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Power operated pedestrian doorsets – Safety in use

Part 0: Code of practice for risk assessment and risk reduction

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Contents

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 26, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 7036 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 October 2014. It was prepared by Technical Committee MHE/31, *Automatic power operated pedestrian doors*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

Together with BS EN 16005:2012, this part of BS 7036 supersedes BS 7036-1:1996, BS 7036-2:1996, BS 7036-3:1996, BS 7036-4:1996 and BS 7036-5:1996, which are withdrawn.

Relationship with other publications

BS 7036-0 is intended to be read in conjunction with BS EN 16005.

Information about this document

This is a new part of BS 7036, which has been developed to take into account the publication of BS EN 16005:2012. For doorsets that were installed prior to 2012, BS 7036-1:1996, BS 7036-2:1996, BS 7036-3:1996, BS 7036-4:1996 and BS 7036-5:1996 still apply.

The intention of this part of BS 7036 is to help its users to identify and eliminate hazards associated with power operated pedestrian doorsets, so that risks are controlled and minimized.

The initial text of this part of BS 7036 was provided by the Automatic Door Suppliers' Association and due acknowledgement is made to this organization.

Use of this document

As a code of practice, this part of BS 7036 takes the form of guidance and recommendations. It should not be quoted as if it were a specification and particular care should be taken to ensure that claims of compliance are not misleading.

Any user claiming compliance with this part of BS 7036 is expected to be able to justify any course of action that deviates from its recommendations.

It has been assumed in the preparation of this part of BS 7036 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its recommendations are expressed in sentences in which the principal auxiliary verb is "should".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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Section 1: General

1 Scope

This part of BS 7036 gives recommendations for risk assessment and risk reduction for power operated pedestrian doorsets conforming to BS EN 16005 with a view to safeguarding users against the risk of injury and accidents. It gives guidance on the process of undertaking hazard analysis and risk assessments, and provides technical advice.

It is intended to be used by suppliers, installers, specifiers, occupiers, property owners and duty holders. It is also intended to be used by designers of the application into which the doorset is to be installed.

It does not cover the manufacture or design of power operated pedestrian doorsets, which are covered in BS EN 16005.

NOTE 1 Performance requirements and test methods for power operated pedestrian doorsets other than swing type are given in BS EN 16361. Performance requirements and test methods for external swing doors are given in BS EN 14351-1.

NOTE 2 Although this part of BS 7036 is not intended to include industrial-type power operated doors (which are excluded from the scope of BS EN 16005), the guidance given might be helpful for such installations.

NOTE 3 Although this part of BS 7036 is intended for general use, it might not be fully applicable to some installations used only by trained personnel where instruction on the safe use of power operated doors has been given. Where special security requirements conflict with safety recommendations, specialist advice is advised.

NOTE 4 Power operated pedestrian doorsets are commonly referred to as automatic doors.

2 Normative references

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

BS 6206, *Specification for impact performance requirements for flat safety glass and safety plastics for use in buildings*

BS 6262 (all parts), *Glazing for buildings*

BS 7671, *Requirements for electrical installations – IET Wiring Regulations – Seventeenth edition*

BS 9999, *Code of practice for fire safety in the design, management and use of buildings*

BS EN 1760-1, *Safety of machinery – Pressure sensitive protective devices – Part 1: General principles for the design and testing of pressure sensitive mats and pressure sensitive floors*

BS EN 16005, *Power operated pedestrian doorsets – Safety in use – Requirements and test methods* [1)]

BS EN ISO 12100, *Safety of machinery – General principles for design – Risk assessment and risk reduction* [2)]

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1) This standard also gives informative references to BS EN 16005:2012.
2) This standard also gives informative references to BS EN ISO 12100:2010.

3 Terms and definitions

For the purposes of this part of BS 7036, the terms and definitions given in BS EN 16005 apply.

4 Risk assessment process

A risk assessment should be carried out in accordance with the methodology given in BS EN ISO 12100 to identify potential hazards and means of reducing risk to an acceptable level.

NOTE 1 Flowcharts showing the risk assessment and risk reduction processes are given in Annex A and Annex B. These are based on BS EN ISO 12100:2010, Figure 1 and Figure 2.

NOTE 2 Sample risk assessment check sheets for different types of doorset are given in the following annexes;

- *sliding doorsets, Annex C;*
- *swing doorsets, Annex D;*
- *folding doorsets, Annex E;*
- *balanced doorsets, Annex F;*
- *three-quarter wing revolving doorsets, Annex G;*
- *two-wing revolving doorsets, Annex H.*

5 Environment and management

5.1 Initial design specification

NOTE Attention is drawn to the fact that many of the areas where power operated door systems are installed are subject to legislative requirements including workplace legislation and food hygiene legislation.

5.1.1 At the design specification stage, the specifier should seek specialist advice from, and work in close liaison with, the power operated door manufacturers or their approved distributors. The specifier should also consult other relevant authorities (e.g. fire and building control authorities, and end user organizations) since each has particular, but related, responsibilities.

5.1.2 The specifier should establish predicted user characteristics and precise operational requirements, to enable account to be taken of the volume and type of pedestrian traffic (such as elderly, infirm and disabled people and young children) that is likely to pass through the particular installation at different times of the day.

5.1.3 It is essential that appropriate safety devices and safety measures are chosen. The specifier should, therefore, ensure that a full hazard analysis and risk assessment is undertaken to confirm that the final installation is safe for its predicted use.

5.1.4 If the hazard analysis and risk assessment indicates that risks cannot be reduced to an acceptable level using safety devices and safety measures, and a residual risk remains for certain sectors of the population, then additional suitable safety measures should be provided, e.g. installation of an additional manually activated power operated door at the side of an automatically activated power operated door to provide a more suitable means of entry and exit for elderly and disabled people.

5.1.5 There should be no attachments to, or devices incorporated into, power operated doors or adjacent areas that could create a potential hazard.

NOTE Such devices include letter boxes, letter flaps and handles.

