the latch of a locking device and/or of gaskets. By doing this, dynamic force can be used effectively in order to keep static forces (closing and opening force of the door closer) as low as possible.

B.6.4.5 Low energy swing door operators

B.6.4.5.1 General

Low energy swing door operators offer a compromise between the conventional door closing device and the fully powered pedestrian (automatic) door. They are not suitable for high traffic areas due to the slow operating speed of the unit.

In the case of low energy powered swing door operators being selected for control of the door closing/opening, it is recommended to activate the operation only manually either by push buttons or by “push and go” function. The device should also not include either a hold open mechanism or a delayed closing function with a delay time of more than 30 s (for more information, see 5.5.5 of EN 14637:2007).

Low energy door closing devices may offer a range of functions including those described in B.6.4.5.2 to B.6.4.5.4.

B.6.4.5.2 Automatic activation by push button

This allows activation of a conventional manual swing door closer with automatic controlled opening and closing when assistance is required. The device is activated manually by push buttons. If not activated, the device functions like an ordinary door closer.

B.6.4.5.3 Power assistance during opening action

Power assistance makes the door appear easier to operate. The opening operation is supported by power supplied externally.

B.6.4.5.4 Push and go function

This allows the door to open automatically when required or to support the opening operation. The activation happens automatically when the door is pushed beyond 25 mm opening.

B.6.4.6 Electrically powered hold-open devices

B.6.4.6.1 General

A self closing door may be held open by some external means such as a wedge, cabin hook or hold open arm linkages. However, for fire/smoke door assemblies only electrically powered hold-open devices are allowed.

Selection of electrically powered hold-open devices should be made in accordance with EN 1155.

The use of electromagnetic hold-open devices enables the choice of free movement and fire protection when connected to an electrically controlled hold-open system in accordance with EN 14637 or to the fire/smoke alarm system of the building. Doors can operate on an intermittent basis whilst being held open for the majority of the time. Such facilities are offered as integral devices and stand-alone devices.

The method of release from the hold-open position could be arranged either electrically by using a push button or switch to interrupt power supply to the hold open device (manual control), or by pulling/pushing the door with a maximum force of 120 N from its held position (manual release).

B.6.4.6.2 Integral devices

The inclusion of an electromagnetic hold-open device as an integral part in the body of the door closing device, whether as overhead door closers surface mounted, concealed door mounted, concealed transom mounted or floor mounted allows a door closer to be fitted in any suitable location. It does not depend on either a wall-mounted or floor positioned magnet, most products being effective at any opening angle greater than 80°.

A version of the concealed overhead door closer is also available with an electromechanical hold-open facility where the release force can be adjusted and is rated to ensure that the door can also be released manually. The inclusion of variable power integral electromagnetic hold-open devices now makes it possible to provide "tailor made" adjustments to suit each application.

B.6.4.6.3 Electrically powered free-swing door closing devices

These door closing devices, both overhead and floor mounted, allow the door, after an initial opening to a predetermined position, to swing freely anywhere from that position to its closed position without any resistance or damping. The door can then be used without the continual resistance of the door closer and the need for the user to exert unnecessary force to gain access through the door. Upon removal of the electrical supply, the door returns to the closed position under the control of the door closing device in the normal way.

Where free-swing door closing devices are fitted it is essential that a latching device is also fitted.

These devices should not be used on cross-corridor doors or in any location where a free-swinging door could create a hazard.

B.6.4.6.4 Stand-alone hold open devices

When door closing devices are fitted to doors in locations where the opening angle is limited to 90° it may be more appropriate to fit stand-alone electromagnets. Similarly, where door closing devices

have been fitted and a hold-open device is desirable, as a retrofit product, the stand-alone unit will provide the necessary facility.

B.6.4.7 Automatic swing door operators

To fix automatic swing door operators on existing door assemblies requires a solid structure of the door, its frame and most important its hinges.

In some cases, the complete exchange of the door into a powered pedestrian swing door system is to be recommended (see B.7).

