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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

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

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ICS:

97.220.10 Športni objekti

Sports facilities

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EUROPEAN STANDARD
NORME EUROPÉENNE
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September 2011

ICS 97.220.10

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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 29 July 2011.

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Foreword

This document (EN 13451-1:2011) has been prepared by Technical Committee CEN/TC 136 "Sports, playground and other recreational facilities and 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of an identical text or by endorsement, at the latest by March 2012, and conflicting national standards shall be withdrawn at the latest by September 2012.

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

This document supersedes EN 13451-1:2001.

EN 13451, *Swimming pool equipment*, consists of the following parts:

- *Part 1: General safety requirements and test methods*
- *Part 2: Additional specific safety requirements and test methods for ladders, stepladders and handle bends*
- *Part 3: Additional specific safety requirements and test methods for inlets and outlets and water/air based water leisure features*
- *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 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*

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

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

In relation to EN 13451-1:2001 the following main amendments have been made:

- a) scope modified in accordance with EN 15288-1 and EN 15288-2;
- b) definition pool/swimming pool deleted;
- c) requirements for materials (see 4.1.2) added;
- d) requirements for barriers (see 4.3) added;

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- e) requirements for suctions deleted and will be moved to EN 13451-3;
- f) requirements for entrapment, crushing and shearing points (see 4.7) added;
- g) requirements for the test report (see 5.2) modified;
- h) values of total vertical user load (see Table A.1) modified;
- i) only two test probes for the test methods of head and neck entrapment (see Annex D);
- j) normative Annex F "Alternate method for the determination of resistance to slipping" added;
- k) normative Annex G "Use of stainless steel with load bearing functions in the swimming pool atmosphere" added.

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies general safety requirements and test methods for equipment used in classified swimming pools as specified in EN 15288-1 and EN 15288-2.

Where specific standards exist, this general standard should 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

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 1990, *Eurocode — Basis of structural design*

EN 1991-1-2, *Eurocode 1: Actions on structures — Part 1-2: General actions — Actions on structures exposed to fire*

EN 1991-1-3, *Eurocode 1: Actions on structures — Part 1-3: General actions — Snow loads*

EN 1991-1-4, *Eurocode 1: Actions on structures — Part 1-4: General actions — Wind actions*

EN 10088-1, *Stainless steels — Part 1: List of stainless steels*

EN 10088-2, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*

EN 12503-1, *Sports mats — Part 1: Gymnastic mats, safety requirements*

EN 12503-5, *Sports mats — Part 5: Determination of the base friction*

EN 12503-6, *Sports mats — Part 6: Determination of the top friction*

EN 15288-1, *Swimming pools — Part 1: Safety requirements for design*

EN ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15288-1 and the following apply.

3.1

swimming pool equipment

components installed in and around a basin, designated:

- to operate the basin and its functionally adjoining areas;
- to use it and its functionally adjoining areas

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NOTE These components can be part of the swimming pool technology (e.g. water inlets or outlets), to assist the users (e.g. ladders), or for competitive and training use (e.g. starting platforms), or for leisure (e.g. fountains).

**3.2
crushing point**
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

[EN 1176-1:2008, 3.10]

**3.3
shearing point**
place where part of the equipment can move past a fixed or other moving part, or past a fixed area so that persons, or parts of their body, can be cut

[EN 1176-1:2008, 3.11]

**3.4
grip**
holding of the hand around the entire circumference of a support

NOTE See Figure 1.



Figure 1 — Grip

[EN 1176-1:2008, 3.15]

**3.5
grasp**
holding of the hand around part of the circumference of a support

NOTE See Figure 2.

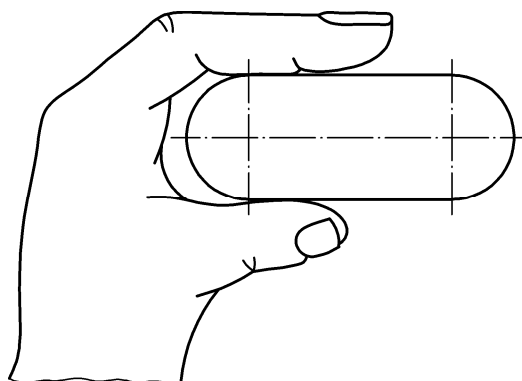


Figure 2 — Grasp

[EN 1176-1:2008, 3.16]

**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, the hair or clothing can become trapped

NOTE Entrapment hazard can arise from situations where the body, its parts, etc. get trapped, but also from situations where the body of the user has no complete freedom to emerge from the water, e.g. when swimming underneath a stepladder.

