



# SLOVENSKI STANDARD

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### Prostori za gledalce - 4. del: Lastnosti sedežev

Spectator facilities - Part 4: Seats - Product characteristics

Zuschaueranlagen - Teil 4: Sitze - Produktmerkmale

Installations pour spectateurs - Partie 4 : Sièges - Caractéristiques des produits

Ta slovenski standard je istoveten z: **EN 13200-4:2023**

#### ICS:

91.040.10	Javne stavbe	Public buildings
97.200.10	Gledališka, odrska in studijska oprema ter delovne postaje	Theatre, stage and studio equipment
97.220.10	Športni objekti	Sports facilities

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## Spectator facilities - Part 4: Seats - Product characteristics

Installations pour spectateurs - Partie 4 : Sièges -  
Caractéristiques des produits

Zuschaueranlagen - Teil 4: Sitze - Produktmerkmale

This European Standard was approved by CEN on 2 January 2023.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

<b>Contents</b>	<b>Page</b>
European foreword.....	3
<b>1</b> Scope.....	<b>4</b>
<b>2</b> Normative references.....	<b>4</b>
<b>3</b> Terms and definitions .....	<b>4</b>
<b>4</b> Abbreviations .....	<b>5</b>
<b>5</b> General requirements of construction.....	<b>5</b>
5.1 Safety, strength and durability.....	5
5.2 Shear and squeeze point.....	6
5.2.1 Shear and squeeze points when setting up and folding .....	6
5.2.2 Shear and squeeze points under influence of powered mechanism .....	6
5.2.3 Shear and squeeze points during use .....	6
5.3 General requirements for fixing elements and fixing methods .....	7
5.3.1 General.....	7
5.3.2 Criteria for presentation of designs .....	7
5.3.3 Acceptance testing.....	7
<b>6</b> Sampling and conditioning.....	<b>8</b>
6.1 Sampling.....	8
6.2 Conditioning.....	8
<b>7</b> Characteristics of materials .....	<b>8</b>
7.1 General.....	8
7.2 Corrosion resistance .....	8
7.3 Resistance to weathering agents/stability to light .....	8
<b>8</b> Strength and durability requirements .....	<b>9</b>
<b>9</b> Test report.....	<b>10</b>
<b>10</b> Seating numbers.....	<b>11</b>
<b>11</b> Instruction for use .....	<b>11</b>
<b>12</b> Marking.....	<b>11</b>
<b>Annex A</b> (informative) <b>Examples of seats</b> .....	<b>12</b>
<b>Annex B</b> (informative) <b>Ergonomy</b> .....	<b>14</b>
<b>B.1</b> Ergonomy .....	<b>14</b>
B.1.1 Anthropometric aspects and data.....	14
B.1.2 Design requirements .....	14
<b>Bibliography</b> .....	<b>23</b>

## European foreword

This document (EN 13200-4:2023) has been prepared by Technical Committee CEN/TC 315 “Spectator facilities”, the secretariat of which is held by UNI.

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 August 2023, and conflicting national standards shall be withdrawn at the latest by August 2023.

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

This document supersedes EN 13200-4:2006.

The main changes compared to the previous edition are listed below:

- Clause 2 “Normative References” has been updated;
- subclauses 5.2.2, 5.2.3 and 5.2.4 have been amended and aligned with the new edition of EN 12727;
- Table 2 in Clause 8 has been updated and aligned with the new edition of EN 12727.

The EN 13200 / CEN/TR 13200 series, *Spectator facilities*, consists of the following parts:

- EN 13200-1, *Spectator facilities — Part 1: General characteristics for spectator viewing area*;
- CEN/TR 13200-2, *Spectator facilities — Layout criteria of service area — Part 2: Characteristics and national situations*;
- EN 13200-3, *Spectator facilities — Part 3: Separating elements — Requirements*;
- EN 13200-4, *Spectator facilities — Part 4: Seats — Product characteristics*;
- EN 13200-5, *Spectator facilities — Part 5: Telescopic stands*;
- EN 13200-6, *Spectator facilities — Part 6: Demountable stands*;
- EN 13200-7, *Spectator facilities — Part 7: Entry and exit elements and routes*;
- EN 13200-8, *Spectator facilities — Part 8: Safety Management*.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

**EN 13200-4:2023 (E)****1 Scope**

This document specifies mechanical, physical and chemical product characteristics of fixed seating for spectator facilities used in sports venues (indoor and outdoor) in the spectator viewing area. It also specifies the criteria for fixing the seating to the structure.

These characteristics and criteria are determined to ensure an adequate resistance to static and dynamic stresses and to atmospheric agents. This document specifies comfort, functionality and safety requirements to prevent serious injury through normal use, as well as misuse that might reasonably be expected to occur. This document does not include any fire behaviour or resistance requirements.

