



SLOVENSKI STANDARD

SIST EN 13451-1:2002

01-september-2002

Oprema za plavalne bazene - 1. del: Splošne varnostne zahteve in preskusne metode

Swimming pool equipment - Part 1: General safety requirements and test methods

Schwimmbadgeräte - Teil 1: Allgemeine sicherheitstechnische Anforderungen und Prüfverfahren

Equipement de piscine - Partie 1: Exigences générales de sécurité et méthodes d'essai

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97.220.10 Športni objekti Sports facilities

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13451-1

February 2001

ICS 97.220.10

English version

Swimming pool equipment - Part 1: General safety requirements and test methods

Équipement de piscine - Partie 1: Exigences générales de
sécurité et méthodes d'essai

Schwimmbadgeräte - Teil 1: Allgemeine
sicherheitstechnische Anforderungen und Prüfverfahren

This European Standard was approved by CEN on 13 January 2001.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 136 "Sports, playground and other recreational equipment", the secretariat of which is held by DIN.

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 2001, and conflicting national standards shall be withdrawn at the latest by August 2001.

The European Standard EN 13451 "Swimming pool equipment" consists of

- Part 1: General safety requirements and test methods
- Part 2: Additional specific safety requirements and test methods for ladders, stepladders and handlebends
- Part 3: Additional specific safety requirements and test methods for equipment for water treatment purposes
- Part 4: Additional specific safety requirements and test methods for starting platforms
- Part 5: Additional specific safety requirements and test methods for lane lines
- Part 6: Additional specific safety requirements and test methods for turning boards
- Part 7: Additional specific safety requirements and test methods for water polo goals
- Part 8: Additional specific safety requirements and test methods for leisure water features
- Part 9: Safety signs
- Part 10: Additional specific safety requirements and test methods for diving platforms, diving springboards and associated equipment
- Part 11: Additional specific safety requirements and test methods for moveable pool floors and moveable bulkheads

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This standard may also be applicable to other equipment not specified, provided the safety requirements are fulfilled.

There may be additional requirements for purposes such as competition swimming and advice should be sought from the governing body of the sport in question.

The Annexes A to E are normative.

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.

1 Scope

This standard specifies general safety requirements and test methods for equipment used in public swimming pools.

Where specific standards exist, this general standard shall not be used alone.

Special care is required in applying this general standard alone to equipment for which no product specific standard has yet been published.

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 (including amendments).

EN 1176-1:1998

Playground equipment – Part 1: General safety requirements and test methods

EN 45001

General criteria for the operation of testing laboratories

ENV 1991-1

Eurocode 1: Basis of design and actions on structures – Part 1: Basis of design

ISO 5904 : 1981

Gymnastic equipment – Landing mats and surfaces for floor exercises – Determination of resistance to slipping

3 Terms and definitions

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For the purposes of this standard, the following terms and definitions apply:

3.1 swimming pool: pool water tank, its fittings and the immediate adjoining areas where the swimming pool equipment can be installed or can have an influence.

3.2 swimming pool equipment: Authorized equipment, either fixed or loose, provided for public use, or in reach of users. This equipment can be part of the swimming pool technology, (e.g. water inlets or outlets), or provided to assist the users (e.g. ladders), or for competitive and training use (e.g. starting platforms).

3.3 crushing point: A place where parts of the equipment can move against each other, or against a fixed area so that persons, or parts of their body, can be crushed.

3.4 grip: Holding of the hand around the entire perimeter of a support (see figure 1).

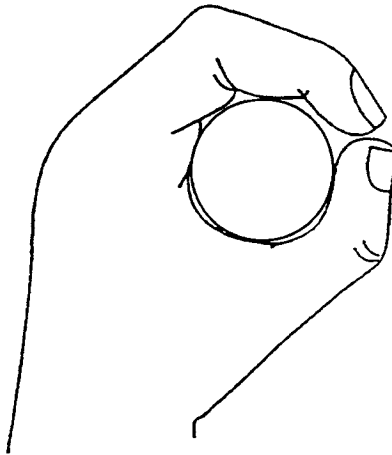


Figure 1: Grip

3.5 grasp: Holding of the hand around part of the perimeter of a support (see figure 2).

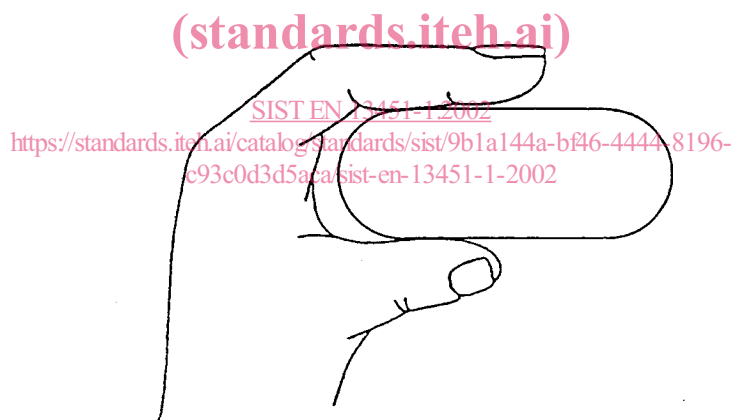


Figure 2: Grasp

3.6 finger hold: Holding which is found with hand, at least with the finger head by hooking in.

