BRITISH STANDARD

BS EN
12604:2000

Industrial, commercial and garage doors and gates — Mechanical aspects — Requirements

The European Standard EN 12604:2000 has the status of a British Standard

ICS 91.060.50

National foreword

This British Standard is the official English language version of EN 12604:2000.

The UK participation in its preparation was entrusted by Technical Committee B/538, Doors, windows, shutters, hardware and curtain walling, to Subcommittee B/538/5, Industrial, commercial and garage doors and gates, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Further information

Users of this standard are informed that the UK submitted a vote of disapproval on final voting stage of the draft EN for the following reasons.

1. For some types of vertically moving doors, compliance with **4.3.4** will require the introduction of safety devices to cover components that do not fail in a dangerous manner. This is beyond the requirements of the following UK regulations.

• Management of Health and Safety at Work Regulations 1999;

• Workplace (Health, Safety and Welfare) Regulations 1992;

• Requirement K5 of Building Regulations, England and Wales and parallel provisions in the Building Standards (Scotland) Regulations and the Building Regulations (Northern Ireland).

2. No consideration is given to the possible results of a failure in secondary safety devices.

3. The durability test permits unlimited expenditure through the ongoing replacement of components. No accurate conclusion of cyclic durability in terms of intended use can be drawn from testing to clause **5** of BS EN 12604:2000.

* *Additional guidance will be given in PD 6666 "Guidance on the interpretation of standards for mechanical aspects for industrial, commercial and garage doors", which is in preparation.*

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 22, an inside back cover and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 12604

April 2000

ICS 91.060.50

English version

Industrial, commercial and garage doors and gates - Mechanical aspects - Requirements

Portes industrielles, commerciales et de garage - Aspects mécaniques - Exigences

Tore - Mechanische Aspekte - Anforderungen

This European Standard was approved by CEN on 1 January 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 12604:2000 E

Contents

Foreword

This European Standard was prepared by CEN/TC 33 "Windows, doors, shutters, building hardware and curtain walling" for which the secretariat is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2000, and conflicting national standards shall be withdrawn at the latest by October 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Parts of this European Standard have been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and support essential requirements of EU Directives. For the relationship with EU Directives, see informative Annexes ZA and ZB, which are integral parts of this standard.

This standard is part of a series of European standards for industrial, commercial and garage doors and gates, which are identified in prEN 13241.

No existing European Standard is superseded.

1 Scope

1.1 This European Standard specifies the mechanical requirements for doors, gates and barriers intended for installation in areas in the reach of people and for which the main intended uses are giving safe access for goods and vehicles accompanied by persons in industrial, commercial and residential premises.

These products may be manually or power operated.

NOTE Power operated doors may be either an original power operated door or a manually operated door with the retrospective addition of a drive unit.

1.2 It does not apply to

- lock gates and dock gates,
- doors on lifts,
- doors on vehicles,
- armoured doors in banks,
- doors for animals in zoos,
- theatre curtains,
- revolving doors of any size,
- horizontally moving doors less than 2,5 m wide and 6,25 m^2 area, designed solely for pedestrian use,
- doors outside the reach of people (such as crane gantry fences),
- railway barriers,
- barriers used solely for vehicles.

1.3 This standard applies only to doors which are not part of the load carrying structure of the building.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 294	Safety of machinery - Safety distances to prevent danger zones being reached by the upper limbs
EN 349	Safety of machinery - Minimum gaps to avoid crushing of parts of the human body
prEN 12424	Industrial, commercial and garage doors and gates – Resistance to wind load – Requirements and classification
EN 12433-1	Industrial, commercial and garage doors and gates - Terminology - Part 1: Types of doors
EN 12433-2	Industrial, commercial and garage doors and gates - Terminology - Part 2: Parts of doors
EN 12605	Industrial, commercial and garage doors and gates - Mechanical aspects - Test methods
prEN 12444	Industrial, commercial and garage doors and gates - Resistance to wind load - Testing and calculation

prEN 12453	Industrial, commercial and garage doors and gates - Safety in use of power operated doors – Requirements and classification
prEN 12600	Glass in buildings - Pendulum test – Impact test method for flat glass and performance requirements
prEN 13241	Industrial, commercial and garage doors and gates - Product standard

3 Definitions

For the purpose of this standard the definitions in EN 12433-1 and EN 12433-2 apply.