NOTE In the case of fire doors it may be desirable to have 3rd party approval for the complete assembly, including the operator.'

B.6.5 Assessment and example of product selection

The following tables will provide an assessment scheme and an example of product selection scheme related to the above products.

See Table B.9 and Table B.10.

B.7 Powered pedestrian doors

B.7.1 Purpose of the hardware

Powered pedestrian doors are generally designed to:

— allow for easy use of a doorway;

— allow for safe use of a doorway;

— allow for good climate control.

B.7.2 Different types and accessories

Powered pedestrian doors consist of three major product families: swing doors, sliding doors, and revolving doors.

The type of powered pedestrian door system (including sliding doors) to be chosen depends on the expected traffic frequency and the conditions provided by the building design. Automatic sliding door systems should be considered first. If lack of space is the problem, folding-door or sliding swing door systems may be the solution. At this time, the use of powered pedestrian door systems as fire and smoke control door assemblies is concentrated on automatic swing door systems. In some European countries, exceptions are possible for other types of powered pedestrian door systems. However, reference can be made to EN 14600 for such doors.

Powered pedestrian doors can be either semi- or fully-automatic. Semi-automatic doors are often used with the purpose of helping disabled people.

Powered pedestrian doors can be combined with a great number of manual or automatic activation systems, safety systems, security systems (code systems) and function selectors.

Table B.9 — Assessment scheme for swing door closing/opening devices and systems

Door and user application			
Potential user's requirements		**Relevant requirements for product categories**	
	Clause	**EN 1154**	**EN 1155**
General requirements			
Adjustable power size	B.6.4.3.3.1	✓	✓
Efficiency over 65 %	B.6.4.3.3.2	✓	✓
Fully controlled closing speed from any opening angle	B.6.4.4.3	✓	✓
Operational requirements			
Automatic operation	B.6.4.1	#	#
Manual operation	B.6.4.1	✓	✓
Double action operation	B.6.4.2.3	✓	✓
Uncontrolled door closing with no speed adjustment	B.6.4.2.2	#	#
Controlled door closing with adjustable speed	B.6.4.2.1	✓	✓
Free swing operation	B.6.4.6.3	✓	#
Sweep and latch speed control within fixed opening angles	B.6.4.4.4	✓	✓
Latch control by adjustment of effective angle	B.6.4.4.6	✓	✓
Electrically powered hold-open (integrated in door closer)	B.6.4.6.2	✓	✓
Electrically powered hold-open (stand-alone device)	B.6.4.6.4	✓	✓
Low energy operation	B.6.4.5	#	#
Functional requirements			
Maximum 120 N pull force to manual release	B.6.4.6.1	#	✓
Electrical release	B.6.4.6.1	#	✓
Delayed closing function	B.6.4.4.5	✓	#
Decreasing opening moment	B.6.4.3.3.3	✓	#
Automatic activation by push button	B.6.4.5.2	#	#
Power assistance during opening action	B.6.4.5.3	#	#
Push and go function	B.6.4.5.4	#	#
Automatic activation by motion sensors	B.6.4	#	#
Suitability for use on fire- / smoke-resisting door sets			
Suitability for use on fire-resisting door sets	B.6.4.3.2 / B.6.4.7	✓	✓
Suitability for use on smoke-resisting door sets	B.6.4.3.2 / B.6.4.7	✓	✓

✓ Requirement can be relevant to the product category.
0 Does not conform to requirement.
Requirement not relevant to the product category.

