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Floating leisure articles for use on and in the water —

Part 1: Classification, materials, general requirements and test methods

Articles de loisirs flottants à utiliser sur ou dans l'eau —

Partie 1: Classification, matériaux, exigences et méthodes d'essai générales

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Foreword

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This document was prepared by Technical Committee ISO/TC 83, *Sports and other recreational facilities and equipment*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 136, *Sports, playground and other recreational facilities and equipment,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 25649-1:2017), which has been technically revised.

The main changes are as follows:

— update of the introduction;

— update of Clause 2;

— in Table 1, Class E[b], deletion of the exclusion indicated in footnote a) in the classification for “Not an aquatic toy”);

— addition of the new 4.2 for device with or without added component;

— modification of Figure 1;

— measurements in Figure 6 and Figure 7 updated to include buoyancy aid;

— in 5.5.2, modification of the maximum body weight for Subject 1 – male;

— in 5.12.2.1, modification of the test procedure;

— update of the Bibliography.

A list of all parts in the ISO 25649 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

0.1 Motives, problems, risk assessment, methods

Investigations in statistical data related to drowning accidents and near-drownings create a new awareness about the enormous relevance of drownings in many countries.

Drowning is among the ten leading causes of death of children and young people in the world. Due to the absence of precise data, there is no information on the relation between drowning accidents and the involvement of certain products. Such links can only be shown for a limited number of products among the wide range of products related to water activities. Consumer protection needs to rely on conclusions by risk analysis, experience and analogy to known cases. Considerations based on probability and the precautionary principle are also important in addressing the problem. Beyond the statistical deficiencies, relations between certain products and an increased risk of drowning are plausible. A risk analysis (see Table 1) shows in ISO 25649-3 to ISO 25649-7 what the partial and final risks are.

Until now, standardization has addressed the risks through a wide series of standards aiming at the protection against drowning and at covering products used in leisure activities on and in the water. There are standards covering the relevant products for activities such as playing in the water, water sports, boating, diving, learning to swim and even the emergency devices as buoyancy aids and life jackets. Beyond these traditional activities and products, there is an increasing tendency for creating and marketing new products. These aim to increase pleasure and entertainment on the water but also to increase speed, action and thrill with new activities such as “tubing” or “white water rafting”. Some new products are traditional core products that have been partially modified, some are derived from traditional products but have been further developed into something new. Additionally, there is a clear trend to bring formerly land-based playground equipment on the water. The use of the word “amphibiation” is justified as in many cases the original function of the product is maintained, i.e. the product can be used both on land and water. Typical examples for amphibiated products are modifications of inflatable boats into bathing rafts or the further development of the earlier swim-ring into a flotation seat. Other examples are inflatable trampolines, climbing installations on the water and inflatable floating armchairs and sun loungers including a mini bar and sun shade. This trend is clear and likely to continue.

The nature of these new products provides an equal or even higher risk potential than the original core products. In parallel, the number of these products override the number of core products. In cases of collective use, the frequency of use is considerably increased, which in turn increases the likelihood of accidents, including drownings. Drowning is the final risk of the activities related to the mentioned products. Other somewhat lesser evils – partial risks – are likely to happen independently or in combination with the final risk.

With regard to safety-related standardization, an evident discrepancy emerges between the core products and the huge number of new products forming what the experts call the “grey zone”. Standardization in the past has focused on the core products, while “grey zone products” have not been considered and investigated, thus remaining excluded from the scopes of related standards. A systematic risk analysis or an investigation of the role of these new products in drowning accidents was never made. This has changed in recent times, with the triggering incident being the swim seat case, involving aquatic toys and related products and negligence. Today, what matters more than a disturbing gap in the series of existing standards, is the presence of several coincidences:

— the main user groups of these products are children and adolescents who in turn are the main victims of drowning;

— the main areas where drowning happens are the same areas where such products are used (rivers, lakes, pools, bathing beaches);

— the risks can be easily identified and partly proven, and the increase in numbers and frequencies of accidents were already mentioned.

0.2 Equal risk, equal requirement

Safety-related standardization covering products used in leisure activities on and in the water aims at:

— achieving equality of technical rules from equality of risks (risk-/rule-alignment);

— closing the standardization gap (i.e. completeness);

— setting clear boundaries between the product areas in order to avoid incorrect certification (e.g. unjustified CE-Mark);

— avoiding individually established testing procedures by the various test houses in the absence of a unified technical rule.

0.3 Risks and need for prevention

The following are considerations around the risks and the need for prevention.