Whenever the term “door” is used in this standard, it shall be deemed to cover the full scope of types and variances of doors, gates and barriers defined in EN 12433-1.

4 Requirements

4.1 Basic principles

4.1.1 General

Doors should be designed and constructed so that they are capable of being installed, maintained, repaired and used in a safe manner.

Doors should withstand both the static and dynamic forces they will be subject to in normal use. Wear, fatigue and corrosion under normal conditions should also be considered.

Significant hazards commonly associated with doors are listed in Annex A. Other hazards may exist in addition to those listed. Where such hazards are present, proper actions should be taken to eliminate such hazards.

Mechanical hazards shall be avoided within the basic design of the door or eliminated by use of suitable guards. Where this is not possible, the hazard locations or remaining risks shall be identified by suitable warning signs.

NOTE This standard does not apply to doors already in use at the time of coming into effect of this standard, but does apply if existing doors are subsequently upgraded to power operation.

4.1.2 Particular safety considerations in connection with normal use of the door

A door should not cause injuries or damages due to

- unintentional or uncontrolled movements of a door leaf due to external influences, such as wind, snow, water, etc.,

- unintentional or uncontrolled movements of a door leaf due to disintegration of the door system in any way, such as falling down, derailment, overrunning of terminal positions, broken components of the leaf suspension, etc.,

- intentional movements of a door leaf (opening or closing) thereby trapping or crushing persons or objects in any position,

- lack of recognition due to material (i.e. glass), colour etc. causing a person to run or walk into a door leaf or not being aware of the movement of the panel,

- lack of predictability of behaviour (doors opening on to a driveway etc.),

- lack of proper operating instructions or instructions which are difficult to understand or to follow,

- parts of a door leaf breaking off.

Safety arrangements fitted on doors are not intended to prevent deliberate misuse of the door system.

4.1.3 Mechanical specifications of door characteristics

The manufacturer shall provide all technical information to enable the door to be correctly selected and the opening prepared for it. The number of full operational cycles which the product is designed/constructed for, has to consider the planned maintenance and replacement of parts subject to normal wear and fatigue and shall be permanently stated in a prominent position on the product.

For the interpretation of the mechanical performance of doors the following specifications should be given:

- structural opening sizes and dimension details;
- frequence of operation;
- operation mode;
- degree of automation;
- position in building (inside, outside);
- provision of pass door;
- transparent surfaces;
- building materials to be used;
- position and types of fixing.

NOTE 1 If such data are not presented by the purchaser at the time of request or order, the producer/supplier may ask for such data or specify his standard ones.

NOTE 2 Additional data in regard of mechanical aspects may be requested for specific conditions on site.

4.1.4 Verification

The methods to verify the various requirements of this standard are given in EN 12605, and a summary of the relevant items is given under Annex D.

4.2 Design and construction

4.2.1 General

All parts of door installations, whether fixed or movable, including the fixings, should in all respects be of good construction, suitable material, adequate strength and free from obvious defects for their intended working life.

4.2.2 Strength

The door and its components, including its fixings for attachment to the building, shall be designed so that, during normal operation, no part of the door, including the fixings, shall be permanently deformed. Normal operation does not include the engaging of anti-drop devices.

The design shall be in accordance with recognized technical rules using adequate safety factors taking into account the most unfavourable static and dynamic forces occurring during the operating cycle or the use of the safety equipments of the door.

The minimum safety factors specified in Table 1 shall generally be used for design purposes unless an EN Standard exists for a particular component which allows the use of a lower safety factor. For materials which have a defined yield stress, this value shall be used for calculation.

When proof testing for permanent deformation, the applied test load shall be equal to 1,10 times the maximum load anticipated during normal operation.

Table 1 - Safety factors

Loading conditions	Safety factors for calculation purposes	Safety factor for testing purposes
Stress due to differential pressure	2,0 min. breaking stress 1,5 yield stress	1,10
Stress due to other loads e.g. dead weight	3,5 min. breaking stress 2,0 yield stress	1,10

4.2.3 Operability

Doors shall be designed so that elastic deformations under operational forces or torques which occur during normal use do not affect the function of the door.

4.2.4 Differential pressure

Door leaves shall be designed for the differential pressure they are intended to be subjected to.