Table B.10 — Example of product selection scheme for swing door closing/opening devices and systems meeting users' requirements

Door application: (e.g. entrance door, residential only, etc.)							
Potential user's requirements	**Relevant requirements for this door application**	**Product reference**					
		A	**B**	**C**	**D**	**E**	**F**
General requirements							
Adjustable power size							
Efficiency over 65 %							
Fully controlled closing speed from any opening angle							
Operational requirements							
Automatic operation							
Manual operation							
Double action operation							
Uncontrolled door closing with no speed adjustment							
Controlled door closing with adjustable speed							
Free swing operation							
Sweep and latch speed control within fixed opening angles							
Latch control by adjustment of effective angle							
Electrically powered hold-open (integrated in door closer)							
Electrically powered hold-open (stand-alone device)							
Low energy operation							
Functional requirements							
Maximum 120 N pull force to manual release							
Electrical release							
Delayed closing function							
Decreasing opening moment							
Automatic activation by push button							
Power assistance during opening action							
Push and go function							
Automatic activation by motion sensors							
Suitability for use on fire- / smoke-resisting doorsets							
Suitability for use on fire-resisting doorsets							
Suitability for use on smoke-resisting doorsets							
Products acceptable for this particular application							

Product A: Product B: Product C:	Product D: Product E:

✓ Conforms to requirement.
0 Does not conform to requirement.
Requirement not relevant to the product category.

B.7.3 Installation and maintenance

Powered pedestrian doors for regular use are currently considered as ordinary commodities. In spite of this, they need to be installed, adjusted and maintained by professional and trained personnel, in accordance with the manufacturer's instructions.

NOTE Mandatory rules and regulations, as well as the manufacturer's instructions, may be applicable to the yearly maintenance of certain types of powered pedestrian doors, for use in fire and escape routes.

B.7.4 Advantages/disadvantages of powered pedestrian doors

B.7.4.1 General

The provision of powered pedestrian doors, or automatic door operators, should be considered for situations where there is heavy traffic and a need for larger doors which may cause inconvenience for semi-ambulant or less mobile individuals.

The use of powered pedestrian doors should be seen as a long-lasting investment in functionalities, safety and convenience.

Adjustments should always promote safety by using slowest possible opening and closing speed and force. Controlled motion and hold open time are other positive safety factors.

The placement of manual activation devices should be defined with regards to the ability to be reached for a wheelchair and to give space for its passage. Also the labels and markings should be verified.

B.7.4.2 Powered pedestrian swing doors

These can be either the semi- or fully-automatic type.

Before fixing a powered pedestrian door drive to an existing manual swing door, it is of importance to know that the structure of the frame and hardware of the door are strong enough for the extra load the automatic opening gives on the door. If, however, a manual or security activation device is specified (for the physically disabled to use) most swing doors can be made power operated.

If a complete powered pedestrian door is to be installed, finger protected hinges are recommended.

For C.E.D. persons, a powered pedestrian swing door is a good way to handle the request for high closing force (wind, fire) with easy use.

For physically disabled persons, a powered pedestrian swing door with properly selected activation devices is a method of ensuring safe and effective use.

NOTE National regulations may be applicable to, and 3rd party certification may be desirable for, powered pedestrian swing doors should they be installed in a fire (smoke) barrier.

Existing building codes for fire, smoke, escape and disabled need to be studied for special requests.

B.7.4.3 Powered pedestrian sliding doors

These are almost always of the fully automatic type as they are intended for high volume traffic. In spite of this, sliding door drives are also used to help disabled people in, for example, private and elderly homes.

If the powered pedestrian sliding door is installed in an environment where a greater number of C.E.D. persons are expected (hospitals, care centres, etc.) additional presence detectors are recommended.

If the powered pedestrian sliding door should be installed in an escape route, such installation demands a third party approved system.

Existing building codes for escape and disabled need to be studied for special requests.

B.7.4.4 Powered pedestrian revolving doors

Revolving doors are constructed for separation of inside and outdoor environments. These can be either the semi- or fully-automatic type.

Revolving doors have high kinetic energy and are therefore equipped with more safety devices than swing and sliding doors. In spite of this, it is recommended to install a manual starting device for C.E.D. persons (slower speed).

If the powered pedestrian revolving door is to be installed in an environment where a greater number of C.E.D. persons are expected (hospitals, care centres, etc.) additional presence detectors are recommended.

If the diameter is below 3 m and the maximum speed at the periphery is over 300 mm/s, separate manual or automatic side doors (slide or swing) are recommended.

