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Oprema za plavalne bazene - 3. del: Dodatne posebne varnostne zahteve in preskusne metode za bazenski pribor za pripravo vode, vgrajen v javne bazene

Swimming pool equipment - Part 3: Additional specific safety requirements and test methods for inlets and outlets and water/air based water leisure features installed in pools for public use

Schwimmbadgeräte - Teil 3: Zusätzliche besondere sicherheitstechnische Anforderungen und Prüfverfahren für Ein- und Ausläufe sowie Wasser-Luftattraktionen

Équipement de piscine - Partie 3 : Exigences de sécurité et méthodes d’essai complémentaires spécifiques aux pièces d’aspiration et de refoulement et aux équipements de loisirs aquatiques disposant d’introduction et d’extraction d’eau/d’air, installés dans les piscines destinées à un usage public

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

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European foreword

This document (EN 13451-3:2022) 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of an identical text or by endorsement, at the latest by December 2022, and conflicting national standards shall be withdrawn at the latest by December 2022.

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 13451-3:2011+A3:2016.

The series EN 13451 *Swimming pool equipment* consists of:

— *Part 1: General safety requirements and test methods for equipment installed in pools for public use*;

— *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 installed in pools for public use*;

— *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*.

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, Turkey and the United Kingdom.

1 Scope

This document specifies safety requirements and test methods for inlets and outlets for water/air and water-/air-based leisure features involving water movement, in addition to the general safety requirements of EN 13451-1.

The requirements of this specific standard take priority over those in EN 13451-1.

This part of EN 13451 is applicable to swimming pool equipment installed in pools for public use designed for:

— the introduction and/or extraction of water for treatment or leisure purposes;

— the introduction of air for leisure purposes;

— water leisure features involving the movement of water.

NOTE The above items are identified with the general term devices.

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 1069-1, *Water slides — Part 1: Safety requirements and test methods*

EN 13451-1:2011+A1:2016, *Swimming pool equipment - Part 1: General safety requirements and test methods*

EN 15288-2, *Swimming pools for public use - Part 2: Safety requirements for operation*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13451-1 [1] and the following apply.

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

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
floor inlet
device designed to be installed into the pool floor for introducing water/air in the pool

[1] Impacted by EN 13451 1:2011+A1:2016.

3.2
wall inlet
device designed to be installed into the pool wall for introducing water/air in the pool

3.3
floor water outlet
device designed to be installed into the pool floor, for the extraction of water, by gravity or by suction

3.4
wall water outlet
device designed to be installed into the pool wall for the extraction of water, by gravity or by suction

3.5
sump
vessel between the suction outlet grille and the suction outlet piping, manufactured or field built

3.6
skimmer
device designed to skim the uppermost layer of water only and return it to the filtration system

3.7
overflow channel
channel to take in the overflowing water of the related basin, as part of the filtration circuit

Note 1 to entry: An overflow channel may be located, e.g. at deck level; built into the basin wall.

3.8
grille
<swimming pool equipment> component to cover any opening, designed to allow the passage of water and/or air

EXAMPLE A grille may be an inlet grille, an outlet grille, an overflow channel grille, a deck level channel grille.

3.9
cover
<swimming pool equipment> protection device or assembly that separates the user from hazards caused by an opening

3.10
water speed
water flow through velocity in the open cross section of an opening

3.11
air speed
air flow through velocity in the open cross section of an opening

3.12
open cross section
sum of all single open sections as designed, through which the corresponding flow rate can flow

3.13
water operated leisure feature
feature intended for playing and/or relaxing, formed as a result of water, being emitted either into or from a swimming pool

EXAMPLE Waves, water cannons, rain sprays, waterfalls, mushrooms and rapid rivers.

3.14
air operated leisure feature
feature intended for playing and/or relaxing formed as a result of air, being emitted into swimming pool water

EXAMPLE Geysers, bubble seats.

3.15
air and water operated leisure feature
feature intended for playing and/or relaxing formed as a result of air and water, being concurrently emitted into or from a swimming pool

EXAMPLE Hydromassages.

3.16
integrated swim jet system
device that incorporates suction outlet and inlet in a single housing that is designed to move a large volume of water at high velocity one directional

3.17
gravity feed tank
tank that is filled by pool water flowing by gravity only, intended as a separation element between the pool and the suction pump(s)

3.18
vacuum release system
system or device capable of providing vacuum release at a suction outlet in case of a high vacuum occurrence due to suction outlet flow blockage

3.19
vortex pool
pool characterised by swirling water movement

3.20
suction group
system of more than one pump with suction inlets that are hydraulically connected by a collector

3.21
nominal flow rate
water flow rate specified by the pool hydraulic systems designer to optimize the installation operation

4 Safety requirements

4.1 General

As the components defined in Clause 3 are integral parts of an overall system, special attention shall be paid to the system design criteria, especially taking into consideration the interaction between different components.