Unless otherwise specified, it is to be assumed that the door shall be suitable for both positive and negative differential pressures stated in Class 1 of prEN 12424.

The deflection of door leaves or other elements resulting from the differential pressure specified shall not cause permanent deformations which will affect the functioning of the door or create any risk for derailment or the like.

4.2.5 Transparent surfaces

Transparent elements in leaves shall be so designed that they remain fully secured under normal operating conditions. If the transparent material should break, then no sharp splinters, cutting edges or other dangerous parts shall occur. The requirements of Class 1 of prEN 12600 shall be satisfied.

Door leaves made primarily from transparent material shall be coloured or have conspicuous safety markings on them to enable them to be seen by persons who might otherwise collide with them.

4.3 Protection against unintentional and uncontrolled movements

4.3.1 Guides and stoppers

The door leaf as well as any other moving part of a door system shall be designed and constructed in such a way that falling down, collapsing or derailment is prevented during normal operation or in case of contact with stationary obstacles, or in case of failure of a suspension element.

The door leaf shall be brought to rest in its terminal positions without undue impact.

4.3.2 Unintentional movements due to wind etc.

Doors of a type which can cause injury or damage if they move under the influence of wind or other similar extraneous forces shall incorporate devices to prevent such movement. Such devices shall automatically be effective at the terminal positions.

4.3.3 Uncontrolled movements of vertically operating door leaves

Vertically operating door leaves shall be constructed in such a way that in normal use the door movement can be stopped in any position. They shall not move in an uncontrolled or dangerous manner.

Examples of some technical solutions which fulfil this requirement are:

- an operational braking system which automatically engages when the door movement is stopped in any position;

- a balancing system which balances the door leaf in any position (not only the terminal ones);

- a balancing system which balances the door leaf only in an intermediate or the fully open position. The out-of-balance state in the other positions should be minimized as far as possible, but in any case shall not produce a static force at the primary closing edge of the door exceeding 150 Newtons;

- a self-sustaining gear which stops the door leaf and holds it firm in any position.

Doors shall be designed in such a way or fitted with devices to ensure that their suspension elements like wire ropes, chains, straps or similar cannot become slack. This requirement can be ignored if the door is fitted with an anti-drop device which acts directly on the door leaf and prevents it dropping.

The requirements in this section do not apply to doors intended for self-closing and opening provided that the requirement in 4.10 is complied with.

4.3.4 Safeguarding against dropping of vertically operating door leaves

Vertically operating door leaves shall be safeguarded against dropping, or uncontrolled out-of-balance movement in the event of failure of a single component in their suspension or balancing systems. The door shall not be able to close if a component fails. Further, the design shall ensure that if a single failure occurs, the resulting short term transient loads imposed on other parts of the door system will not cause secondary failures, which then cause the door leaf to drop.
Rigid parts, such as shafts or levers, provided that they are correctly dimensioned and designed, need not be considered as a potential cause of suspension failure.

The above requirement may be disregarded if the maximum out-of-balance static force occurring at the primary closing edge of the door does not exceed 200 N when there is a suspension or balancing component failure.

Safeguards against dropping can be achieved by using an anti-drop device or by other design features incorporated into the door suspension system. These safeguards against dropping are all referred to as anti-drop safeguards and have to conform to the following:

a) If an operational brake is fitted to the drive motor of the door, this cannot be considered on its own as the anti-drop safeguard.

b) Door leaves shall also be safeguarded against dropping in the event of a failure in the door suspension system when the door is switched over from power to manual operation.

c) In the event of a failure in the door suspension system, the door leaf shall be brought to rest after an eventual downward movement (or drop) of not more than 300 mm and held safely in this position, as long as no further action is carried out.

d) An anti-drop safeguard, as an emergency system, shall be designed to take the full dynamic load of the door leaf. Further, any brackets or other part of the link which connect between the anti-drop safeguard and the door leaf shall remain effective under the full dynamic load.

e) The anti-drop safeguard shall be automatically activated in the event of a suspension failure.

f) Anti-drop safeguards shall be designed so that the mechanism, once activated, cannot slip as a result of vibrations, oscillations etc.. Suitable warnings shall be given, to instruct users to seek trained help to release any such device which has activated.

g) An anti-drop safeguard or other door components may incorporate parts which shall be replaced once the safety device has been in operation. The existence and extent of such parts shall be specified by the manufacturer. Where replacement parts are not specified the activations of the anti-drop safeguard shall not cause deformation which impairs the subsequent operation.