— Relevance of drowning is proven (age groups, places, partly product involvement).

— The increase in the frequency of use and in the number of products likely contributes to accidents.

— Theoretical risk analysis shows additional risks below the final risk of drowning.

— Plausibility and likelihood of harm to users is evident, so is the probability of adequate safety standards to avoid or minimize this.

— Positive contribution to the basic problem of parental supervision is needed and claimed with regard to children activities, but is often weak, not existing or neglected.

— Safety provided by a product design that ensures the highest possible level of technical security does not exempt parental supervision for young children.

— There is a trend to bring more and more former land-based products on the water, as well as trends to adventure activities increasing the thrill of water related leisure activities and entertainment.

— There is a need for prevention.

0.4 Body entrapment, human tests subjects and USA anthropometric data

This document includes test procedures based on human test subjects. The anthropometric data for the worst-case human test subject – the heaviest and biggest person representing the 95th percentile of a population – have been derived from European body measurement data. The international worst-case regarding body dimensions is constituted by the USA-population. The 95 % body weight for the USA population needs to be increased from 90 kg to 110 kg and the Body Mass Index (BMI) should be specified between 35 and 40. This corresponds to a body height of 170 cm to 175 cm. Accordingly, the rigid test probe needs to be modified.

Floating leisure articles for use on and in the water —

Part 1:
Classification, materials, general requirements and test methods

1 Scope

This document specifies general safety requirements and test methods related to materials, safety and performance for classified floating leisure articles for use on and in water.

This document is not applicable to:

— aquatic toys (use in shallow waters/use under supervision);

— inflatable boats with a buoyancy > 1 800 N;

— buoyant aids for swimming instructions;

— air mattresses that are not specifically designed or intended for use on the water (e.g. velour bed, self-inflating mattress and rubberized cotton air mattress);

— floating seats for angling purposes;

— surf sports type devices (e.g. body boards, surf boards, stand-up-paddles boards);

— water ski, wakeboard or kite surfing board;

— devices made from rigid materials e.g. wood, aluminium, hard or non-deformable plastic;

— devices that are kept in shape by permanent air flow;

— rings intended for use on water slides;

— wading 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.

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

ISO 105-A03:2019, *Textiles — Tests for colour fastness — Part A03: Grey scale for assessing staining*

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

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

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

ISO 868:2003, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*

ISO 1817:2022, *Rubber, vulcanized or thermoplastic — Determination of the effect of liquids*

ISO 2411:2017, *Rubber- or plastics-coated fabrics — Determination of coating adhesion*

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

ISO 25649-2:2024, *Floating leisure articles for use on and in the water — Part 2: Consumer information*

ISO 25649-3:2024, *Floating leisure articles for use on and in the water — Part 3: Additional specific safety requirements and test methods for Class A devices*

ISO 25649-4:2024, *Floating leisure articles for use on and in the water — Part 4: Additional specific safety requirements and test methods for Class B devices*

ISO 25649-5:2024, *Floating leisure articles for use on and in the water — Part 5: Additional specific safety requirements and test methods for Class C devices*

ISO 25649-6:2024, *Floating leisure articles for use on and in the water — Part 6: Additional specific safety requirements and test methods for Class D devices*

ISO 25649-7:2024, *Floating leisure articles for use on and in the water — Part 7: Additional specific safety requirements and test methods for Class E devices*

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

EN 13138-3:2021, *Buoyant aids for swimming instruction — Part 3: Safety requirements and test methods for swim seats into which a user is positioned*

EN 16051-1:2012, *Inflation devices and accessories for inflatable consumer products — Part 1: Compatibility of valves and valve adapters*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 16051-1:2012 and the following apply.

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

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

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

3.1
buoyancy
resultant upthrust of a body when totally submerged in water with its uppermost part just below the water surface

Note 1 to entry: For the purpose of measuring, the buoyancy of boats (see ISO 25649-7) is measured as the volume of any chamber which forms the inflatable hull, including *components* (3.4) that are permanently fixed to it. This buoyancy is measured by calculation or water filling and measuring the amount of water.

3.2
residual buoyancy
provision of remaining *buoyancy* (3.1) in case of a defect of any buoyancy chamber

3.3
inflatable system
device, including all its *components* (3.4), which ensure stable floating conditions and contribute to safety

3.4
component
subgroup of the entire device, integrated or detachable, that contributes to *buoyancy* (3.1), function and safety

3.5
protrusion
component (3.4) exceeding the base structure in height and thus contributing to wind drift of the device

3.6
static use
use that typically needs limited action from the user

Note 1 to entry: Product is mainly used for relaxing, sun bathing, lying, sitting, etc.