5.2 Planning

The specifier should plan the design and location of power operated door installations carefully, taking particular account of the following.

a) Power operated doors should be sited so that they are readily visible and have sufficient space on either side to accommodate the passage of pedestrians approaching and leaving the doors.

b) The clear opening of the doorway should be adequate for the anticipated volume and type of pedestrian traffic.

c) Ramped floors down to power operated doors are a potential hazard and should be avoided.

d) Most power operated doors are fully glazed but, where they are not, vision panels should be provided where appropriate.

5.3 Floor surfaces

5.3.1 To minimize the risk of trapping feet, hands, etc. underneath power operated door leaves, the bottom edge of the leaves should be positioned at, and maintain an appropriate clearance from, the floor. The floor surfaces over which power operated doors pass should, therefore, be even and level.

NOTE Clearances are specified in BS EN 16005.

5.3.2 To minimize the risk of tripping or obstruction, all floor-mounted items, e.g. control mats and threshold plates, should be suitably tapered or ramped or, where practicable, recessed into a mat well to be flush with the surface of the floor. Flooring should, where practicable, incorporate anti-slip or water clearing capabilities.

5.4 Congestion

NOTE If congestion occurs near a power operated door, pedestrians might be forced into the path of the door and could then be at risk of injury.

To reduce the risk of congestion in the vicinity of a power operated door, the installation and its immediate area should be designed and arranged to promote safe pedestrian traffic flow. In particular:

a) the layout of the power operated door installation and the areas leading to and from a power operated door should be suitable for the type of door;

b) the installation should be suitable for the type and volume of pedestrian traffic;

c) there should be no obstructions near a door restricting the flow of pedestrian traffic;

d) cross-flowing pedestrian traffic close to a door should be avoided;

e) there should be no distracting notices or displays close to a door;

f) any intended direction of traffic-flow should be clearly marked.

5.5 Supervision of doors

Where appropriate, staff should be trained in the use of power operated doors to enable them, as applicable, to:

a) advise parents and their children of the risks to ensure that children are not exposed to unnecessary risks at power operated doors;

b) help and advise elderly, infirm and disabled people;

c) take appropriate action in an emergency.

5.6 Operation, inspection and maintenance

5.6.1 Installation, final verification and operational tests

The installation and bringing into use should be carried out by a competent person or professional installation technician. All safety functions and systems should be verified and recorded in the log book in accordance with BS EN 16005.

NOTE 1 It is advisable that a copy of the verification tests and settings is retained by the competent person or professional installer for future reference.

*NOTE 2 More detailed requirements are given in BS EN 16005:2012, **4.2**.*

5.6.2 Occupier safety checks

5.6.2.1 To ensure continued safe operation of a power operated door installation, the installation and its environment should be subjected to systematic operational checks as often as is appropriate to the type of installation and its traffic flow, as detailed in the log book.

NOTE The occupier is deemed to be the person responsible for the day-to-day use of the power operated pedestrian doorset.

5.6.2.2 The test results should be recorded and retained by the building occupier for at least 1 year.

5.6.3 Maintenance

Power operated pedestrian doorsets should be maintained and inspected by a competent person in accordance with the manufacturer's specification.

*NOTE More detailed requirements are given in BS EN 16005:2012, **4.2**. The recommended frequency of inspection given in BS EN 16005 is at least once a year.*

5.7 Specialized operation

NOTE Power operated doors can have overriding controls that limit the function of the door to one of the following:

- *to remain open;*
- *to remain closed;*
- *to operate in one direction only;*
- *to operate with reduced opening width.*

Where the normal function of a door is overridden by selection of a specialized operation that creates a potential hazard, then it is essential that warning is given to users of the door. Such warnings should preferably be in the form of notices placed on the door itself. Barriers, or notices on stands, should not be used where they could cause an obstruction in case of emergency.

6 Electrical design

Electrical installations to the point of supply should conform to BS 7671.

7 Glazing

7.1 Glazing in power operated door installations should conform to the appropriate part of BS 6262 using safety materials conforming to BS 6206.

7.2 Glazing should be appropriately marked, or incorporate features to make its presence apparent.

NOTE Guidance is given in HSE publication L24 [1].

8 Construction of doors

Door leaves, frames, associated sidelights and hardware should be constructed in such a manner that they do not create the potential to cause injury. They should be sufficiently robust to withstand the forces occurring during normal operation and foreseeable misuse.

NOTE Operating forces and mechanical strength are specified in BS 6375-2.

9 Activation systems

9.1 General

Power operated doors are activated automatically, manually or remotely, and the selection of the most appropriate system depends on various factors, including the location of the door and the circumstances of its intended use. Specialist technical advice (e.g. manufacturer or supplier) should always be sought in the selection of activators.

9.2 Automatic activation

Automatic activation, where installed, should ensure wherever possible that a person approaching a door does not have to hesitate whilst the door is opening. In certain situations it might be necessary for the user to wait for the door to open; the hazard analysis and risk assessment should take this into account.

NOTE 1 Unnecessary activations could present additional hazards.

*NOTE 2 Requirements for automatic activation are given in BS EN 16005:2012, **4.5.1**.*

NOTE 3 Examples of automatic activation devices include motion sensors, presence sensors, photo electric devices and control mats.

9.3 Manual activation

*COMMENTARY ON **9.3***

Manual activation is the physical action which starts a door into motion. This could be a push button, push pad or by means of other mechanical switching devices. Manual activation could also be initiated by pushing a door to start motion.

Manual activators should be positioned so they do not create additional hazards, i.e. not positioned in the swept area of a swing door.

When manual activators are used they should be clearly marked and identifiable so that users are aware of their function. When manually activated doors are positioned at the side of an automatically activated door for vulnerable users who need alternative access, additional operating signage should be provided where appropriate.

NOTE 1 A typical example could be a low energy swing door adjacent to a power operated revolving door.

*NOTE 2 Requirements for manual activation are given in BS EN 16005:2012, **4.5.2**.*

9.4 Remote activation

Remote activation to open or close a power operated door should be used only when operation of the door is not anticipated to result in a hazardous situation.

The door should be arranged to open and close at an appropriate speed, and should include safety measures to minimize any risks identified in the risk assessment (see Clause **4**), especially when the remote command is initiated automatically or without the initiator being in direct vision of the door.

NOTE 1 Examples of remote activation devices include push-buttons, pull-cords, elbow switches, key switches and access control devices.