Where leisure water features are created by the introduction of air and/or water under pressure into the pool water, the safety of the users shall be provided by means of a risk assessment according to EN 15288-2, including consideration of their design, location, method of operation, warning signals and supervision (see also EN 17232 concerning water play equipment and features).

4.2 Structural integrity

4.2.1 Floor inlets

Floor inlets shall be tested for:

— vertical load and deformation, according to 5.2.2;

— horizontal load and deformation, if applicable, according to 5.2.3;

— point load according to 5.2.4;

— shear load, if applicable, according to 5.2.5.

4.2.2 Wall inlets

Wall inlets shall be tested for:

— horizontal load and deformation, if applicable, according to 5.2.3;

— point load according to 5.2.4;

— shear load, if applicable, according to 5.2.5.

4.2.3 Floor and wall water outlets

Floor and wall water outlets shall be tested for:

— vertical load and deformation, according to 5.2.2;

— horizontal load and deformation, if applicable, according to 5.2.3;

— point load according to 5.2.4;

— shear load, if applicable, according to 5.2.5;

— vacuum and point impact according to 5.2.6;

— hair entrapment in accordance with 5.3.

4.2.4 Grilles

4.2.4.1 General

Grilles and their substructure shall be designed to withstand the load according to EN 13451-1:2011+A1:2016, A.2.2 related to their shape (point, line or area load).

If grilles are not subject to users' loads, then A.2.2 does not apply.

Floor grilles shall be tested for vertical and horizontal loads, deformations and point load, in accordance with 5.2.2, 5.2.3, and 5.2.4. Grille parts of floor inlet or outlet are already covered with 4.2.1.

Wall grilles shall be tested for horizontal load, deformation and point load, in accordance with 5.2.3 and 5.2.4. Grille parts of wall inlet or outlet are already covered with 4.2.2.

If applicable, 5.2.5 and 5.2.6 shall also apply.

In case of manufactured substructures (e.g. overflow channel) also the complete assembly of grill and substructure shall be tested for vertical load and deformation in accordance with 5.2.2.

4.2.4.2 Grilles for overflow channels

Grilles made up from separate elements shall remain interconnected under conditions of use.

Grilles shall be designed to remain in position and to prevent their movement when subject to normal conditions of use.

4.2.5 Skimmer weir

As the floating weir is an essential component for skimming the uppermost layer of the water only, it shall be always properly working. It shall be removable only by intentional manoeuvre or with the use of tools.

4.2.6 Skimmer top covers

If the upper part of the skimmers and/or their top cover are placed in a walkable area, it shall be designed to withstand the load according to EN 13451-1:2011+A1:2016, A.2.2. Lids shall be removable only by intentional manoeuvre or with the use of tools.

Skimmer top covers shall be tested for vertical load and deformation according to 5.2.2.

4.2.7 Overflow channels

When the overflow channel is designed to be covered by a grille, the supporting structure of the grille shall withstand the same load as the grille itself.

Overflow channels shall pass the vertical load and deformation test in accordance with 5.2.2.

4.3 Water speed at inlets

The water speed at inlets shall be ≤ 15 m/s, except for vertical injection from the swimming pool floor in water depth < 700 mm, where it shall be ≤ 2 m/s.

NOTE Typical values of water speed are:

— inlet for circulation for water treatment purposes: ≤ 4 m/s;

— water leisure features (e.g. hydromassages, swim jets and cannons) ≤ 15 m/s.

For water speed test see Annex A.

4.4 Hair entrapment

Wall and floor water outlets shall pass the hair entrapment test in accordance with 5.3.

4.5 Slip resistance of grilles

Slip resistance of any walkable grilles shall comply with the requirements in accordance with EN 13451-1:2011+A1:2016, Table 1.

4.6 Risk of suction entrapment

4.6.1 General

Suction systems either with suction pumps or gravity tanks shall be designed and installed so as to reduce the potential for entrapment of the user.

Water speed at outlets shall be ≤ 0,5 m/s.

NOTE 1 There is a direct correlation between the risk of suction and hair entrapment and high water speeds through outlets. It is advised to keep water speed as low as possible, taking into consideration hydraulic technical requirements (e.g. avoid stagnation).

Valves fitted on pipes connecting suction outlet(s) to pump(s) shall not be accessible to unauthorized people (users and inexperienced staff).

The water speed is obtained with the following formula:

$$v = \frac{Q}{A}$$

Where:

— v is the water speed calculated through any openings of the suction grille, in metres per second;

— Q is the flow rate measured in the pipe connected to the suction grille, in cubic metres per second;

— A is the total free openings surface of the suction device grille, provided by the manufacturer of the suction device grille, in square metres.

NOTE 2 It is advised to take into account a safety factor for debris and construction tolerances when considering the free opening surface of the grille.

