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Spectator facilities - Part 4: Seats-product characteristics

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Contents

Page

Foreword

This document (prEN 13200-4:2004) has been prepared by Technical Committee CEN/TC 315 “Spectators Facilities”, the secretariat of which is held by UNI.

This document is currently submitted to the CEN Enquiry.

1 Scope

This draft European Standard specifies the mechanical, physical and chemical product characteristics of fixed seating used in sports and multipurposes venues (indoor and outdoor) in the Spectator viewing area (S.V.A.). It also specifies the criteria for fixing the seating to the structure.

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

2 Normative references

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

EN 13200-1, *Spectator facilities - Part 1: Layout criteria for spectator viewing area - Specification*

EN 12727, *Furniture - Ranked seating - Test methods and requirements for strength and durability*

ENV 581–2, *Outdoor furniture - Seating and tables for camping, domestic and contract use - Part 2: Mechanical safety requirements and test methods for sampling*

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

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

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

ISO 554, *Standard atmospheres for conditioning and/or testing - Specification*

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

ISO 7724-1, *Paints and varnishes - Colorimetry - Part 1: Principles*

ISO 7724-2, *Paints and varnishes - Colorimetry - Part 2: Colour measurement*

ISO 7724-3, *Paints and varnishes - Colorimetry - Part 3: Calculation of colour differences*

ISO 2813, *Paints and varnishes – Determination of specular gloss of non metallic paint films at 20 degrees, 60 degrees and 85 degrees*

3 Terms and definitions

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

3.1
seating place
a space intended for a single spectator in a sitting position (see figures in Annex A)

3.2
seats

— bench, a continuos element, forming a raised seat level with respect to the footway (Figure 1)

— a low back seat, a shaped element or an assembly fixed to the step or on to a support. It has a backrest with a maximum height of 15 cm above the seat level and may be fitted with armrests (Figure2).

— a high back seat, a shaped element or an assembly fixed to the step or on to a support. It has a backrest with a minimum height of 15 cm above the seat level and may be fitted with armrests (Figure 3)

— a tip-up seat, a seating place where in the seat elements automatically returns to the upright position on the departure of the occupant (Figure 4)

3.3
fixing elements
any elements for attaching the seat to the fixed support

3.4
fixing method
the assembly of elements for attaching the support or the seats to a stand

3.5
seat numbering
means of identifying seat position

NOTE 1 Considering that this is only a draft for the moment all the figures are at the end of the document, the different types of seating places which are shown in the figures are only examples.

NOTE 2 For general terms relating to the structures of spectator facilities, see EN 13200-1.

4 Abbreviations

According to EN 13200-1 “Spectator Facilities - Part 1: Layout Criteria for Spectator Viewing Area”, for the purpose of this standard the following abbreviations shall apply:

Bse: dimension of the tread where are seating places (seating row depth);

F: depth of seats including the thickens of the back;

i: width of seats (minimum dimension for a 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 Seats

The seats shall comply with the following general requirements.

a) It shall be so designed to not cause injury to the user. All parts of the seating place with which the user comes into contact, during the intended use, shall be so designed that physical injury and damage to spectator property are avoided. The following consideration are necessary:

— the safety distance of accessible movable parts is addressed to EN 294 in any position during movement;

— all accessible parts are without sharp edges/corners;

— 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.

b) All parts which are lubricated to assist sliding (greasing, lubricating, etc.) shall be designed to protect users from lubricant stains when in normal use;

c) Seats shall be securely fixed to the steps or to the supports;

d) 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;

e) If the components are made of different materials, they shall be compatible with each other;

f) The seating place shall comply the minimum dimensions given in EN 13200-1;

g) The recommended values are given in Table 1.

Table 1 — Recommended dimensional criteria for seats

SEAT TYPE	f	i	s	ROW DEPTH (Bse)	
				min.	rec.
BENCH	300	0	0	700	800
SEAT WHIT LOW BACK	400	500	<150	700	800
SEAT WHIT HIGH BACK	400	500	>150	700	800

The dimensions indicated in Table 1 are in millimetres.

5.2 Ergonomy

5.2.1 Anthropometric aspects and data

5.2.1.1 General

The dimensions of the human body vary considerably from individual to individual within the same population. The so-called “average” man or woman is hypothetical. There are persons who might have an average stature, or an average weight; persons who are “average” for two size values make up only 7% of the population; 3% match three size values; less than 2% match four size values. In order to be operatively efficient, working environments must conform to the variability of measurements of the human body.

5.2.2 Design requirements

When designing a chair, anthropometric aspects must be assessed in tandem with biomechanical data. Body stability is given by both the support surface of the seat and the contact of the legs, feet and back with other supports. Muscular effort is also indispensable for stability. Seated users must therefore be allowed to have contact (through the leg, back, etc.) with support surfaces in order to increase equilibrium and reduce muscular work.

Basic sizes that must be considered in the design of a chair are:

— height of seat from ground (min./max.)