NOTE 1 Examples of elements of the suspension system which could fail are springs, steel wire ropes, chains, straps, belts, gears.

NOTE 2 Examples of methods of safeguarding by "Other Design Features" are described in Annex B (informative).

4.4 Manual operation

4.4.1 Forces for manual operation

A door intended for manual operation shall be able to open or close by the use of a force not exceeding 150 N for garage doors in private areas and 260 N per person for industrial/commercial doors. These loadings are exclusive of the influence of wind or other environmental factors which do not have to be considered. It is permissible to exceed these forces at the start of the movement, and on final closure.

NOTE The above-mentioned forces are valid for the lifetime of the door provided that it is properly maintained according to the manufacturer’s instructions.

4.4.2 Devices for manual operation

Doors intended for manual operation shall be fitted with suitable devices, such as handles or pull cords, on the inner and outer faces of the door to enable them to be moved. If a door is only operated from one side, only that face has to be equipped with such devices.

The devices shall be so designed and located that they are convenient for use and there is no risk of injuries.

4.5 Mechanical protection and safety clearances against crushing, cutting, shearing, entanglement, drawing-in and trapping

4.5.1 Manual operation

The mechanical features of a door shall be designed so that as far as possible the risk to the operator and adjacent persons of crushing, cutting, shearing, entanglement, drawing-in and trapping is eliminated. This shall be done primarily by the door design, setting suitable clearances or provision of guarding. Where this action does not eliminate all risk, suitable warning signs shall be provided.

Door leaves, fittings and handles shall be so designed and constructed that persons operating the door during the opening and closing phase are not exposed to any crushing, cutting, shearing, entanglement or drawing-in hazards. Closing gaps which are accessible during the leaf movement shall be eliminated or safeguarded up to a height of 2,5 m above floor level or other permanent access level.

Persons and their clothing shall not be at risk of being entangled in any way when passing through an open door.

NOTE Examples are given in C.1.

4.5.2 Power operation

Where power operation is fitted, all the above requirements shall be met in addition to prEN 12453.

Examples of guards are described in C.2.

Examples of safety clearances and distances are shown in C.3. Values for safety clearances for certain parts of the human body are included in EN 349. Safety distances to prevent access to a danger zone in relation to the width of the gap are described in EN 294.

4.6 Doors adjacent to traffic areas

Provision, such as observation windows, shall be made in doors opening on to traffic areas, to ensure the door is not opened without warning on to persons or vehicles in the traffic area.

4.7 Specific requirements for parts commonly used in suspension systems

4.7.1 Springs

Springs shall be arranged so that one spring cannot cause faulty operation of another.

Precautions shall be taken to prevent ejection of springs or spring coils in the event of spring breakage.

4.7.2 Counterweights

The path of counterbalancing weights shall be covered by resistant, solid or close-gapped material up to 2,5 m above floor level or any other permanent access level, preventing accidents due to moving counterweights. If counterweights are fully beyond the covering during any part of the door operation, the guide shall ensure their re-entry into their covers again.

Falling counterweights shall not cause unintentional, dangerous movements of the door leaf or cause any danger.

Counterweights shall be fixed securely to the supporting system. Where more than one rope is fastened to one counterweight they shall be individually fixed to the counterweight. Counterweights shall not be fixed on to rods or levers using clamping screws. The method of fixing shall ensure that accidental displacement is prevented.

Concrete counterweights shall be of reinforced construction.

4.7.3 Steel wire ropes, chains, straps, etc.

Steel wire ropes, chains, straps, etc. shall be suitable for the intended application, e.g. drive chains, suspension chains, corrosion resistance, etc.

If such suspension elements are used for vertically operating doors, then a minimum of two independent steel wire ropes, chains, straps etc. shall be used.

Where two or more suspension elements are used, it shall be assured that the deadloads are shared in a pre-determined way.

The guaranteed minimum breaking strength of such suspension elements shall be confirmed by a test certificate from the supplier/manufacturer of these elements. On request, a copy of the test certificate shall be made available to the user and/or other inspection body.