**2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12727:2016, *Furniture - Ranked seating - Requirements for safety, strength and durability*

EN 13200-1, *Spectator facilities - Part 1: General characteristics for spectator viewing area*

EN ISO 179-1:2010, *Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test (ISO 179-1:2010)*

EN ISO 527-2, *Plastics - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

EN ISO 4892-2, *Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps (ISO 4892-2)*

EN ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227)*

EN ISO 13857, *Safety of machinery - Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857)*

EN 20105-A02, *Textiles - Tests for colour fastness - Part A02: Grey scale for assessing change in colour (ISO 105-A02)*

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

**3 Terms and definitions**

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

**3.1 seating place**

space intended for a single spectator in a sitting position

Note 1 to entry: See figures in Annex A.

## 3.2 seat

### 3.2.1

#### **bench seat**

continuous element, forming a raised seat level with respect to the footway (Figure A.1)

### 3.2.2

#### **low back seat**

shaped element or an assembly fixed to the step or on to a support with a backrest with a maximum height of 15 cm above the seat level and can be fitted with armrests (Figure A.2)

### 3.2.3

#### **high back seat**

shaped element or assembly fixed to the step or on to a support with a backrest with a minimum height of 15 cm above the seat level and can be fitted with armrests (Figure A.3)

### 3.2.4

#### **tip-up seat**

seating place where in the seat element automatically returns to the upright position on the departure of the occupant (Figure A.4)

## 3.3

#### **fixing element**

element for attaching the seat to the fixed support

## 3.4

#### **fixing method**

assembly of elements for attaching the support or the seats to a stand

## 3.5

#### **seat numbering**

means of identifying seat position

## 4 Abbreviations

For the purposes of this document, the abbreviations in EN 13200-1 and the following apply.

- B<sub>se</sub>** dimension of the tread where seating places are (seating row depth)
- F** depth of seats including the thickness of the back
- I** width of seats (minimum dimension for lateral boundaries of a single seating place)
- E** distance between the foremost projection of one seat and the back of the seat in front of it (clearway)
- S** height of seat back, including the thickness of the seat

## 5 General requirements of construction

### 5.1 Safety, strength and durability

The seating shall be designed as to minimize the risk of injury to the user.

All accessible parts shall be so designed that physical injury and damage are avoided and shall be without sharp edges/corners.

**EN 13200-4:2023 (E)**

Seating shall be securely fixed to the steps or to the supports when installed in spectator facilities area.

These requirements are met when:

- a) accessible corner and edges are rounded or chamfered;
- b) all other corners and edges are free from burrs and sharp edges;
- c) ends of hollows components with a diameter greater than 7mm and less than 12mm, where the accessible depth is greater than 10mm are closed or capped.

Movable and adjustable parts shall be designed so that injuries and inadvertent operation are avoided. It shall not be possible for any load bearing part of the seating to come loose unintentionally. All parts which are lubricated to assist sliding shall be designed to protect user from lubricant stains when in normal use.

**5.2 Shear and squeeze point****5.2.1 General**

EN 12727:2016, Clause 5 applies, with the following:

**5.2.2 Shear and squeeze points when setting up and folding**

Unless 5.2.3 or 5.2.4 are applicable, shear and squeeze points that are created only during setting up and folding, including tipping seat actions, are acceptable because the user can be assumed to be in control of his/her movements and to be able to cease applying the force immediately upon experiencing pain. The edges of parts moving relative to each other and creating shear and squeeze points are specified in 5.1.

**5.2.3 Shear and squeeze points under influence of powered mechanism**

With the exception of tipping seats, there shall be no shear and squeeze points created by parts of the seating operated by power mechanisms, e.g. springs and gas lifts.

**5.2.4 Shear and squeeze points during use**

With the exception of tipping seats there shall be no shear and squeeze points created by forces applied during normal use, see Table 1. There shall be no shear and squeeze points if a hazard is created by the weight of the user during normal movements and actions, e.g. by adjusting the backrest and it shall be so designed to not cause injury to the user.

NOTE This hazard is best prevented by the use of automatic locking mechanism.

All parts of the seating place with which the user comes into contact, during the intended use, shall be designed so that physical injury and damage to spectator property are avoided. The following considerations are necessary:

- the safety distance of accessible movable parts is in compliance with EN ISO 13857 in any position during movement;
- the edges of the seat, backrest and armrests which are in contact with the user when sitting, are rounded with recommended minimum 3 mm radius;
- the ends of hollow components are closed or capped.



- a) All parts which are lubricated to assist sliding (greasing, lubricating, etc.) shall be designed to protect users from lubricant stains when in normal use;
- b) the shape of the seats shall be such as to allow rain and water to drain and shall allow easy cleaning of it and of the underlying steps;
- c) during the normal use of a tip-up seat, this shall not harm users of adjacent seats when opening or closing the seats;
- d) if the components are made of different materials, they shall be compatible with each other;
- e) the seating place shall comply the minimum dimensions given in EN 13200-1;
- f) the recommended values are given in Table 1; when designing a chair, anthropometric aspects need to be assessed with biomechanical data (See for information Annex B “Ergonomy”).