*NOTE 2 Requirements for remote activation are given in BS EN 16005:2012, **4.5.3**.*

10 Safety devices

10.1 General

NOTE 1 A wide range of safety devices is available to take account of the diverse circumstances in which power operated doors are used, and to ensure that each installation is suitable and safe.

10.1.1 Safety devices should be monitored by the control system and should select a predetermined safe mode if a fault is detected.

10.1.2 Protection at danger points should be provided in accordance with BS EN 16005.

NOTE 2 BS EN 16005 allows the following means of protection to be used:

- *guards (see BS EN 16005:2012, **4.6.9**);*
- *barriers (see BS EN 16005:2012, **4.6.10** and **4.6.11**);*
- *limitation of impact forces (does not apply to shearing and drawing-in hazards) (see BS EN 16005:2012, **4.6.7**);*
- *electro-sensitive protective equipment (ESPE) and/or pressure sensitive protective equipment (PSPE) (see BS EN 16005:2012, **4.6.8**);*
- *safety distances (see BS EN 16005:2012, **4.6.11**);*
- *low energy movement (see BS EN 16005:2012, **4.6.4**).*

10.1.3 When any contact with the user is unacceptable (high risk) because a significant proportion of the users are elderly, infirm or disabled people or young children, additional protective devices should be provided.

10.2 Emergency stop control device

Emergency stop control devices should be easily identifiable and accessible.

*NOTE BS EN 16005:2012, **4.7.1.4** requires revolving doorsets to be equipped with an emergency stop command device in accordance with BS EN ISO 13850. General requirements for electrical equipment of machines are given in BS EN 60204-1.*

10.3 Presence-sensing (active) safety devices

NOTE 1 There are various types of presence-sensing safety devices which may be fitted in various positions at power operated doors. These devices include active infra-red, capacitive, ultrasonic or photo-electric types.

NOTE 2 Tests for protective devices are given in BS EN 16005:2012, Annex C.

10.3.1 Devices of this type should be used to detect the presence of slow moving or stationary pedestrian traffic in the path of a door.

10.3.2 Different presence-sensing devices have differing capabilities, e.g. photo-electric devices might not detect walking aids whilst others might be less effective in detecting dark coloured objects or small children. Specialist technical advice (e.g. manufacturer or supplier) should always be sought in the selection of presence sensing devices.

10.3.3 Detection by a presence-sensing device should occur when pedestrian traffic is in the protection area.

11 Signage

11.1 General

The competent person or professional installation technician should ensure that appropriate signage is affixed to the power operated door system at a height of between 1 300 mm and 1 600 mm on completion of installation.

NOTE Responsibility for the continued display and maintenance of such signage lies with the building owner/occupier.

11.2 No entry sign

This sign should be used to indicate to users that entry from the side of approach is prohibited. The sign should consist of a red circle of 150 mm minimum diameter with a white rectangle placed horizontally (see Figure 1).

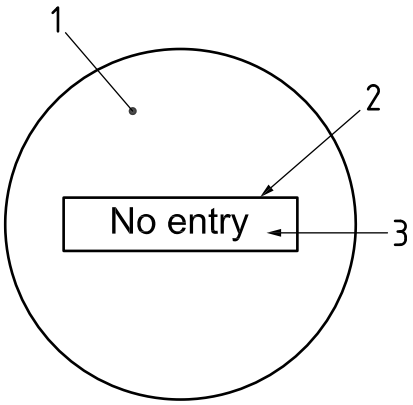
11.3 Keep clear sign

This sign should be used to instruct and inform users to keep away from the space through which a power operated door travels. The sign should consist of a blue circle and a blue rectangle of width of at least 150 mm. The lettering should be in white and placed centrally in the blue rectangle. Blue should cover at least 50% of the area of the sign (see Figure 2).

11.4 Direction of travel sign

This sign should be used to indicate to users the direction of travel through the door. The sign should consist of a blue circle of 150 mm minimum diameter with a white arrow pointing upwards (see Figure 3).

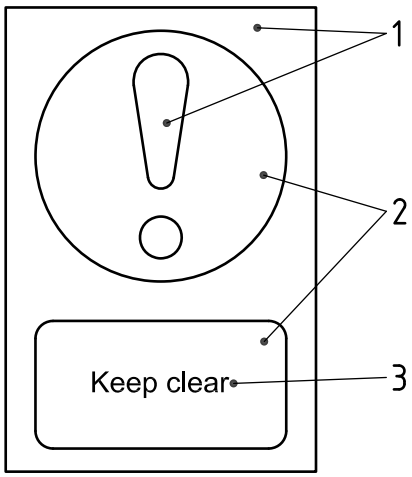
Figure 1 **No entry sign**



Key

1 Red background
2 White rectangle
3 Black letters

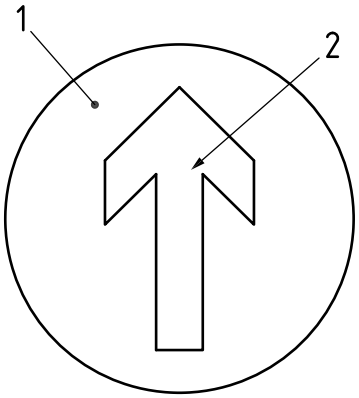
Figure 2 **Keep clear sign**



Key

1 White
2 Blue
3 White letters

Figure 3 **Direction of travel sign**



Key

1 Blue background

2 White arrow

11.5 Emergency breakout sign

This sign should be used on doors which have an emergency breakout facility. The sign should be green and white with the vertical side at least 150 mm (see Figure 4).

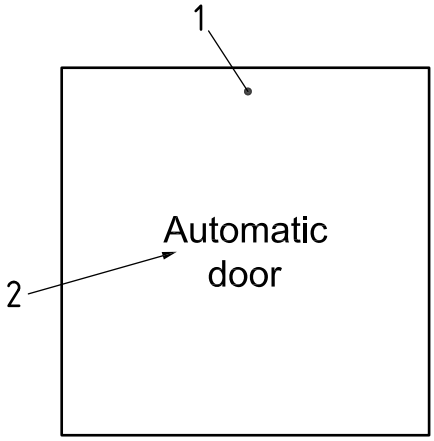
NOTE There is no lettering on the breakout sign.