These types of suspension elements shall be so arranged that they can be inspected over their full length.

All such suspension elements shall have terminations with a breaking load of not less than 90% of that of the element, or have a minimum of two full turns left on the drum in the terminal position. Measures shall be taken to ensure that terminations cannot be accidentally detached.

Where such suspension elements enter grooves on drums or sheaves, the design shall ensure that the elements are aligned correctly to allow entry of the suspension elements.

4.7.3.1 Steel wire ropes

Each steel wire rope shall have a safety factor not smaller than 6 (minimum breaking strength/static load of one rope).

Rope pulleys and rope drums shall have a pitch circle diameter (PCD) at least equal to 20 times the rope diameter. Deviations are only allowed if covered by a certificate from the manufacturer of the rope, verifying that the strength or life time shall not be affected by a smaller PCD.

Rope drums shall be grooved and the ropes coiled in only one layer.

Rope pulleys shall be so designed that the steel wire rope cannot jump out of the pulley.

4.7.3.2 Straps

Each strap shall have a safety factor not smaller than 6 (minimum breaking strength/static load on one strap).

4.7.3.3 Chains

Chains may be used for direct suspension of the door leaf, for transmission of power or as an element in the balancing system.

Only roller chains, leaf chains or calibrated round link chains shall be used as suspension chains.

Only roller chains shall be used as transmission chains.

Single transmission chains may only be used with balanced doors or when anti-drop safeguards are fitted.

Each chain shall have a safety factor not smaller than 6 (minimum breaking strength/static load on one chain).

Chain wheels shall not have teeth with undercut flanks.

Chain wheels up to a height of 2,5 m above floor level or another permanent level shall be fitted with a guard.

4.8 Pass doors

Pass doors shall be designed and positioned so that hazards associated with normal use are avoided or minimized.

If a single panel of a folding door is used as a hinged pass door, the maximum area of this panel shall not exceed 4 m^2.

4.9 Rolling doors and shutters

When a rolling door or shutter is in the fully closed position, at least 10% of the door leaf shall remain on the door roller or minimum half of the circumference of the roller shall be covered. This also applies where sections of reduced width are used. Deviations from this are allowed provided the manufacturer can verify that strength and economical life time are not reduced.

A lateral movement between the sections/laths shall not cause any damage or danger or shall be prevented.

4.10 Additional requirements for doors operating by gravity or other self-closing mechanism

Doors operating by the use of gravity or self-operating mechanisms shall not expose any person to the risk of being crushed or entangled by forces causing injury or damage.

The operating speed of doors which operate solely by gravity shall not exceed 0,3 m/s. The force of the door impacting on the human body or part of it shall not exceed admissible values according to prEN 12453. If this is not possible, then an audible warning device shall be fitted to the door which starts to sound immediately the door begins to close.

5 Durability

The manufacturer shall state, on request, the number of cycles performed by the relevant door type under the durability test in accordance with EN 12605.

Annex A (informative)
Mechanical hazards related to doors

The mechanical hazards that can influence the safety of persons during operation, maintenance or inspection of doors have been identified by the risk assessment procedure. Table A.1 shows the hazards and corresponding requirements which have been formulated in this standard.

Table A.1: Significant mechanical hazards and safety requirements related to doors

Hazards, hazardous situations and hazardous events	EN 12604 relevant clause	Compulsory for power-operated doors	
		Machinery Directive Annex 1 Ref.-No.	EN 1050 Annex 1 Ref.-No.
Crushing hazard	4.5.1	1.3	1.1
Shearing hazard	4.5.2 4.7.2 4.10		1.2
Cutting hazard	4.2.5, 4.5.1		1.3
Entanglement hazard	4.5.1		1.4
Drawing-in or trapping hazard	4.5.2		1.5
Impact hazard	4.3.1 4.3.2 4.3.3		1.6
Excessive effort	4.4.1	1.1.2 d, 1.1.5, 1.6.2, 1.6.4	8.1
Falling or ejected parts	4.3.4 4.7.1 4.7.2 4.9	1.3.3	17
Loss of stability	4.2.2, 4.2.3 4.2.4 4.2.5	1.3.1	18
Contact with wheels	4.7.3.3	1.3.7	21.4
Insufficient visibility	4.2.5	1.7.2	21.5

Annex B (informative)
Safeguarding against dropping by other design features incorporated in the suspension system of vertically operating door leaves according to 4.3.4

When safeguards against dropping can be achieved via other design features, the following design features, if they fulfil all the applicable requirements of 4.3.4, are acceptable solutions:

- The door leaf, balanced by counter weights with suspension elements like steel wire ropes, straps and chains, is equipped with additional suspension elements which can carry the door leaf if one of the normally carrying suspension elements fails.