3.7 entrapment: Hazard presented by the situation in which a body, or part of a body, or clothing is trapped.
[EN 1176-1 : 1998]

NOTE: The user is not able to free himself/herself and injury is caused by the entrapment.

3.8 minimum space: The smallest space required for the safe installation and use of the equipment.

3.9 minimum zone: The minimum space required for anyone who may come into contact with an equipment.

3.10 obstacle/protrusion: An object, or a portion of an object, that stands or protrudes in/into the minimum zone.

3.11 handrail: Rail intended to assist the user to balance. [EN 1176-1 : 1998]

3.12 barrier: Device intended to prevent a user from falling, e.g. guardrail, full faced panel, wall.

4 Safety requirements

4.1 Structural integrity

Structural integrity, including stability, of the equipment shall be assessed by one of the following:

- a) calculation, carried out in accordance with annexes A and B;
- b) physical testing, in accordance with annex C; or
- c) a combination of a) and b).

When calculations are carried out in accordance with annex B, no limit states shall be exceeded at combinations of loads as given in B.2.

When tested in accordance with annex C, the equipment shall not show any cracks or damage. Deformation shall remain within the elastic field.

In some cases, these specific calculations or tests are not appropriate but the structural integrity shall be at least equivalent.

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Each structure shall resist both the permanent and variable loads acting on equipment and parts of equipment as described in annex C.

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NOTE 1: No allowance for accidental loads, i.e. loads produced by fire, collision by vehicles or earthquake need to be made for swimming pool equipment.

NOTE 2: The loads associated with fatigue are much smaller than the loads in combination with the appropriate load factors when calculated according to B.2. Therefore swimming pool equipment needs not to be verified for fatigue.

Structural parts shall resist the worst case loading condition.

If a piece of equipment is made by components, it has to be constructed in such a way that every component is secured in its working position.

4.2 Minimum space

The manufacturer/supplier shall indicate the minimum space needed for the installation, operation and use of the equipment.

4.3 Protection against falling

4.3.1 Handrails and barriers

Handrails and barriers shall fulfill the requirements given in 4.1.

4.3.2 Grip

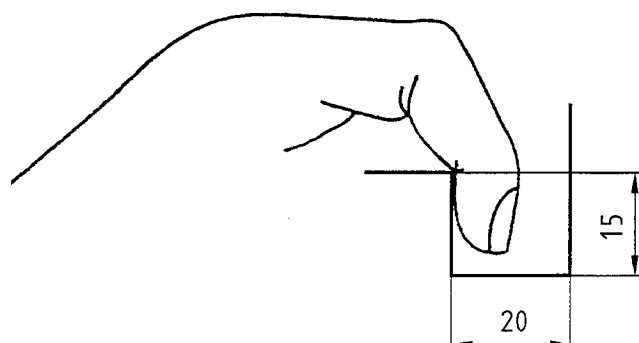
The cross section of any component designed to be gripped shall have in any direction, when measured across its centre, a dimension not less than 16 mm and not more than 50 mm.

4.3.3 Grasp

The thickness of any component designed to be grasped shall have a width not exceeding 60 mm.

4.3.4 Finger hold

The minimum space for clutching shall be 15 mm high and 20 mm wide (see figure 3).



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Figure 3: Finger hold

4.4 Surfaces

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4.4.1 Surface finishing

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The surface finishing of the equipment shall be non-splintering.

All welds shall be finished smooth.

Rough surfaces should not present any risk of injury.

4.4.2 Surface materials

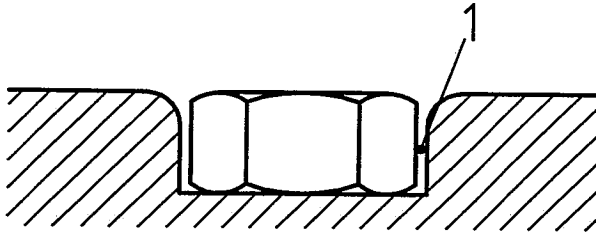
The materials in contact with the water shall have no detrimental effects on its quality and shall be fit for their purposes.

4.5 Protrusions

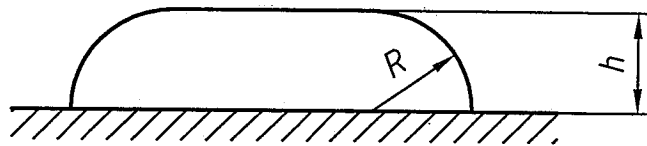
Protrusions are a hazard of impact and/or clothing entrapment especially where water movement may cause involuntary movement of users.

Protrusions with a height $h \leq 10$ mm, not shielded by adjacent areas, as shown in figure 4a), shall be rounded with a radius $R = h$, see figure 4b).