If the powered pedestrian revolving door is fitted in an escape route, such installation demands a third party approved system.

Existing building codes for escape and disabled persons need to be studied for special requests.

B.7.5 Assessment and example of product selection

The following tables will provide an assessment scheme and an example of product selection scheme related to the above products.

See Table B.11 and Table B.12.

Table B.11 — Product assessment scheme for powered pedestrian doors

Door and user application					
	Potential user's requirements		**Relevant requirements for product category**		
			EN 1154	**EN 12100-1/2**	**EN 954-1**
	General requirements				
	Provide audio/visual feedback				
	Visual recognition of operating elements			✓	
	Rounded corners and finger protection			✓	
	Accessible from a wheelchair			✓	
	Operational requirements				
	Single action to operate			✓	
	Operable with one hand			✓	
	Operable without need to grip			✓	
	No need to insert a key				
	Self-latching action		✓		
	Maximum allowed torque on handle				
	Maximum allowed torque on key				
	Maximum allowed force on thumb slide				
	Maximum manual door opening force		✓	✓	
	Maximum manual door closing force				
	Controlled door closing with adjustable speed		✓		
	Delayed closing function		✓		
	Free swing function with maximum opening force				
	High demands for user safety				
	High demands for C.E.D. accessibility				✓
	Dimensional requirements				
	Good clearance around finger-operated element				
	Good clearance around hand-operated element				
	Low projection into the clear opening of the door				
	Space demands for wheelchairs and alike means				
	Suitability for use on fire- / smoke-resisting				
	Suitability for use on fire-resisting doorsets		✓		
	Suitability for use on smoke-resisting doorsets		✓		
	Suitability for use in escape routes				
✓ Requirement can be relevant to the product category					

Table B.12 — Example of product selection scheme for powered pedestrian doors

Entrance door, residential, daily use, elderly person, not using a wheelchair							
	Potential user's requirements	**Relevant requirements for this application**	**Products**				
			A	**B**	**C**	**D**	**E**
	General requirements						
	Provide audio/visual feedback	✓	✓	✓		✓	
	Visual recognition of operating element	✓	✓	✓		✓	
	Rounded corners (finger protection)	✓	✓	✓		✓	
	Accessible from a wheelchair						
	Operational requirements						
	Single action to operate	✓	✓	✓		✓	
	Operable with one hand	✓	✓	✓		✓	
	Operable without need to grip (fully automatic?)	✓	✓	✓		✓	
	No need to insert a key	✓	✓	✓		✓	
	Self-latching action	✓	✓	✓		✓	
	Maximum torque on handle: 5 Nm [e]						
	Maximum torque on key: 0,8 Nm [e]						
	Maximum force on thumb slide: 50 N [e]						
	Maximum manual door opening force with adjustable power size	✓	✓	✓		✓	
	Maximum manual door closing force						
	Controlled door closing with adjustable speed	✓	✓	✓		✓	
	Delayed closing function	✓	✓	✓			
	Free swing function						
	Maximum force to manual release	✓	✓	✓		✓	
	Dimensional requirements						
	Good clearance around finger-operated element	✓	✓	✓		✓	
	Good clearance around hand-operated element	✓	✓	✓		✓	
	Low projection into the clear opening of the door	✓	✓	✓			
	Space demands for wheelchairs and alike means						
	Suitability for use in fire and emergency						
	Suitability for use on fire-resisting doorsets	✓	✓				
	Suitability for use on smoke-resisting doorsets	✓	✓				
	Suitable for use in escape routes	✓	✓	✓		✓	
Products acceptable for this particular application			✓	✓		✓	

A powered pedestrian swing door B powered pedestrian sliding door	C powered pedestrian revolving door diameter above 4 m D powered pedestrian revolving door diameter below 4 m

✓ Conforms to requirement

0 Requirement not relevant to the product offering

B.8 Sliding door gear

B.8.1 Purpose of the hardware

Sliding door gear allows doors to open manually and to close (automatically or not) without obstruction on the floor, especially for use with wheelchairs or people with arm or hand handicaps.