- Doors are equipped with suspension systems (with or without springs) like steel wire ropes, straps or chains so designed that

    - in the event of a failure of one suspension element, the other suspension element(s) can carry the panel and hold it in position,
      and
    - the drive system can bear the resulting out of balance state in the event of a failure of a spring.

- The door leaf is balanced by springs, without suspension elements like steel wire ropes, straps or chains, if the drive system is designed to carry the resulting out of balance in the event of a failure of a spring.

- The door leaf is driven by two drive systems and each drive system is designed to be able to independently carry the weight of the door leaf in the case of failure of the other drive system. A further movement of the door leaf is automatically prohibited at the latest when the door leaf has reached its lower terminal point.

- The door leaf is directly hydraulically driven and equipped with devices on the operating cylinder to prevent dropping in the event of a pipe or supply line fracture (e.g. pipe fracture valve).

Annex C (informative)
Examples of mechanical protection and safety clearances

C.1: Examples for safeguarding against crushing, shearing and drawing-in

- at sectional doors

A) Flexible guide, following the movement of the door leaves.
B) Design of door leaves panels whereby variable openings do not occur.
C) Openings sealed with rubber/flexible material.
D) A safety distance of at least 25 mm preventing injuries to fingers measured in compressed state.

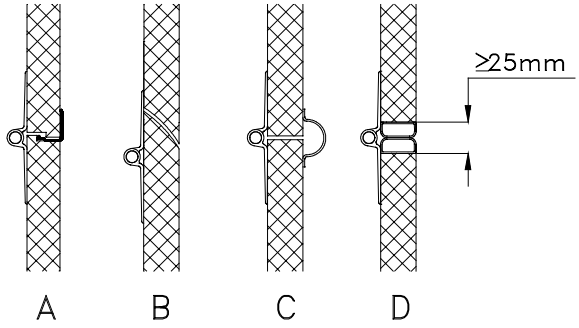
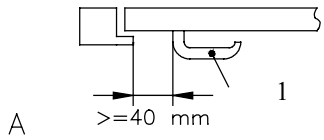
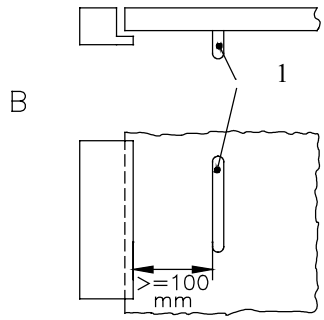


Figure C.1.1: Safeguarding at sectional doors

- at hinged doors

A) Safety distance between horizontal handle and door frame.
B) Safety distance between vertical handle and door frame.





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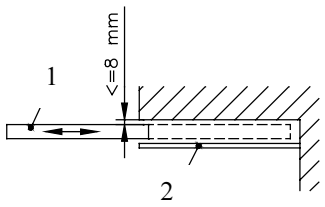
1 Handle

Figure C.1.2: Safeguarding at hinged doors

C.2: Examples of guards

- at sliding doors

Door leaf at the secondary edge is provided with a fixed screen.



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1 Leaf
2 Screen

Figure C.2.1: Guard at a sliding door

- at hinged doors

A deformable sealing is mounted at the secondary edge which allows a safety distance of 25 mm, measured in compressed state.

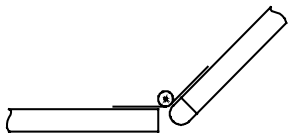


Figure C.2.2: Guard at a hinged door

Secondary edge is protected by a profile.