3.7
dynamic use
use during which the user is in full action

Note 1 to entry: Product is mainly used for activities such as jumping, climbing, rollicking (horse playing, rocking), sliding, swinging in and out from the water into or onto the inflatable, etc.

3.8
positional use
use of the product within a limited area

Note 1 to entry: The area where the product is used is supposed to be in safe proximity to the shore, pool edge, etc.

3.9
means of propulsion
devices used to generate the movements of a manually operated floating leisure article

EXAMPLE A paddle wheel, swing flipper, oar or paddle.

3.10
test panel
group of test subjects

3.11
conditioning
process to which the complete device is submitted prior to testing

3.12
load
human subjects and other items carried on or in an inflatable structure

3.13
floating stability
capability of a non-moving buoyant structure to withstand internal and external forces that tend to capsize it and to maintain a *stable floating position* (3.14)

Note 1 to entry: Internal forces leading to capsizing can result from uneven *load* (3.12) distribution, external forces leading to capsizing can result from wind or waves.

3.14
stable floating position
in-water position of a buoyant structure safeguarding upright floating and the on-board position of all passengers in sitting posture

3.15
reinforced material
material that consists of a basic fabric and a coated or laminated layer that ensures air tightness

4 Classification and criteria to distinguish floating leisure articles from aquatic toys

4.1 Classification

Floating leisure articles shall be classified by their intended use, means of propulsion and design as set out in Table 1.

Table 1 — Classification and criteria to distinguish floating leisure articles from aquatic toys

Class	Description/Structural design criteria	Not an aquatic toy because[b]:
A[a]	Floating leisure articles intended for quasi-static positional use on the water and position of user upon the buoyant structure. Single and collective use, mainly passive. Normally no mechanical means of propulsion, but possible. Some devices may be of design that provides floating stability; others do not and need to be balanced by the user. — Minimum age above 36 months. — The product use includes use in deep water.	— Largest uninflated dimension (D_L) exceeds 1,2 m; — provokes use in deep water; — due to size, product is at risk to be blown into open waters; — intended use includes adult users (according to the label); — product is not labelled as a toy; — product includes a body opening inside a circumferential buoyancy system around the user's body and thus a serious entrapment risk.
B[a]	Floating leisure articles intended for quasi-static use, but including a buoyant structure around the user's body (relatively tight fit), fully enclosing or with openings. Devices can provide a body holding system or user is expected to hold himself by the upper arms and hands. Body holding system might be an integrated seat, straps or other means of holding regardless of the body posture (sitting, standing, laying, kneeling etc.). User's body is more or less immersed. Normally the upper part (chest upwards) is out of the water. Single or collective / passive or active use. Normally no mechanical means of propulsion, but possible. — B1: use out of user's standing depth. — Minimum age / body weight variable, but above 36 months / 18 kg.	— Product includes a body opening inside a circumferential buoyancy system around the user's body and thus a serious entrapment risk; — for appropriate use of the product, water needs to be deeper than user's standing depth; — product is not labelled as a toy; — intended use includes adult users (according to the label); — use of product depends on deep water or use in deep water is foreseeable.
C[a]	Floating leisure articles for dynamic use, i.e. application at high speed. Position of user is upon or inside the buoyant structure. There can be a cockpit or seat or other means to give hold to the user. The device is towed behind external means of propulsion. Towing rope fixed to device or held by user. User is required to manage floating stability and safe course behind the towing devices. — C1: static use towable, static user. — C2: active sport use towable, active user, sport application. — C3: active extreme use towable, active user, extreme application. — Use beyond user's standing depth. — Minimum age variable, but above 6 years.	— Product is towed by non-manual means; — product use exceeds a speed limit of 3 km/h; — intended use includes adult users (according to the label); — product is not labelled as a toy; — use of product depends on deep water or use in deep water is foreseeable.
D[a]	Floating leisure articles for passive use (resting, relaxing on flat surface) but mainly active use i.e. climbing, jumping (more than 1 m), swinging, rotating and any related activity. No distinct position of user. Single or collective use. No mechanical means of propulsion. Shall be anchored. — Minimum age variable, but above 36 months. — The product includes use in deep water.	— product includes usability for jumping and climbing to a height of more than 1,0 m; — labelling does not include the warning note according to EN 71 series concerning supervision and use in shallow water only; — intended use includes adult users (according to the label).

[a] For typical products, see risk analysis (as described in the introduction).

[b] For each class, one of more reasons for exclusion can apply.