Figure 4 **Emergency breakout sign**

11.6 Automatic door sign

This sign should be used to indicate that the door is activated automatically and thus give users advance warning of operation. The sign should consist of a white square with sides of at least 150 mm and the lettering in black, placed centrally (see Figure 5).

Figure 5 **Automatic door sign**



Key

1 White background

2 Black letters

11.7 Disabled person sign

This sign should be used on doors or door activation switches that are specifically intended for use by disabled people. When fixed on doors, the sign should consist of a square with sides of at least 150 mm. The sign should consist of a black symbol on a white background as shown in Figure 6.

Figure 6 **Disabled person sign**

12 Additional recommendations for doorsets on escape routes and emergency exits

If the escape route function can be overridden by a mode selection switch or other devices, these should where practicable be protected by lockable code or key to prevent unauthorized changes.

If power operated pedestrian doorsets are proposed for installation on an escape route and are intended as means of escape doors, then where practicable the doors should either be capable of manual breakout in the direction of escape, or be arranged to fail safely in the open position in the event of mains power failure (see BS EN 16005:2012, **4.7.2**).

If neither of these recommendations can be achieved, or if they conflict with the advice of the relevant fire and building control authorities, then power operated pedestrian doorsets might not be appropriate for means of escape. In such cases, suitable alternative installations should be provided, such as outward opening hinged doors, of an appropriate width and fastened in accordance with BS 9999, provided immediately adjacent to the doorset.

NOTE Attention is drawn to the Building Regulations 2010 [2], the Building (Scotland) Regulations 2004 [3], the Building Regulations (Northern Ireland) 2012 [4] and the Building Regulations (Isle of Man) Order 2003 [5], in respect of requirements for means of escape. In particular, Scotland has additional requirements for automatic and revolving doorsets considered for use on escape routes and fire exits. Current technical guidance is given in Scottish Building Standards Technical Handbook, Section 2 (non-domestic edition) [6].

Section 2: Power operated sliding and folding doorsets

*COMMENTARY ON SECTION **2***

Power operated sliding and folding doors have potential hazards in the following five areas:

- *during the opening cycle – users can be struck, drawn in, trapped or walk into the door;*
- *during the closing cycle – users can be struck, trapped or walk into the door;*
- *tripping hazards (see **5.3**);*
- *congestion (see **5.4**);*
- *other hazards due, for example, to lack of supervision (see **5.5**).*

*When any contact with the user is unacceptable (high risk) because a significant proportion of the users are elderly, infirm or disabled people or young children, additional protective devices are needed (see **10.1**).*

13 Safety during the opening cycle for sliding doorsets

Provision should be made to deter persons from occupying the area through which the door travels during its opening cycle. If a residual risk remains after the appropriate safety measures have been selected, a "Keep clear" sign should be affixed to the screen or wall across which the door travels (see Figure 2).

NOTE BS EN 16005:2012 covers the following safety provisions:

- *safety distances [see BS EN 16005:2012, **4.6.2.1**a)];*
- *force limitation [see BS EN 16005:2012, **4.6.2.1**b)];*
- *protective devices [see BS EN 16005:2012, **4.6.2.1**c)];*
- *guards (pocket screens) [see BS EN 16005:2012, **4.6.2.1**d)];*
- *barriers [see BS EN 16005:2012, **4.6.2.1**e)];*
- *low energy movement [see BS EN 16005:2012, **4.6.2.1**f)].*

14 Safety during the closing cycle for sliding doorsets

Provision should be made using one of the following means to prevent doors from closing on users during the closing cycle:

a) protective devices [see BS EN 16005:2012, **4.6.2.2**a)];

b) low energy movement (see BS EN 16005:2012, **4.6.4**).

15 Safety during the opening cycle for folding doorsets

Provision should be made to deter persons from occupying the area through which the door travels during its opening cycle. If a residual risk remains after the appropriate safety measures have been selected, appropriate signage should be fitted to draw the user's attention to the risk, e.g. "Automatic door", "Keep clear", "No entry", "Direction of travel".

NOTE BS EN 16005:2012 covers the following safety provisions:

- *safety distances [see BS EN 16005:2012, **4.6.6.1**a)];*
- *force limitation [see BS EN 16005:2012, **4.6.7**)];*
- *protective devices [see BS EN 16005:2012, **4.6.8**)];*
- *guards [see BS EN 16005:2012, **4.6.3**.4, Figure 3b)];*
- *barriers [see BS EN 16005:2012, **4.6.10**)];*
- *low energy movement [see BS EN 16005:2012, **4.6.4**)].*

16 Safety during the closing cycle for folding doorsets

Provision should be made using one of the following means to prevent doors from closing on users during the closing cycle:

a) protective devices (see BS EN 16005:2012, **4.6.8**);

b) guards (finger protection) [see BS EN 16005:2012, **4.6.6.2**, Figure 3b)];

c) low energy movement (see BS EN 16005:2012, **4.6.4**);

d) mats conforming to BS EN 1760-1.

Section 3: Power operated swing and balanced doorsets

*COMMENTARY ON SECTION **3***

Power operated swing and balanced doors have potential hazards in the following five areas:

- *during the opening cycle – users can be struck, drawn in, trapped or walk into the door;*
- *during the closing cycle – users can be struck, drawn in, trapped or walk into the door;*
- *tripping hazards (see **5.3**);*
- *congestion (see **5.4**);*
- *other hazards due, for example, to lack of supervision (see **5.5**).*

Particular attention is drawn to the potentially increased risk that can arise when swing doors are specified for two-way traffic operation due to the door leaf opening towards the user.

*When any contact with the user is unacceptable (high risk) because a significant proportion of the users are elderly, infirm or disabled people or young children, additional protective devices are needed (see **10.1**).*

17 Safety during the opening cycle for swing doorsets

Provision should be made to deter persons from occupying the swept area of the door. If a residual risk remains after the appropriate safety measures have been selected, appropriate signage should be fitted to draw the user's attention to the risk, e.g. "Automatic door", "Keep clear", "No entry", "Direction of travel".