Protrusions with a height $h > 10$ mm, not shielded by adjacent areas, for the first 10 mm of projection shall be radiused as stated in the previous paragraph, and for the remaining projection shall have a maximum inclination of 45°, tangentially connected, see figure 4c).

**Key**

- 1 Free space see entrapment requirements
a) Example of protrusion shielded by adjacent areas



- b) Example of protrusion ≤ 10 mm



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- c) Example of protrusion > 10 mm

Figure 4: Protrusions

4.6 Edges and corners

Edged and corners within the minimum zone shall be radiused with a minimum radius of 3 mm. Where not possible, they shall be protected.

4.7 Moving parts

There shall be no crushing points or shearing points between moving and/or stationary parts of the equipment.

For gaps whose dimensions change during use of the equipment, three dimensional groups are accepted: 0 mm to 8 mm, 25 mm to 50 mm, 250 mm or more.

4.8 Protection against entrapment

4.8.1 General

Any opening not technically necessary should be closed or covered.

4.8.2 Entrapment of the head and neck

Equipment shall be constructed so that any openings do not create head and neck entrapment hazards either by head first or feet first passage.

NOTE: Examples of hazardous situations are:

- a) completely bound openings
- b) partially bound or V-shaped openings
- c) shearing or moving openings

Completely bound openings, which allow passage of the small probe (s), shall also allow the large probe to pass through, when tested in accordance with D.2.1

Partially bound and V-shaped openings shall be constructed so that either:

- a) the opening is not accessible when tested in accordance with D.2.2; or
- b) if accessible when tested in accordance with D.2.2:
 - the template apex contacts the base of the opening during the test (see figure D.4, a = passes); or
 - the template contacts the sides of the opening at a height of less than 600 mm above the ground (see figure D.4, b = fails).

4.8.3 Entrapment of fingers

Equipment shall be constructed so that any opening does not create finger entrapment hazards. Special attention shall be paid to:

- a) gaps
- b) open-ended tubes or pipes; and
- c) variable gaps.

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When tested in accordance with D.3.2, openings in reach of the user, where he is subjected to forced movement shall conform to one of the following requirements:

- 1) the 8 mm finger rod (see figure D.5) shall not pass through the minimum cross-section of the opening and the profile of the opening shall be such that the rod cannot be locked in any position when set in motion as given in D.3.2; or
- 2) if the 8 mm finger rod passes through the opening, the 25 mm finger rod (see figure D.5) shall also pass through the opening, provided that the opening does not permit access to another finger entrapment site.

The closures shall not be removable without using tools.

4.9 Suction

Suction from the swimming pool shall be avoided, unless the water speed in the proximity of the suction point is under all conditions $\leq 0,5$ m/s. Additionally at least one of the following requirements shall be met:

- a) a number of extraction points connected in parallel to each suction line and placed at a distance > 2 m;
- b) domed grids with perimetral suction;
- c) a gravity feed tank;
- d) single grids of a minimum area of 1 m^2

It is recommended to install at the deck level an accessible general emergency switch for the pumps.

NOTE 1: It's also recommended to install a vacuum detector, connected to the suction line between the pump and the suction outlet (see definition in prEN 13451-3:2000), which switches off the pumps in case the set point is overcome.

NOTE 2: See also Code of Practice 60.03 "Securing of discharge pipes against pressure forces" of Deutsche Gesellschaft für das Badewesen.

4.10 Slip resistance

Surfaces of the equipment, where the user can stand or walk on with bare feet and which can be tested in accordance with annex E, shall comply with table 1.

Table 1: Minimum angles to be obtained for specific surfaces

Surfaces of equipment	Rating group
– installed in horizontal pool areas from 800 mm to 1 350 mm water depth	12°
– installed in horizontal pool areas from 0 mm to 800 mm water depth – installed in up to 8° inclined pool areas from 0 mm to 1 350 mm water depth – installed in pool surrounding areas occasionally wetted	18°
– installed more than 8° inclined pool areas from 0 mm to 1 350 mm water depth – steps, starting platforms, treads of ladders and stepladders	24°

Surfaces of the equipment where the user can stand or walk with bare feet, which cannot be tested in accordance with Annex E, shall obtain a minimum coefficient of friction of 0,75, when tested in accordance with ISO 5904 : 1981.

4.11 Fixings

Fixings, either fixed or removable, shall be considered as integral part of the equipment and shall be subjected to the same safety requirements.

Fixings for removable equipment/items (e.g. starting blocks, etc.) shall be protected/covered by suitable tamper proof devices when the equipment/item is removed.

In case of reuse of existing installed fittings to secure new equipment, it is the responsibility of the contractor (supplier/manufacturer/installer of the new equipment) to check their suitability.

4.12 Protections

Where protections are used to prevent risks (e.g. cover plates for fixings not in use, grids for suction outlets) they shall not be removable without the use of tools or of tamper proof techniques.

4.13 Alteration of existing equipment

In case of alteration/partial reuse of existing equipment, who alters the equipment (manufacturer, supplier, installer, operator) is responsible for the compliance of the complete modified equipment to this standard.