B.8.2 Different types and accessories, product standards

For sliding door gear for doors, reference can be made to EN 1527.

NOTE Sliding door gear for fire doors are not covered by EN 1527 and are subject to National regulations.

Different types are:

— straight sliding door gear (single panel or multiple panels);

— bi-folding door gear;

— multi-folding door gear.

To be used easily by elderly and disabled people, hardware of sliding doors and folding doors should conform to the highest level of the initial friction test for sliding doors (see EN 1527).

B.8.3 Installation and maintenance

Care should be taken to ensure proper alignment and precision of installation to reduce friction.

B.8.4 Advantages/disadvantages of sliding door gear

B.8.4.1 General

The provision of sliding doors may enable a wheelchair to be manoeuvred more easily through an opening.

Where there is a space restriction to both inward and outward opening wide doors, e.g. toilet and privacy cubicles, it may be more beneficial to consider the use of sliding doors.

Generally, sliding door gear should be top hung to avoid any obstruction on the floor.

Straight sliding doors, either single or bi-parting, may be fitted with motorized opening/closing devices. These can be operated automatically by remote sensors or by individual local controls (see Powered pedestrian doors).

Sliding doors and folding doors are not appropriate for emergency and panic exit doors.

B.8.4.2 Straight sliding door gear

Straight sliding door gear is able to provide a more ergonomic means of opening for certain disabilities, and requires less operating space. It may be fitted to the face of a dividing wall. Alternatively, the wall surface may also be preserved by using the "pocket door kit" where the door slides into a "pocket recess" or cavity between the two wall surfaces.

An additional benefit is that straight sliding doors with two panels may be connected to open simultaneously if required. This can be achieved by using a coordinating device.

B.8.4.3 Bi-folding door gear

Bi-folding door gear can add a further advantage to the selection of sliding doors. Ergonomically, the opening of a pair of sliding doors from the centre enables the "less-able" person to maintain balance without over-reaching and will allow the use of both hands if necessary.

An additional benefit is that bi-folding doors may be connected to open simultaneously if required. This can be achieved by using a coordinating device.

A version of the bi-folding door may be advocated as a space saving arrangement for the conventional door providing access to restricted spaces such as toilets and bathrooms without encroaching on the circulation area.

B.8.4.4 Multi-folding door gear

Multi-folding door gear can be a good compromise because it offers a larger opening while avoiding door operations, for example during normal business hours.

B.8.5 Assessment and example of product selection

The following tables will provide an assessment scheme and an example of product selection scheme related to the above products.

See Table B.13 and Table B.14.

Table B.13 — Assessment scheme for sliding doors and folding door gear

Door application and user's needs								
	Potential user's requirements		**Relevant requirements for hardware product categories (to be completed by the manufacturer)**					
						EN 1527		
	General requirements							
	Accessible from a wheelchair							
	Operational requirements							
	Single action to operate							
	Operable with one hand							
	Operable without need to grip							
	No need to insert a key							
	Free swing function							
	Maximum pull force to manual release (grade 3 of the standard)							
	Dimensional requirements							
	Good clearance around finger-operated element							
	Good clearance around hand-operated element							
Requirement can be relevant to the product category 0 Does not conform to requirement.								

Table B.14 — Example of product selection scheme for sliding doors and folding door gear

Entrance door, residential, daily use, elderly person, not using a wheelchair								
	Potential user's requirements	Relevant requirements for this application	Products					
			A	B	C	D	E	
	General requirements							
	Accessible from a wheelchair							
	Operational requirements							
	Single action to operate							
	Operable with one hand							
	Operable without need to grip							
	No need to insert a key							
	Free swing function							
	Maximum pull force to manual release (grade 3 of the standard)							
	Dimensional requirements							
	Good clearance around finger-operated element							
	Good clearance around hand-operated element							
Products acceptable for this particular application								
A: B:		D: E:						
Requirement can be relevant to the product category 0 Does not conform to requirement.								

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