NOTE BS EN 16005:2012 covers the following safety provisions:

- *safety distances [see BS EN 16005:2012, **4.6.3**, Figure 3a)];*
- *speed limitation (see BS EN 16005:2012, Annex G);*
- *protective devices (see BS EN 16005:2012, **4.6.8**);*
- *guards (finger protection) [see BS EN 16005:2012, **4.6.3**, Figure 3b)];*
- *barriers (see BS EN 16005:2012, **4.6.10**);*
- *low energy movement (see BS EN 16005:2012, **4.6.4**);*
- *mats conforming to BS EN 1760-1.*

18 Safety during the closing cycle for swing doorsets

Provision should be made using one of the following means to prevent doors from closing on users during the closing cycle:

a) speed limitation (see BS EN 16005:2012, Annex G);

b) protective devices (see BS EN 16005:2012, **4.6.8**);

c) guards (finger protection) [see BS EN 16005:2012, **4.6.3**, Figure 3b)];

d) barriers (see BS EN 16005:2012, **4.6.10**);

e) low energy movement (see BS EN 16005:2012, **4.6.4**);

f) mats conforming to BS EN 1760-1.

19 Safety during the opening cycle for balanced doorsets

Provision should be made to deter persons from occupying the swept area of the door leaves. If a residual risk remains after the appropriate safety measures have been selected, appropriate signage should be fitted to draw the user's attention to the risk, e.g. "Automatic door", "Keep clear", "No entry", "Direction of travel".

NOTE 1 BS EN 16005:2012 covers the following safety provisions:

- *safety distances [see BS EN 16005:2012, **4.6.3**, Figure 3a)];*
- *speed limitation (see BS EN 16005:2012, Annex G);*
- *protective devices (see BS EN 16005:2012, **4.6.8**);*
- *guards (finger protection) [see BS EN 16005:2012, **4.6.3**, Figure 3b)];*
- *barriers (see BS EN 16005:2012, **4.6.10**);*
- *low energy movement (see BS EN 16005:2012, **4.6.4**);*
- *mats conforming to BS EN 1760-1.*

NOTE 2 Due to the differing, varied and unique designs of construction of balanced doors, a combination of protective measures might be required.

20 Safety during the closing cycle for balanced doorsets

Provision should be made using one or more of the following means to prevent doors from closing on users during the closing cycle:

a) speed limitation (see BS EN 16005:2012, Annex G);

b) protective devices (see BS EN 16005:2012, **4.6.8**);

c) guards (finger protection) [see BS EN 16005:2012, **4.6.3**, Figure 3b)];

d) barriers (see BS EN 16005:2012, **4.6.10**);

e) low energy movement (see BS EN 16005:2012, **4.6.4**);

f) mats conforming to BS EN 1760-1.

Section 4: Power operated revolving doorsets

*COMMENTARY ON SECTION **4***

Power operated revolving doorsets have potential hazards in the following five areas:

- *during the operating cycle – users can be struck, trapped or walk into the edge of the door;*
- *drawing-in hazards;*
- *tripping hazards (see **5.3**);*
- *congestion (see **5.4**);*
- *other hazards due, for example, to lack of supervision (see **5.5**).*

21 Safety during the operating cycle for revolving doorsets

Provision should be made to protect persons moving more slowly than the door, or remaining stationary within the swept area.

NOTE 1 Particular attention is drawn to BS EN 16005:2012, Annex H, Table 1, Table 2 and Table 3, which identify the danger points at revolving doorsets.

If a residual risk remains after the appropriate safety measures have been selected, appropriate signage should be fitted to draw the user's attention to the risk, e.g. "Automatic door", "Keep clear", "No entry", "Direction of travel".

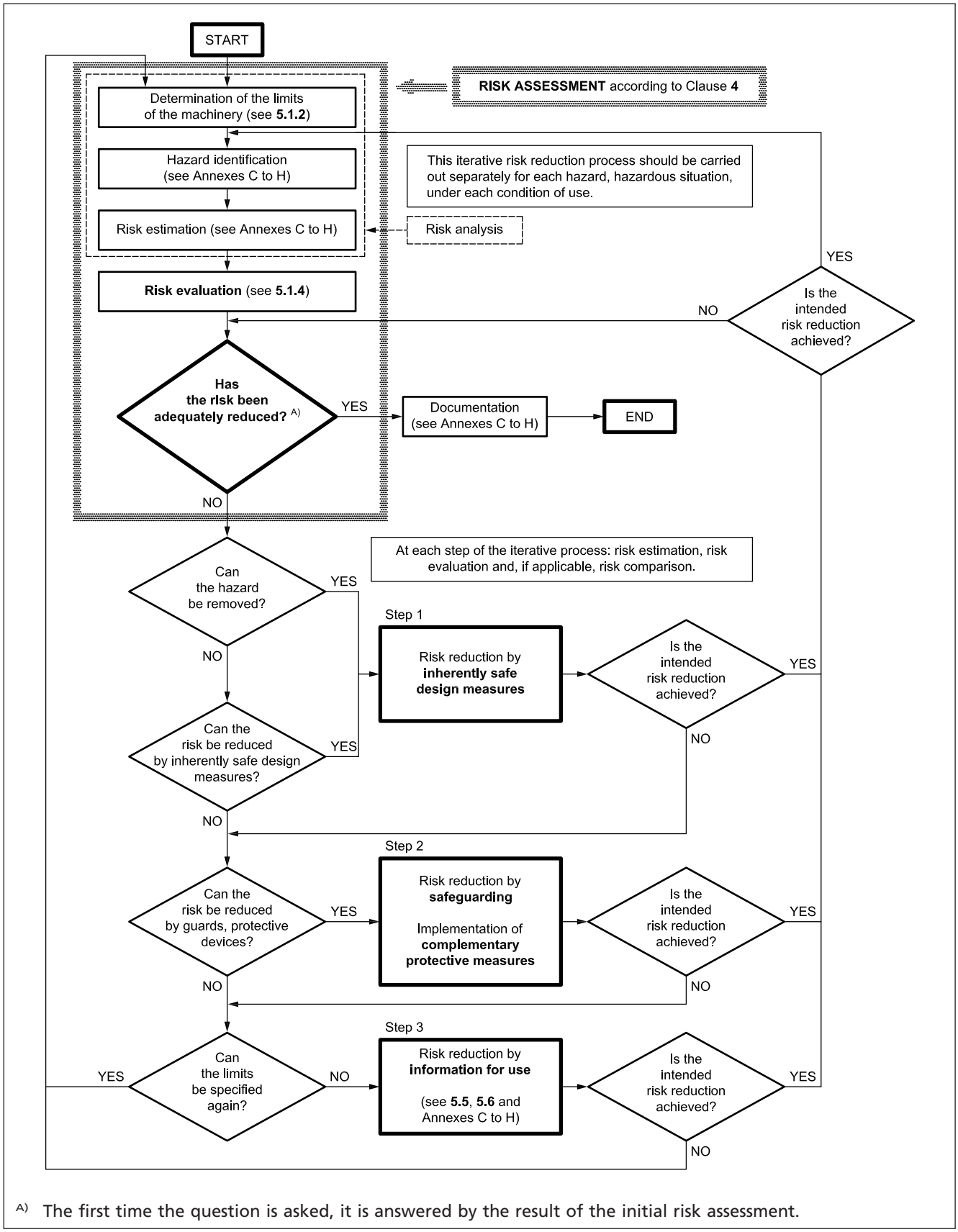
NOTE 2 BS EN 16005:2012 covers the following safety provisions:

