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Plavajoči pripomočki za učenje plavanja - 1. del: Varnostne zahteve in preskusne metode za plavajoče pripomočke, ki se oblečejo

Buoyant aids for swimming instruction - Part 1: Safety requirements and test methods for buoyant aids to be worn

Auftriebshilfen für das Schwimmenlernen - Teil 1: Sicherheitstechnische Anforderungen und Prüfverfahren für am Körper getragene Auftriebshilfen

Aides à la flottabilité pour l'apprentissage de la natation - Partie 1 : Exigences de sécurité et méthodes d'essai pour les aides à la flottabilité portées au corps

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97.220.40	Oprema za športe na prostem in vodne športe	Outdoor and water sports equipment

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This European Standard was approved by CEN on 18 July 2021.

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European foreword

This document (EN 13138-1:2021) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand and arm protection and lifejackets”, 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of an identical text or by endorsement, at the latest by April 2022 and conflicting national standards shall be withdrawn at the latest by April 2022.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 13138-1:2014.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

Annex N provides details of significant technical changes between this European Standard and the previous edition EN 13138-1:2014.

EN 13138, *Buoyant aids for swimming instruction* consists of the following parts dealing with buoyant swimming devices for swimming instructions for the various stages of the learning process:

- *Part 1: Safety requirements and test methods for buoyant aids to be worn*
- *Part 2: Safety requirements and test methods for buoyant aids to be held*
- *Part 3: Safety requirements and test methods for swim seats into which a user is positioned*

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.

0 Introduction

0.1 Design and materials

The entire process of learning to swim is considered to include two stages:

- getting familiar with the water environment and movements in it, and
- acquiring skills in standard swimming strokes.

Buoyant aids for swimming instruction (in brief: swimming device(s)) are intended to assist users (in particular children) to learn to swim. The design and purpose of the swimming devices are related to the above stages.

Swimming devices are intended to give the user positive buoyancy in the water while maintaining the correct body position for swimming. However, it should not be assumed that standard conformity of the swimming devices will by itself eliminate the risk of drowning as this depends also on the behaviour of the user and any supervision.

Although this document sets performance requirements to ensure that swimming devices perform appropriately, it is essential that the swimming devices are used correctly and under constant and close supervision. It is important to ensure that they are securely fitted to the appropriate size of user and that when correctly fitted, they cannot become displaced. Swim seats however should allow immediate escape in case of capsizing. Therefore, the use of these swimming devices is recommended to be restricted to water out of standing depth of the user.

The highest degree of protection against drowning can only be achieved by using lifejackets. It is essential that there is a clear distinction between rescue intended to preserve life and those which are intended only to assist buoyancy for the user when learning to swim. As swimming devices are not life preservers, they should only be used in swimming pools and other situations free from current, tides and waves.

The bulk storage of some types of swimming devices could, under certain conditions, result in a potential fire hazard. The perceived risk of such a hazard was evaluated against the actual risk to the user from materials treated with certain known toxic fire-retardant chemicals. However, the fire hazard is less of a problem to the user than the risk associated with the swimming devices being put in the mouth, especially by children. For this reason, flammability requirements are not included in this document.

For the above reasons and to differentiate these swimming devices from aquatic toys, advisory safety measures, including marking, warning notices and user instructions are included in this document.

The range both of the design and function of buoyant aids for swimming instruction varies considerably and for this reason, the standard for swimming devices has been prepared in three parts, namely products that are intended to allow the user to become familiar with water (passive user), products that are worn (active user) and those products that are held by the user to improve swimming strokes.

- Part 1 of this series is only for products that are securely attached to the body (Class B swimming devices = for an active user). They are intended to introduce the user to the range of swimming strokes.
- Part 2 of this series is for products that are held either in the hands or by the body (class C swimming devices = for an active user) and are intended to assist with improving specific elements of the swimming stroke. For adult beginners or more advanced users they can also be used for further stages of the process to learn to swim.
- Part 3 of this series deals only with products (swim seats) to assist children up to 36 months in their first attempts to learn to swim (i.e. to get familiar with the —in-water-environment) and moving through it. The child is positioned inside the buoyant structure, which provides buoyancy and lateral support to the body, thereby keeping the child's head above water level (class A swimming devices = for a passive user).