— depth of seat

— width and height of backrest

— height of and distance between armrests

— properties of headrest

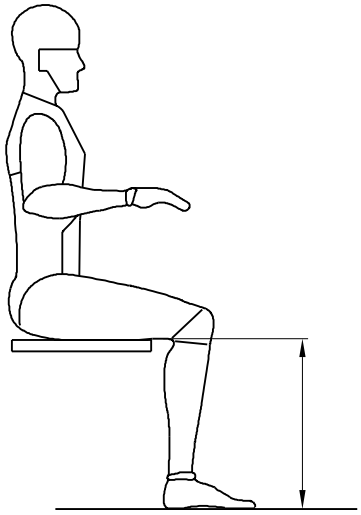
To make a chair comfortable, padding must be well designed.

It is also important to consider the changes of position (movement – adjustment) pertinent to a seating place in relation to human body joints.

5.2.2.1 Height of seat from ground

The popliteal height, the distance, taken vertically, from the ground to the popliteal fossa, which is the lower tip of the thigh behind the knee, is the fundamental consideration as regards the eight of a seat.

Dimensions in mm



HEIGHT OF SEAT			
men		*women*	
Percentile 5	*Percentile 95*	*Percentile 5*	*Percentile 95*
394	490	356	445

Figure 1 — Height of seat

The measurements given are in mm

The variability of the height of the popliteal fossa, justifies the importance ascribed to flexibility and adjustability for all seat types. When determining the height of the seat, it is important to consider the type of seat, its covering and/or padding.

Seat set too high

The lower part of the thigh is compressed, and may prevent blood circulation. It does not allow sufficient contact of the sole of the foot with the floor, producing a reduction in body stability.

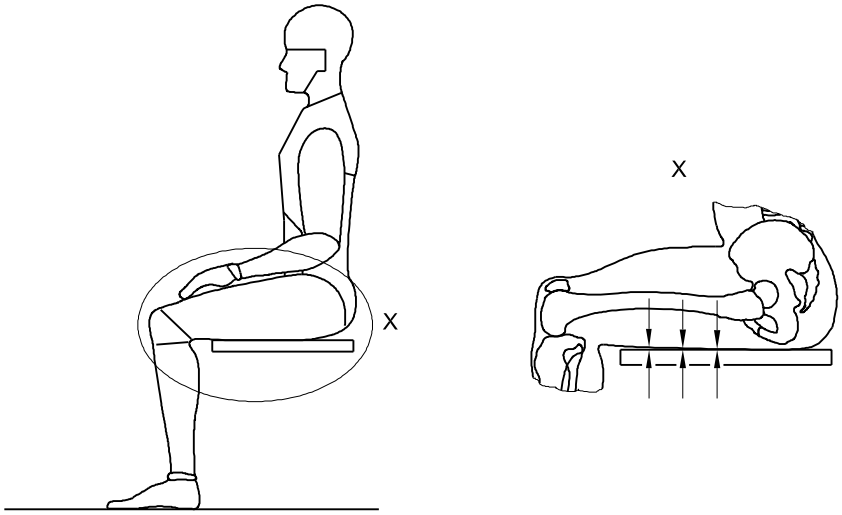


Figure 2 — Example of seat too high

Seat set too low

Legs require to be extended. As a result, the feet fail to perform their stabilising function. In addition, with the body moving forward the back is distanced from the backrest, thus depriving the person sitting down of necessary support for the lumbar region.

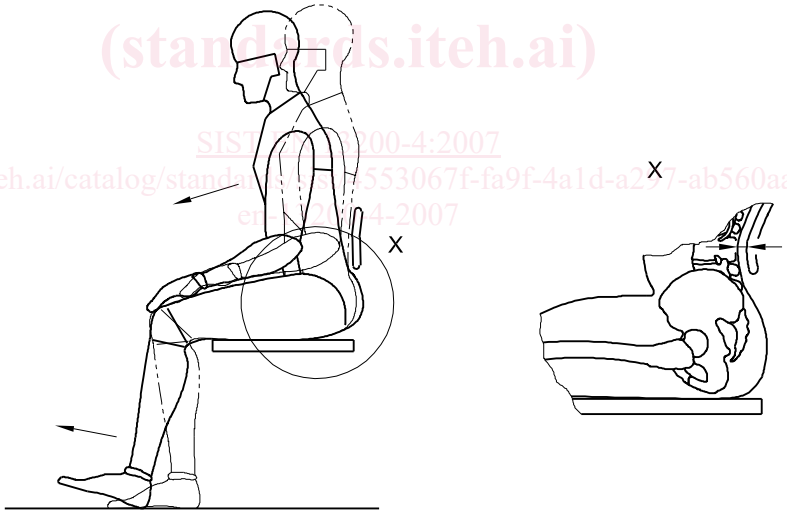


Figure 3 — Example of seat too low

5.2.2.2 Depth of Seat

The gluteal-popliteal distance (the horizontal distance between the back tip of the gluteus and the popliteal fossa), is the appropriate distance for the correct sizing of seat depth.