Additionally at least one of the either a) or b) shall be met:

a) in case of suction outlet systems with only one grille, suction outlet shall be designed in such a way that:

   1) only single grilles with a surface of the area circumscribed to the suction openings ≥ 1 m² (see Figure 2) are allowed, or

   2) A rectangular template representing an adult torso sized 65,5 cm × 36,0 cm, with 4x50mm radius corners shall not cover more than 50 % of the free projected suction surface, with any orientation of the template. In that case, the water speed at the remaining free opening surface shall not exceed 0,8 m/s (see Figure 1).

b) when more than one suction outlet is connected to a single pump (or single suction group) or gravity feed tank, suction outlets shall be designed in such a way that:

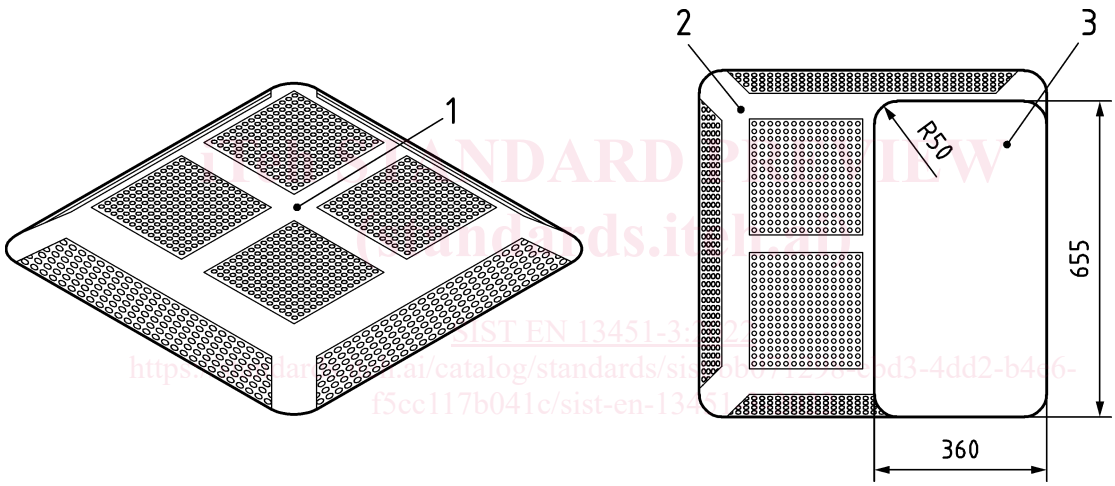
1) the distance between the nearest points of the perimeters of the devices is ≥ 2 m, and;

2) at least 50 % of the open cross section, connected to the same pump (or single suction group) remains not covered when applying a rectangular template representing an adult torso sized 65,5 cm x 36,0 cm, with 4 corners of 50 mm radius on any suction outlet (see Figure 1), and;

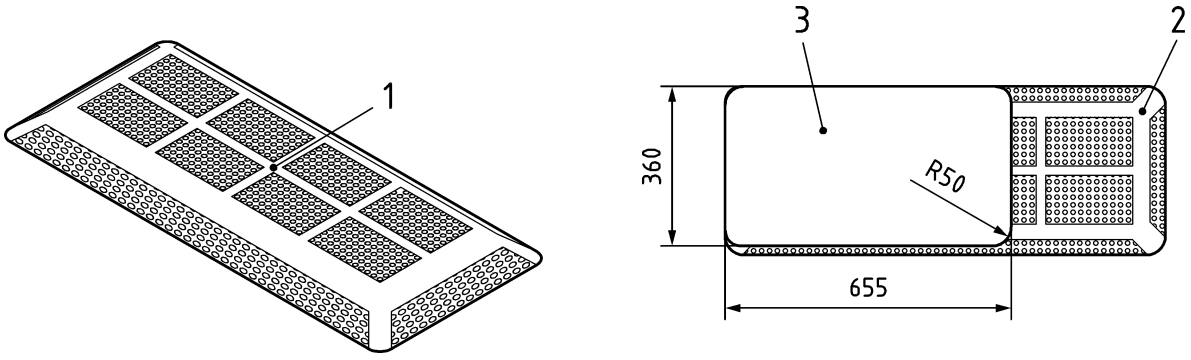
3) if any one of the suction outlet becomes blocked, the entire hydraulic system connected to the remaining suction outlets shall be designed to accommodate 100 % of the nominal flow rate. In this case the water speed at the remaining outlets shall not exceed 0,8 m/s. The flow and the pressure loss in the hydraulic system shall be taken into account.

NOTE 3 This requirement is to prevent a suction entrapment risk from being created in the hydraulic system in the event one of the outlets gets blocked.

Dimensions in millimetres



a) Pass, less than 50 % of the projected open cross section is covered (dome shaped)



b) Fail, more than 50 % of the projected open cross section is covered (dome shaped)