Swim seats allow young children to experience the water environment and being moved through it. Movements of lower limbs and arms are possible. The use of swim seats does however not replicate any form of a correct swimming stroke.

Swim seats complying with this document provide a stable, floating position for a child sitting in the swim seat and avoid entrapment in case of capsizing. Children in swim seats do however require very close parental supervision. Overload beyond specified body mass, breaking waves and violent external forces are remaining risks that can cause capsizing. Use of these swimming devices in water that is of the child's standing depth will increase the risk of capsizing and will hinder or block the escape from the seat in case of emergency.

0.2 In-water performance

Over more than two decades of standardization work in this field it was not possible to establish test methods to verify "Buoyant Aids for Swimming Instruction" with regard to their in-water performance. Do they provide help when learning to swim? Is a user supported in a way that he/she can adopt easily the optimal floating angle for chest strokes? Which type is best for what category of users? Do swimming devices prevent a passive user from sinking unstoppable to the ground? With regard to babies, infants and young children all these questions could only be estimated but never objectively measured. In-water tests were only possible with school kids and even here the behaviour of young children cannot be considered as "standard-test-method"-conform.

With this edition these problems have been solved. All above mentioned crucial parameters can be measured objectively. The allocation of a type of swimming device to a user group — defined by body weight and body size — can be based on objective performance data. Tests given prove: Due to their comparatively heavy heads, babies and infants are the most demanding users. The centre of gravity — in particular when immersed — is positioned high on the body, i.e. "top-heavy". Moreover, there is little space on the tiny bodies to attach a swimming device above the immersed centre of gravity so that a positive torque can be applied to support the heavy heads. These problems decrease with increasing age/weight/body size. The increased body height stretches the space to attach swimming devices on the torso and lowers the centre of gravity. The influence of head weight in relation to body weight gets smaller and smaller. A swimming device can be positioned close to the chest and even to the belly area without losing the desired support when learning to swim.

The performance criterion of a swimming device is the floating angle of the wearer achieved by it and not any longer only its buoyancy value alone. Prevention from sinking of the wearer is measured as freeboard at back head. The performance unit is the so-called TLC (turning lifting capacity) of a swimming device. It is measured in angle degrees. A positive value means that the upper body of smaller persons (children with less than 30 kg body weight) is lifted and supported. To reproduce the top heaviness of small children the test manikins are calibrated to a negative sinking angle. Manikins representing older users are calibrated to only -10° and finally to 0° for persons above 30 kg body weight. In all these above cases it is important that the swimming device does not generate a downwards torque. The natural sinking angle persons above 30 kg body weight and normal body-built is however positive, i.e. they sink feet first, buoyancy conditions change.

The manikin tests specified in this document end with the age/weight group of 6 to 7 years and 30 kg. From this size on anthropometrical circumstances and behavioural capabilities offer the option to carry out testing with human test subjects also the child age 7 to 14 years. The human tests subjects are requested to behave like the manikins and simulate a passive user. The reason for this is that a standard test method striving for objective and reproducible product related performance measurements has to eliminate subjective factors. Not the skills of a user to handle a product are needed to be measured but solely the product properties and their performance data.

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All test conditions simulate a worst-case situation, i.e. a passive user. The manikin's head however is immersed and receives buoyancy during all tests. In practice, children still struggle to generate sufficient dynamic buoyancy to keep the head above water and to move forwards. Swimming aids are no life preservers, they do not protect against drowning. But they help and give a certain protection without releasing the user from the efforts when learning to swim.

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1 Scope

This document specifies safety and in water performance requirements for construction, sizing, marking and information supplied by the manufacturer for swimming aids intended to ensure a degree of buoyancy to assist beginners with movement through the water while learning to swim or while learning part of a swimming stroke. It also gives methods of test for verification of these requirements.