**3.8
edge**

line being formed by two surfaces of something solid which meet one another

**3.9
corner**

point being formed by two or more edges which meet one another

**3.10
minimum space**

smallest space required for the safe installation and use of the equipment

**3.11
minimum zone for use**

minimum space required for anyone who may come into contact with equipment

**3.12
protrusion**

object, or a portion of an object, that stands or protrudes in/into the minimum zone for use

**3.13
handrail**

rail intended to assist the user to balance

[EN 1176-1:2008, 3.21]

**3.14
barrier**

means of segregation to prevent movement or access

EN 13451-1:2011 (E)**3.15****safety barrier**

barrier designed to prevent users from falling over, through or beneath

3.16**slit**

small opening < 8 mm, where entrapment is possible, which can cause a risk of drowning

3.17**grid**

component to cover an overflow channel or an opening, designed to allow the passage of water

4 Safety requirements**4.1 Structural integrity****4.1.1 General**

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

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

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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.

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

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

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

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

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 need not 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.

4.1.2 Materials**4.1.2.1 General**

Any material may be used provided it is fit for purpose, also considering the particular characteristics of the swimming pool environment (e.g. oxidizing atmosphere, humidity, ageing).

Where stainless steel is used, see 4.1.2.2, and where plastic material is used, see 4.1.2.3.

Risk assessment should be developed according to EN ISO 12100.

4.1.2.2 Use of stainless steel

As stress corrosion cracking may affect stainless steel in the swimming pool atmosphere, wherever the use of stainless steel is considered a design risk assessment shall be carried out.

For the selection and use of stainless steel with safety critical load bearing function in the swimming pool atmosphere, see Annex G.

4.1.2.3 Use of plastic

Wherever the risk assessment identifies possible hazards for users in case of progressive degradation of plastic components, appropriate actions shall be taken (e.g. stating a maximum life span, necessity of periodical inspection).

Wherever the design risk assessment identifies the possibility of fracture or failure due to degradation, the component shall be subject to continuing risk assessment.

NOTE For a possible ageing test see NF T 54-405-1.

4.2 Minimum space

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

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4.3 Handrails, barriers, safety barriers

4.3.1 Handrails

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Handrails for general use shall be not less than 800 mm and not more than 1 100 mm above the foot position. Handrails designed for children only shall be not less than 600 mm and not more than 850 mm above the foot position.

4.3.2 Barriers

The design of the barriers shall not encourage the users to stand or sit on them and shall prevent climbing.

Barriers may be in form of gratings, full faced panels or walls.

NOTE The design should consider the visual needs connected with the use of the facility.