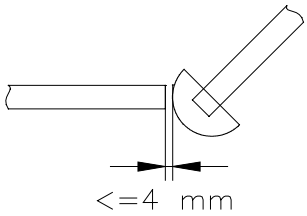
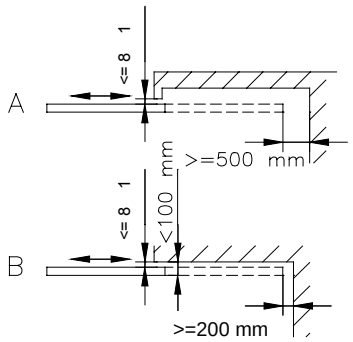


Figure C.2.3: Protection profile

C.3: Examples of appropriate safety clearances and safety distances

- at sliding doors

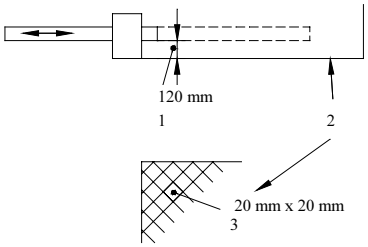
A) A clearance of 500 mm is provided at the rear edge of a leaf moving along, but apart from, a closed wall.
B) A clearance of 200 mm is provided at the rear edge of a leaf moving along a closed wall in a distance of less than 100 mm.



key
1 Gap

Figure C.3.1: Safety clearance and distance

A safety distance of 120 mm is needed with a fence gap of 20 mm x 20 mm.



key
1 Safety distance
2 Fence
3 Gap

Figure C.3.2: Safety clearance and distance

- at hinged doors

A) The area behind the leaf has a minimum clearance of 500 mm over the entire depth when the door is fully open.

B) A clearance width of 200 mm remains when the door is fully open, provided that the maximum depth of the area formed by the open leaf and the fixed objects in the vicinity is 250 mm.

C) Between the leaves remains a safety clearance of 25 mm at least.

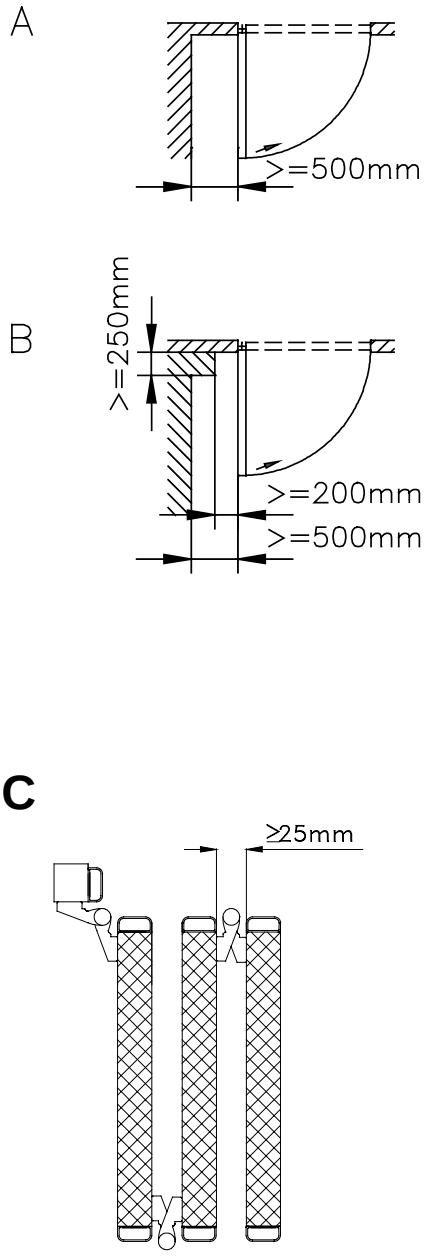


Figure C.3.3: Safety clearance at hinged doors

- at up-and-over doors

A) Between the levers of up-and-over-doors remains a safety distance of at least 25 mm.

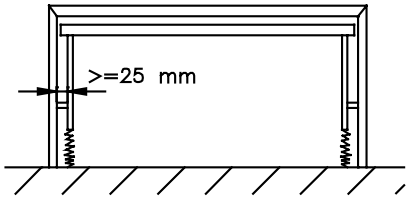


Figure C.3.4: Safety clearance at up-and-over doors

B) - Observation window
or
- interlocking switch between up-and-over-door and passenger door
or
- hinges of the pedestrian door at the side of the up-and-over-door and safety distance of 25 mm.