This document applies only to swimming devices that are designed to be worn, to be securely attached to the body and which have either inherent buoyancy or can be inflated. It only applies to class B swimming devices intended to introduce the user to the range of swimming strokes.

It does not apply to class A or class C swimming devices, to pull buoys, swim rings, lifebuoys, buoyancy aids, lifejackets or aquatic toys.

This document is not applicable for products known as 'baby neck rings' aiming to keep the user's airways above the water level.

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 71-1:2014+A1:2018, *Safety of toys — Part 1: Mechanical and physical properties*

EN 20105-A02:1994, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour (ISO 105-A02:1993)*

EN ISO 105-E03:2010, *Textiles — Tests for colour fastness — Part E03: Colour fastness to chlorinated water (swimming-pool water) (ISO 105-E03:2010)*

EN ISO 105-E04:2013, *Textiles — Tests for colour fastness — Part E04: Colour fastness to perspiration (ISO 105-E04:2013)*

EN ISO 105-X12:2016, *Textiles — Tests for colour fastness — Part X12: Colour fastness to rubbing (ISO 105-X12:2016)*

EN ISO 216:2007, *Writing paper and certain classes of printed matter — Trimmed sizes — A and B series, and indication of machine direction (ISO 216:2007)*

EN ISO 3696:1995, *Water for analytical laboratory use — Specification and test methods (ISO 3696:1987)*

EN ISO 7010:2020, *Graphical symbols — Safety colours and safety signs — Registered safety signs (ISO 7010:2011, Corrected version 2020-06)*

EN ISO 25649-1:2017, *Floating leisure articles for use on and in the water — Part 1: Classification, materials, general requirements and test methods (ISO 25649-1:2017)*

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

3 Terms and definitions

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

ISO and IEC maintain terminological 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

buoyancy

resultant upthrust of a swimming device when totally submerged in fresh water with its uppermost part just below the water surface

3.2

inherent buoyancy

upthrust provided by material which is less dense than water or by sealed chambers that are not inflatable and are filled with air or gas

3.3

buoyant aid for swimming instruction

garment or swimming device which when worn or held correctly will provide the buoyancy required to become familiar with movement through the water, assist with learning to swim or to improve swimming strokes

Note 1 to entry: in brief: swimming device(s)

3.4

minimum buoyancy

least buoyancy required by the standard

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3.5

original buoyancy

buoyancy (3.1) provided by a complete swimming device when first tested

3.6

class A swimming device

swimming device for children up to 36 months of age in which the child is in contact with the water positioned inside the buoyant structure so that it will keep the passive user in a stable floating position where the base of the chin is at or above the surface of the water

Note 1 to entry: This swimming device is intended to allow the user to become familiar with the water environment.

Note 2 to entry: For swimming devices class A for children above 36 months, see EN ISO 25649-4:2017.

3.7

class B swimming device

swimming device intended to be worn, to be securely attached to the body and to introduce the active user to the range of swimming strokes

3.8**class C swimming device**

swimming device intended to be held either in the hands or by the body and to assist with swimming strokes and/or improving specific elements of the strokes

3.9**swimming device intended to be worn**

swimming device having either inherent buoyancy or may be inflated to provide buoyancy and which is securely attached to the body in such a way that it cannot be accidentally be removed and so as to provide the user with buoyancy

3.10**swimming device intended to be held**

device held either in the hands or by the body and which provides buoyancy whilst it is being held by the user

3.11**conditioning**

process to which the complete swimming device is submitted that includes immersion in chlorinated swimming pool water and storage in cold and hot conditions and comprising a number of cycles, to simulate the conditions to which the swimming device is likely to be subjected in normal use and storage

3.12**component**

sub-group of the entire swimming device which contributes to either buoyancy, function or safety

3.13**swim seat**

buoyant swimming device intended to introduce the user to the aquatic environment and to build water confidence as a pre-requisite to learning to swim

Note 1 to entry: Swim seats provide safety for the user but do not guarantee protection against drowning.

