



SLOVENSKI STANDARD

SIST EN 12604:2001

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Vrata v industrijske in javne prostore ter garažna vrata - Mehanske lastnosti - Zahteve

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

Tore - Mechanische Aspekte - Anforderungen

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

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EUROPEAN STANDARD

EN 12604

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EUROPÄISCHE NORM

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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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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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of an identical text or by endorsement, at the latest by October 2000, and conflicting national standards shall be withdrawn at the latest by October 2000.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.

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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 m² 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;
- frequency 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.

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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

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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.