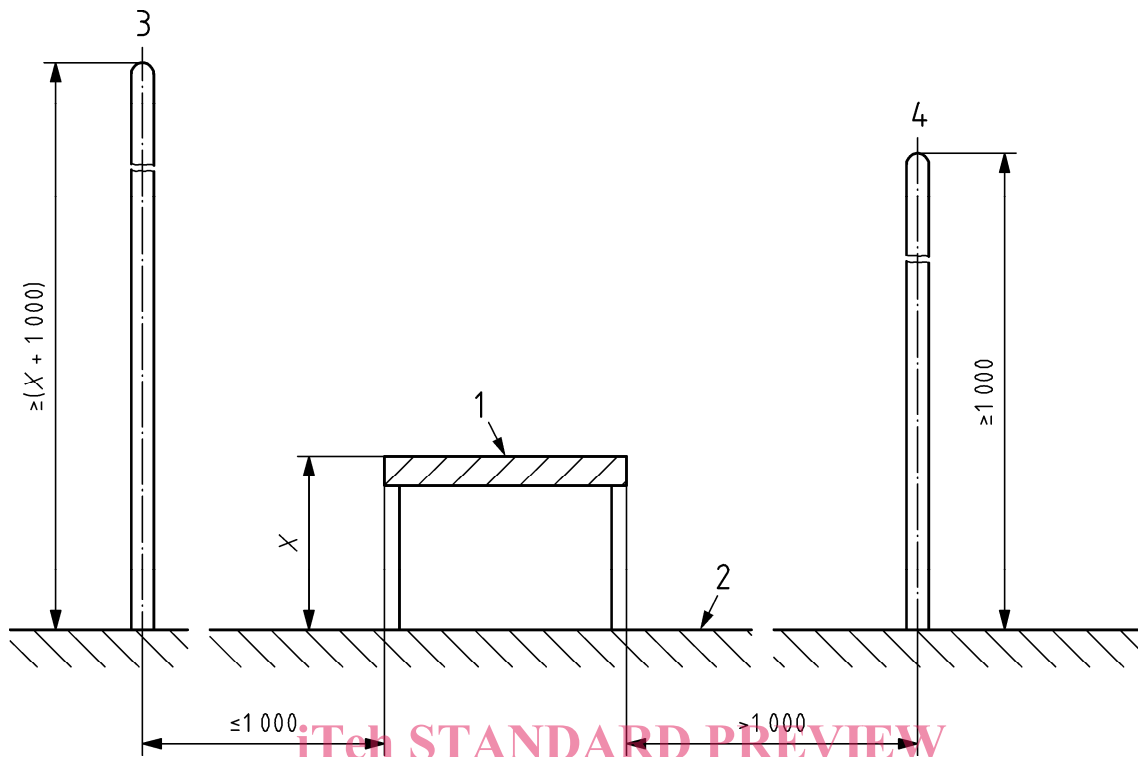
4.3.3 Safety barriers

Safety barriers shall be used to prevent users from falling from heights > 600 mm, except in situations where a risk assessment shows that a safety barrier is not necessary.

Gaps shall have a width \leq 110 mm and where two or more safety barriers are used in combination (e.g. ladder, stair and platform) the safety barrier shall be designed to give continuous protection.

Safety barriers shall have a height \geq 1 000 mm, measured from the highest point on which a person can stand within 1 000 mm from the barriers themselves, see Figure 3.

Dimensions in millimetres

**Key**

- 1 highest standing point
- 2 platform
- 3 safety barrier within 1 000 mm from a higher standpoint
- 4 safety barrier outside 1 000 mm from a higher standpoint
- 3, 4 are different possibilities for placing barriers
- X height of highest point on which a person can stand

Figure 3 — Height of the safety barriers**4.3.4 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.

4.3.5 Grasp

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

4.3.6 Finger hold

The minimum space for clutching shall be at least 15 mm high and at least 20 mm wide. For an example, see Figure 4.

EXAMPLE

Dimensions in millimetres

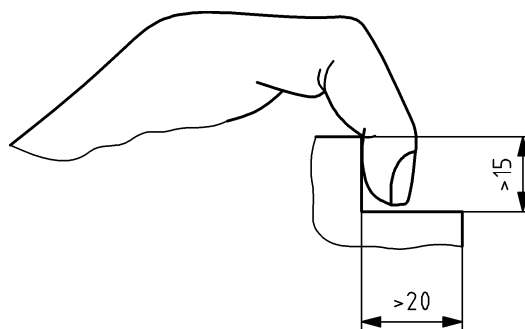


Figure 4 — Finger hold

4.4 Surfaces

4.4.1 Surface finishing

The surface finishing in the minimum zone for use shall not present any risk of injury. Special attention shall be paid to:

- the finishing of welds;
- the risk of splintering.

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4.4.2 Surface materials

The materials in contact with the water shall have no detrimental effect on its quality and shall be fit for purpose.

4.5 Protrusions

NOTE Protrusions are a hazard of impact or entrapment especially where water movement can cause involuntary movement of users.

Protrusions with a height $h \leq 3$ mm, not shielded by adjacent areas as shown in Figure 5 a), shall be rounded with a radius $R > h/2$ or chamfered in accordance with Figure 5 b).

Protrusions with a height $h > 3$ mm to ≤ 15 mm, not shielded by adjacent areas, as shown in Figure 5 a), shall be rounded with a radius $R \geq 3$ mm. See Figure 5 c).

Protrusions with a height $h > 15$ mm, not shielded by adjacent areas or additional measures (e.g. handles for counter-flow plants), for the first 15 mm of projection shall be radiused as stated in the previous paragraph, and for the remaining projection shall have an inclination of $< 45^\circ$, tangentially connected. See Figure 5 d).