- *safety distances (see BS EN 16005:2012, **4.7.1.2**);*
- *speed limitation (see BS EN 16005:2012, **4.7.1.1**);*
- *protective devices (see BS EN 16005:2012, **4.6.8**);*
- *guards (finger protection for pivoting leaves) [see BS EN 16005:2012, **4.6.3**, Figure 3b)];*
- *low energy movement (see BS EN 16005:2012, **4.6.4**);*
- *mats conforming to BS EN 1760-1.*

Annex A (informative) Risk assessment flowchart

A flowchart showing the risk assessment process is given in Figure A.1.

Figure A.1 **Schematic representation of risk reduction process including iterative three-step method**

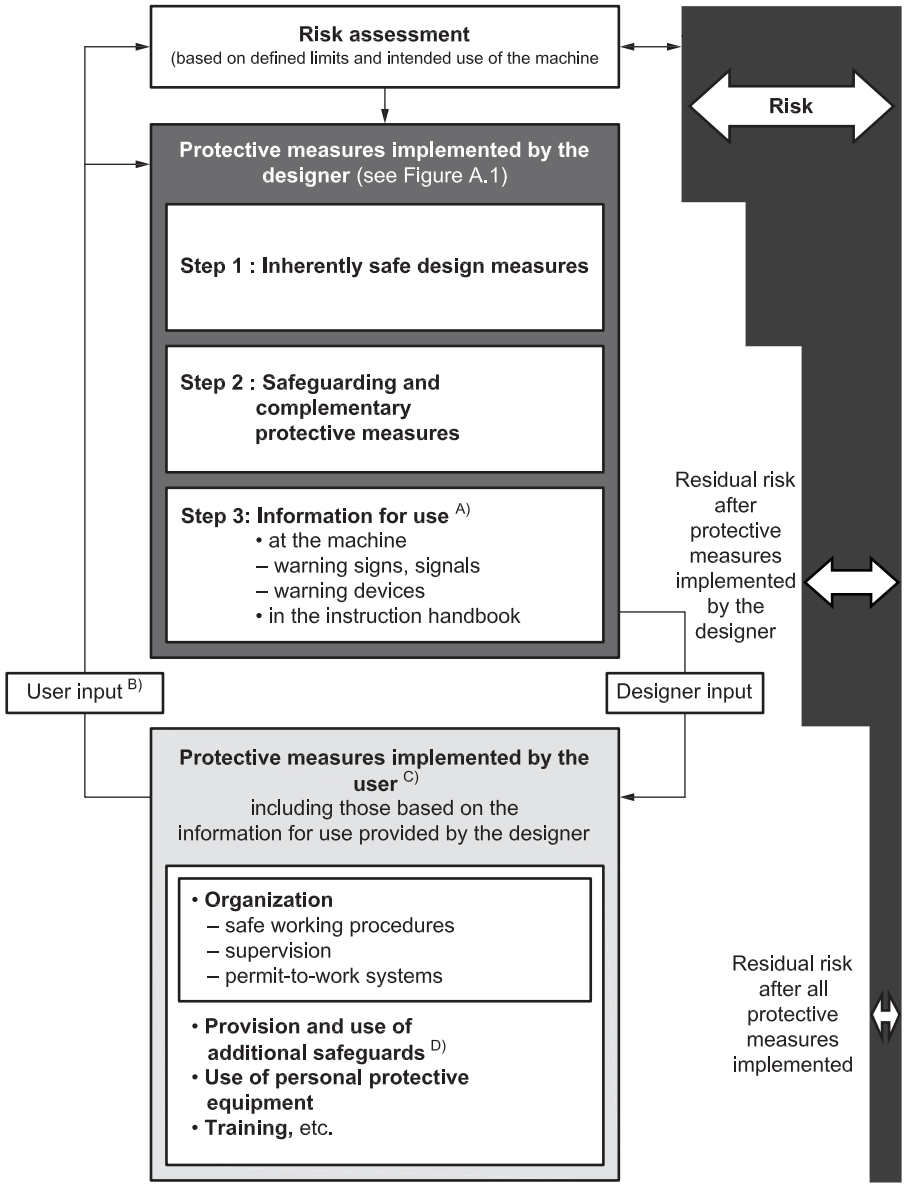


A) The first time the question is asked, it is answered by the result of the initial risk assessment.

Annex B (informative) Risk reduction process

A flowchart showing the risk reduction process is given in Figure B.1.

Figure B.1 **Risk reduction process**



A) Providing proper information for use is part of the designer's contribution to risk reduction, but the protective measures concerned are only effective when implemented by the user.

B) The user input is that information received by the designer either from the user community, regarding the intended use of the machine in general, or from a specific user.