**Table 1 — Recommended dimensional criteria for seats**

Seat type	F (mm)	I (mm)	S (mm)	Row depth ( $B_{se}$ ) (mm)	
				min	rec
Bench	300	0	0	700	800
Seat with low back	400	500	< 150	700	800
Seat with high back	400	500	> 150	700	800

### 5.3 General requirements for fixing elements and fixing methods

#### 5.3.1 General

The fixing of the seats shall comply with the following requirements:

- a) the fixing elements of the seats shall withstand the forces generated during the tests described in EN 12727;
- b) it shall not be possible to remove the seats without the use of a special tool;
- c) the fixing methods shall be compatible with the supporting structure;
- d) the metal elements making up the fixing elements and fixing methods shall be protected against corrosion (see 7.2);
- e) regarding materials, see Clause 6.

#### 5.3.2 Criteria for presentation of designs

The design including plans, sections and elevations, and details of the seat, of the fixed support and of the fixing elements, at an appropriate scale, shall include the declaration of conformity to this document and a report of the static tests on the seat, and the fixing support structure.

#### 5.3.3 Acceptance testing

An independent agent shall ascertain the compliance between the design and the finished product.

**EN 13200-4:2023 (E)**

The agent is entitled to accept the declaration of conformity and the calculations contained in the design or to carry out additional checks.

**6 Sampling and conditioning****6.1 Sampling**

The minimum number of samples to be tested shall be two.

The samples to be tested shall always be inspected before and after each test, any significant changes that have taken place shall be recorded.

**6.2 Conditioning**

At least two weeks in normal conditions, 23/50 according to ISO 554, shall have elapsed between manufacturing (or assembling) and testing in the case of glued joints in timber and the like.

The tests shall be carried out in normal ambient conditions but, upon agreement, tests may be carried out in special ambient conditions and these shall be recorded in the test report.

The test samples of other materials shall be contained in normal conditions, 23/50 according to ISO 554 for at least 72 h.

**7 Characteristics of materials****7.1 General**

Assessment of the characteristics of materials used in the seating assembly, shall be carried out on the finished products but can be carried out on test specimens derived from it, after conditioning according 6.2.

The components of seating assembly shall comply with the following requirements.

NOTE National regulations regarding fire behaviour can apply.

**7.2 Corrosion resistance**

All metal components of the seating and the fixing elements shall be corrosion resistant.

Namely, after testing in accordance with EN ISO 9227 for:

- 500 h of exposure for outdoor use;
- 200 h of exposure for indoor use;

there shall be no metal base's oxidation or red rust zones which indicate internal corrosion of metal parts. Compliance is checked by visual inspection of the surface of all parts.

**7.3 Resistance to weathering agents/stability to light**

Plastic components of the seating shall be exposed to a xenon arc lamp according to EN ISO 4892-2.

They shall be irradiated for a total energy of 8,3 GJ/m<sup>2</sup> in the wavelength range of 295 nm to 3000 nm.

NOTE In the test conditions of xenon arc lamp described in EN ISO 4892-2:2013, method A, this energy value is achieved with an irradiation period of 2 300 h when a spectral irradiance of 0,50 W/m<sup>2</sup> · (at 340 nm) is selected.

The test chamber conditions are the following:

- black panel temperature:  $63\text{ °C} \pm 3\text{ °C}$ ;
- relative humidity:  $65\% \pm 5\%$ ;
- 102 min of light;
- 18 min of light and water spray.

After exposure, the test specimens shall not show any visual defects on the exposed surface.

The assessment of colour variation rating shall be according to EN 20105-A02, grey scale.

The minimum rating shall be agreed between client and supplier.

Alternative measurements can be performed, such as:

- colour variation according to ISO/CIE 11664-4;
- gloss variation according to EN ISO 2813.

When tested according to EN ISO 527-2, the exposed specimen shall have a maximum yield strain variation from the unexposed specimen of 30 %.

When tested according to EN ISO 179-1:2010, test method 1 e A, the exposed specimen shall have a maximum Charpy impact strength variation from the unexposed specimen of 30 %.

## 8 Strength and durability requirements

Seats shall be tested according to EN 12727 to assess the mechanical resistance. Several loads and cycles can be performed according to 4 different levels of severity (1, 2, 3 and 4).

Seats used as spectator facilities shall be tested according to level 4 of EN 12727 (See Table 2).

At the end of the tests, there shall be no damage or deformation that will affect the safe use of the seating and the functions shall be maintained.

**Table 2 — List of test methods and requirements for strength and durability according to EN 12727**

TEST	REFERENCE	LOADING	TEST SEVERITY			
			1	2	3	4
1. Seat static load and back static load test	EN 1728:2012 6.4	seat force, N back force <sup>a</sup> , N cycles	1 300 560 10	1 600 760 10	2 000 760 10	2 000 760 10
2. Seat front edge static load	EN 1728:2012 6.5	seat force, N cycles	1 300 10	1 600 10	2 000 10	2 000 10
3. Horizontal forward static load test on back rests	EN 1728:2012 6.7	force, N cycles	- -	- -	760 10	760 10
4. Vertical load on back rests	EN 1728:2012 6.6	force, N cycle	- -	600 10	900 10	900 10