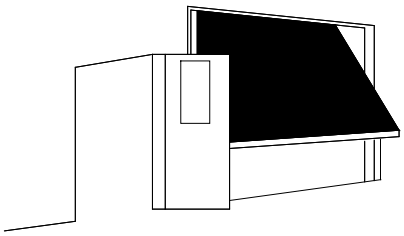


Figure C.3.5: Structural measures for safeguarding danger points

Annex D (informative)
Relationship between requirements for mechanical aspects and relevant test methods

Requirements EN 12604		**Test method EN 12605 or defined otherwise**	
Object/Clause	**Headword**	**Type**	**Clause**
Door 4.2.2 4.2.3 5	 Strength Operability Durability	 Inspection (Calculation or test) Functionality test Durability test	 5.4.1 5.1.1 5.2
Differential pressure 4.2.4	Deformation	Calculation or test	prEN 12444
Transparent surfaces 4.2.5	Performance	Special test	5.3.1
Guides and stoppers 4.3.1	Disengagement or derailment - during use and operation	Inspection Functionality test	5.4.2 5.1.2
	- by obstacles	Functionality test	5.1.2
Arresting devices 4.3.2	Movement by wind	Functionality test	5.1.3
Vertically operating doors 4.3.3	Uncontrolled movements	Functionality test	5.1.4
4.3.4	Safeguarding against dropping - by anti-drop device	Special test Inspection	5.3.2 5.4.3
	- by other design features	Inspection	5.4.3
Manual operation 4.4.1	Required force	Functionality test	5.1.5
4.4.2	Devices	Inspection	5.4.4
Crushing, cutting, shearing, entanglement, drawing-in and trapping 4.5.1, 4.5.2	Hazard of crushing, cutting, shearing	Inspection	5.4.5
Doors to traffic areas 4.6	Observation window	Inspection	5.4.6
Springs 4.7.1	Ejection	Inspection	5.4.7
Counterweights 4.7.2	Guidance, protection	Inspection	5.4.8
Steel wire rope 4.7.3, 4.7.3.1	Design of steel wire rope, pulleys or drums	Inspection	5.4.9
Straps 4.7.3, 4.7.3.2	Design of straps	Inspection	5.4.10
Chains 4.7.3, 4.7.3.3	Design of chains	Inspection	5.4.11
Pass doors 4.8	Interlocking, threshold	Inspection	5.4.12
Rolling doors 4.9	Door leaf attachment	Inspection Durability	5.4.13 5.2
Self closing doors 4.10	Operating speed and force	Functionality test	5.1.6
Remaining hazards 4.1.1, 4.5.1	Warning signs	Inspection	5.4.14

Annex ZA (informative)
Clauses of this European Standard addressing the provisions of the EU Construction Product Directive

This European Standard has been prepared under a Mandate given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard, shown in the table below, meet the requirements of the Mandate given under the EU Construction Products Directive (89/106).

Compliance with these clauses confers a presumption of fitness of the construction product covered by this European Standard for its intended use(s).

WARNING Other requirements and other EU Directives, not affecting the fitness of intended use(s), can be applicable to the construction product falling within the scope of this European Standard.

Construction Product(s): industrial, commercial and garage doors and gates
Intended use(s): access for goods and vehicles accompanied by persons

Relevant characteristics	**CPD**	**Requirement clause in this European Standard**
Operating forces	ID 4 No. 3.3.2.3	4.4.1
Break-down of doors or components	ID 4 No. 3.3.2.3	4.2.2 4.2.4
Falling of parts / components	ID 4 No. 3.3.1.1.	4.3.4
Cutting at sharp edges	ID 4 No. 3.3.2.3	4.2.5 4.5.1
Push and running against not visible parts	ID 4 No. 3.3.2.3	4.2.5

NOTE Limiting values or classes, if any referred to under these clauses in the standard, are not to be taken into account except if they are recognized as classes and levels according to Article 3.2 of CPD, as specified in the mandate, or later agreed by the Standing Committee according to Article 20.2 of the CPD, following a CEN proposal.

Annex ZB (informative)
Relationship of this European Standard with other EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of following EU Directives:

Machinery Directive 98/37/EG

in the clauses listed in Annex A (informative).

Compliance with this standard provides one means of conforming with the specific essential requirements of the Directives concerned and associated EFTA regulations.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

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