C) There is no hierarchy between the various protective measures implemented by the user. These protective measures are outside the scope of this British Standard.

D) These are protective measures required due to a specific process or processes not envisaged in the intended use of the machine or to specific conditions for installation that cannot be controlled by the designer.

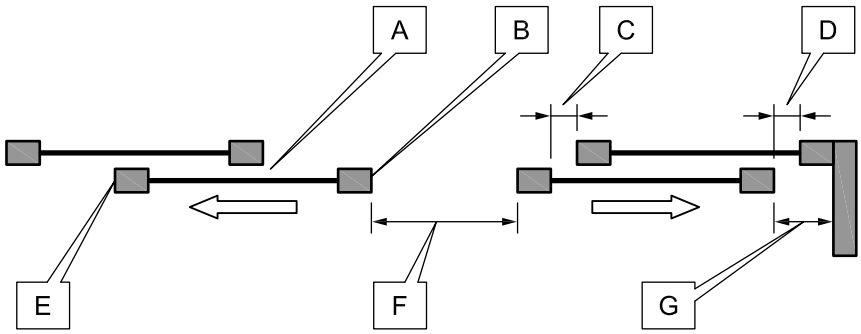
Annex C (informative) Risk assessment check sheet for power operated sliding doorsets

An example of a risk assessment check sheet for power operated sliding doorsets is given in Figure C.1.

Figure C.1 **Example of a risk assessment check sheet for power operated sliding doorsets**

When a large proportion of the users are elderly, infirm, disabled persons and young children, any contact with the user is to be considered unacceptable (High Risk).

☐ Risk category – High ☐ Risk category – Low



Tick Chosen protective measures.

Location	Hazard	Protective measure chosen						
		Guards (pocket screen)	Barriers	Limitation of leaf forces	ESPE PSPE	Safety distances	Low energy movement	Signage
A	Drawing in							
B	Impact							
C	Shearing							
D	Shearing							
E	Impact							
F	Crushing							
G	Crushing							

NOTE: Highlighted boxes above denote protective options for high risk categories. Location B & F, ESPE only.

☐ Safety glass installed

☐ Activation distances suitable

☐ Emergency escape door ☐ Failsafe system installed ☐ Breakout system installed

Comments:

Door location…….…… Name of assessor……..……Date……

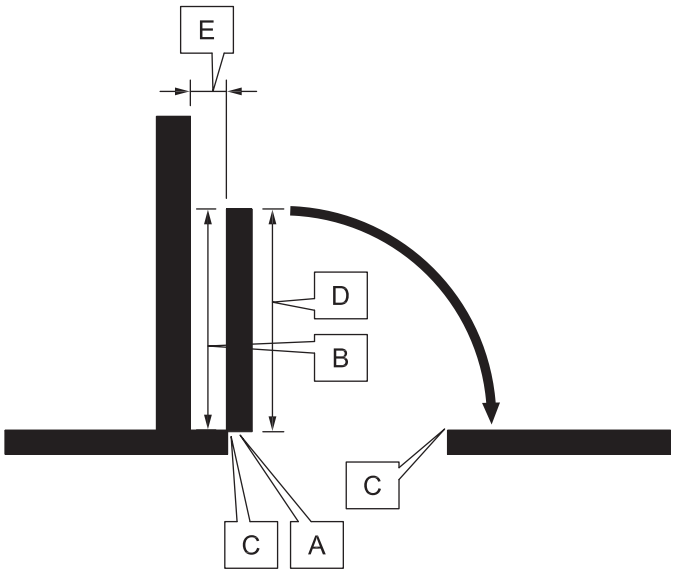
Annex D (informative) Risk assessment check sheet for power operated swing doorsets

An example of a risk assessment check sheet for power operated swing doorsets is given in Figure D.1.

Figure D.1 **Example of a risk assessment check sheet for power operated swing doorsets**

When a large proportion of the users are elderly, infirm, disabled persons and young children, any contact with the user is to be considered unacceptable (High Risk).

☐ Risk category – High ☐ Risk category – Low



Tick Chosen protective measures.

Location	Hazard	Protective measure chosen						
		Guards or hinge design	Barriers	Limitation of leaf forces	ESPE PSPE	Safety distances	Low energy movement	Signage
A	Drawing in							
B	Impact							
C	Shearing							
D	Impact							
E	Crushing							

NOTE: Highlighted boxes above denote protective options for high risk categories. Location B, C & D, ESPE only.

☐ Safety glass installed

☐ Activation distances suitable

☐ Emergency escape door ☐ Failsafe system installed ☐ Breakout system installed

Comments:

Door location…….…… Name of assessor……..……Date……

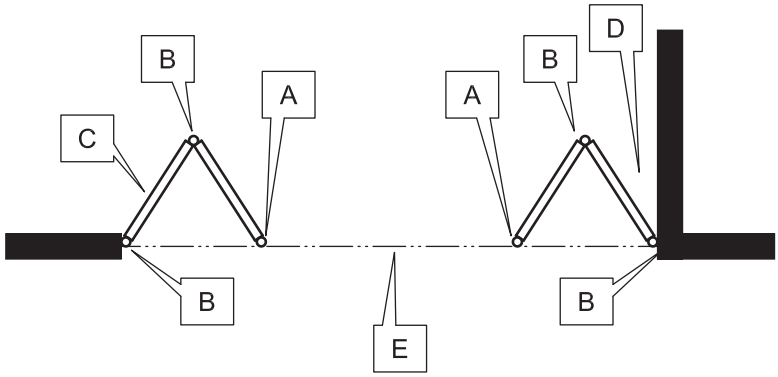
Annex E (informative) Risk assessment check sheet for power operated folding doorsets

An example of a risk assessment check sheet for power operated folding doorsets is given in Figure E.1.

Figure E.1 **Example of a risk assessment check sheet for power operated folding doorsets**

When a large proportion of the users are elderly, infirm, disabled persons and young children, any contact with the user is to be considered unacceptable (High Risk).

☐ Risk category – High ☐ Risk category – Low



Tick Chosen protective measures.