Note 2 to entry: Swim seats are learning aids and not aquatic toys as defined in EN 71-1:2014+A1:2018.

3.14**swim seat system**

all integrated components (parts) of a swim seat which contribute to stable floating conditions and to safety during normal use or after a capsizing emergency

3.15**escape**

complete separation between the test dummy and the swim seat in case of a deliberate capsizing of the swim seat or swim seat system

3.16**assessment panel**

group of three people, all of whom are experienced in assessing buoyant swimming devices appointed to witness and assess the swimming device

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3.18

turning-lifting-capacity**TLC**

capability of a swimming device to turn the user's body into a specified floating angle and to lift him to a level where the body floats at least just on equal level with the water surface or above

Note 1 to entry: It is expressed as angle α between calibrated sinking angle and floating angle achieved by the device.

3.19

sinking angle

angle to which a test manikin is intentionally calibrated when hung on its centre of gravity and completely immersed under water

3.20

passive user

user who does not need to make conscious efforts to keep their airway above water level since this is achieved by the swimming device

3.21

active user

user who needs to make conscious efforts to keep their airway above water level since this is not achieved by the swimming device

3.22

freeboard

distance of the backhead of the manikin or of the test subject to the water level

Note 1 to entry: See Figure M.1, key F.

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4 Classification

Buoyant swimming devices shall be classified according to Table 1.

Table 1 — Classification of buoyant aids for swimming instruction

Class	Description
A	Buoyant swimming device in which the child is in contact with the water positioned inside the buoyant structure. This swimming device is intended to allow the user to become familiar with the water environment and movements through it. The swimming device will keep the passive user in a stable floating position so that the base of the chin is at or above the surface of the water
B	Buoyant swimming device intended to be worn, to be securely attached to the body and to introduce the active user to the range of swimming strokes.
C	Swimming device intended to be held either in the hands or by the body and to assist with swimming strokes and/or improving specific elements of the strokes

5 Safety Requirements concerning design and material

5.1 General

Construction of a buoyant swimming device shall be such that it corresponds in terms of design, dimensions, safety, strength and durability for its intended use. The requirements set out were chosen to ensure compliance with these considerations. Where buoyant swimming devices are provided in several components, the requirements apply to each of the components as specified in the relevant paragraphs below.

Buoyancy may be provided by inherent buoyancy materials, by inflatable chambers or by both. Where buoyancy is not inherent, components shall have a minimum of two independent chambers safeguarding function.

Class B swimming devices shall provide a stable floating position and prevent the user from sinking even if the air chamber most likely to cause failure has become deflated. Testing shall be in accordance with Clause 9. A swimming device shall be only class A or class B or class C.

For safety reasons and to assist in supervising children when in the water, the visible areas of these products when being used shall be clearly visible. For conspicuity, see 5.2.

The assessment panel shall agree, by at least a 2:1 majority or by unanimity, that the swimming device is visible.

5.2 Conspicuity

5.2.1 Requirement

The above-water area of swimming devices in use shall contrast to all 4 test backgrounds as specified in Annex G. The positive contrast assessment shall be made by at least the majority of the assessment panel.

The contrasting appearance can be achieved by the swimming device itself or by any other additional means providing contrast. If contrast is achieved by additional means they need to be securely fixed to the swimming device and withstand a pulling force of 50 N in the direction most likely to cause failure.

5.2.2 Testing

The above water area of the swimming device shall be marked during the performance tests according Clause 9 and consider the swimming device-manikin-combination and the swimming device human-subject-combination most likely to cause failure.

Testing shall be done according to Annex G.

5.3 Buoyancy

5.3.1 Buoyancy characteristics of the complete swimming device

When tested in accordance with the procedures in 5.3.3, the swimming device shall, with all of its buoyant components, have minimum buoyancy in accordance with Table 2. Where a dash (—) is shown in Table 2, this indicates that the swimming device is not appropriate for the type of user.

NOTE For illustration of class of swimming device, see Figure 2.

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