Location	Hazard	Protective measure chosen					
		Barriers	Limitation of leaf forces	ESPE PSPE	Safety distances	Safety hinge design	Signage
A	Impact						
B	Shearing						
C	Impact						
D	Crushing						
E	Crushing						

NOTE: Highlighted boxes above denote protective options for high risk categories. Location A & E, ESPE only.

☐ Safety glass installed

☐ Activation distances suitable

☐ Emergency escape door ☐ Failsafe system installed

Comments:

Door location…….…… Name of assessor……..……Date……

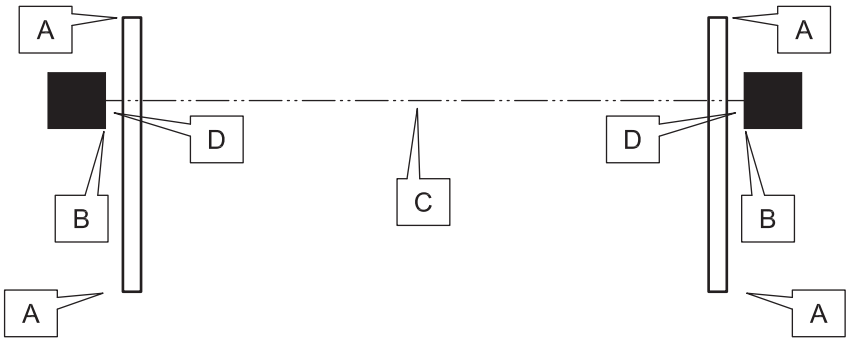
Annex F (informative) Risk assessment check sheet for power operated balanced doorsets

An example of a risk assessment check sheet for power operated balanced doorsets is given in Figure F.1.

Figure F.1 **Example of a risk assessment check sheet for power operated balanced doorsets**

When a large proportion of the users are elderly, infirm, disabled persons and young children, any contact with the user is to be considered unacceptable (High Risk).

☐ Risk category – High ☐ Risk category – Low



Tick Chosen protective measures.

Location	Hazard	Protective measure chosen					
		Barriers	Limitation of leaf forces	ESPE PSPE	Safety distances	Safety hinge design	Signage
A	Impact						
B	Shearing						
C	Crushing						
D	Crushing						

NOTE: Highlighted boxes above denote protective options for high risk categories. Location A & C, ESPE only.

☐ Safety glass installed

☐ Activation distances suitable

☐ Emergency escape door ☐ Failsafe system installed

Comments:

Door location…….. Name of assessor……..……Date……

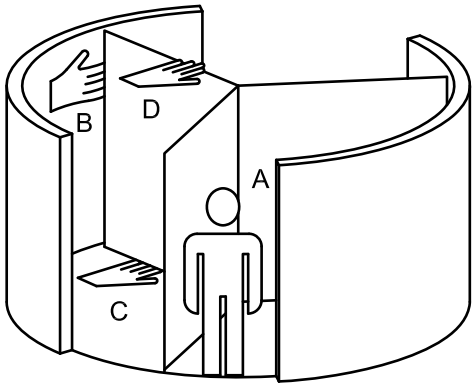
Annex G (informative) Risk assessment check sheet for power operated three-quarter wing revolving doorsets

An example of a risk assessment check sheet for power operated three-quarter wing revolving doorsets is given in Figure G.1.

Figure G.1 **Example of a risk assessment check sheet for power operated three-quarter wing revolving doorsets**

When a large proportion of the users are elderly, infirm, disabled persons and young children, any contact with the user is to be considered unacceptable (High Risk).

☐ Risk category – High ☐ Risk category – Low



Tick Chosen protective measures.

Location	Hazard	Protective measure chosen				
		Limitation of leaf forces	ESPE PSPE	Safety distances	Low energy movement	Signage
A	Crushing Shearing					
B	Crushing Shearing					
C	Crushing Shearing Impact					
D	Crushing Shearing					

NOTE: Highlighted boxes above denote protective options for high risk categories.

☐ Safety glass installed

☐ Activation distances suitable ☐ Disabled user activation

☐ Emergency escape door ☐ Failsafe system installed ☐ Breakout system installed

Comments

Door location..... Name of assessor.....Date.....

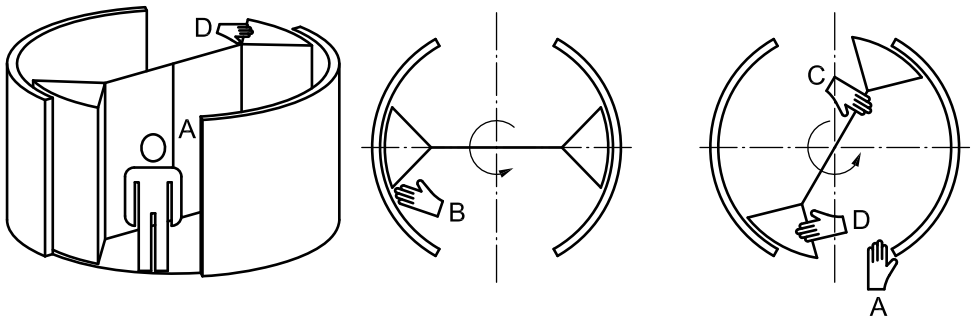
Annex H (informative) Risk assessment check sheet for power operated two-wing revolving doorsets

An example of a risk assessment check sheet for power operated two-wing revolving doorsets is given in Figure H.1.

Figure H.1 **Example of a risk assessment check sheet for power operated two-wing revolving doorsets**

When a large proportion of the users are elderly, infirm, disabled persons and young children, any contact with the user is to be considered unacceptable (High Risk).

☐ Risk category – High ☐ Risk category – Low



Tick Chosen protective measures.

Location	Hazard	Protective measure chosen				
		Limitation of leaf forces	ESPE PSPE	Safety distances	Low energy movement	Signage
A	Drawing in Crushing Shearing					
B	Crushing Shearing					
C	Crushing Shearing Impact					
D	Crushing Shearing					

NOTE: Highlighted boxes above denote protective options for high risk categories.

☐ Safety glass installed

☐ Activation distances suitable ☐ Disabled user activation

☐ Emergency escape door ☐ Failsafe system installed ☐ Breakout system installed

Comments:

Door location…….…… Name of assessor……..……Date……

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