SLOVENSKI STANDARD
oSIST prEN 13138-4:2014

01-oktober-2014

Plavajoči pripomočki za učenje plavanja - 4. del: Preskusna lutka za preskušanje lastnosti plavajočih pripomočkov, ki se oblečejo, v vodi

Buoyant aids for swimming instruction - Part 4: Test manikin for in water performance testing of buoyant aids to be worn

Auftriebshilfen für das Schwimmenlernen - Teil 4: Prüfpuppe zur Wassereignungsprüfung von Auftriebshilfen

Aides à la flottabilité pour l'apprentissage de la natation - Partie 4: Mannequins d'essais de performances dans l'eau d'aides à la flottabilité devant être portées au corps

Ta slovenski standard je istoveten z: **prEN 13138-4**

ICS:

13.340.70	Rešilni jopiči, vzgonska pomagala in plavajoči pripomočki	Lifejackets, buoyancy aids and floating devices
97.220.40	Oprema za športe na prostem in vodne športe	Outdoor and water sports equipment

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Foreword

This document (prEN 13138-4:2014) 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 document is currently submitted to the CEN Enquiry.

1 Scope

This European Standard specifies safety and performance requirements regarding the in-water behaviour of Buoyant aids for swimming instruction according to EN 13138-1. It specifies in-water test methods based on the application of test manikin as well as on human test subjects.

This European Standard covers class B devices that are designed to be securely attached to the body and which have either inherent buoyancy or can be inflated. These devices are intended to introduce the user to the range of swimming strokes. It does not apply to buoyancy aids, lifejackets or aquatic toys.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13138-1, *Buoyant aids for swimming instruction — Part 1: Safety requirements and test methods for buoyant aids to be worn*

EN 13138-3, *Buoyant aids for swimming instruction — Part 3: Safety requirements and test methods for swim seats to be worn*

3 Terms and definitions

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

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 filled with air or gas

3.3
buoyant swimming device
garment or 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

3.4
class B device
Buoyant swimming device intended to be securely attached to the body and to introduce the active user to the range of swimming strokes.

3.5
device to be worn
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 removed and so as to provide the user with positive buoyancy.

3.6
component
Sub group of the entire device which contributes to either buoyancy, function or safety

3.7
assessment panel
Group of three people from an accredited and notified test house, all of whom are experienced in assessing buoyant swimming devices

4 Safety and performance requirements

4.1 General

Swimming devices when correctly worn shall assist the active wearer in his/her attempts to learn to swim. The device shall support the immersed body in a way that it does not exert forces or torques which are counterproductive to the basic swimming techniques. If the active user becomes passive the swimming device shall prevent the user from sinking no further than just below the water surface. In order to satisfy this requirement the provision of the minimum buoyancy as specified in EN 13138-1 requires the correct fit and positioning to be adhered too. Safety and performance requirements as well as in-water testing as specified below are needed.

All tests shall be performed in chest stroke position of the test manikin / human test subject and in calm fresh water. Depending of the type of swimming aid to be tested manikins shall be fitted with the appropriate arm stumps as shown in figure 1, key number 8.

Test manikins as specified in EN 13138-3 and EN 13138-4 already provide the adequate residual functional lung volume and the required body posture. Their application shall be analogue to the specification above.

If swimming aids of an equal design series cover more than one mass range only the lowest and highest mass range needs to be tested in order to meet the requirements for the entire series.

4.2 Category of users, test manikins, human test subjects

4.2.1 Allocation

Safety and performance requirements as specified in Clause 5 shall be verified according the allocation of test manikin and human test subject to the appropriate swimming aid as specified in table 1.

Table 1 — Category of user in combination of test manikin or human test subject

category of user		**test manikin / human test subject / devices**
age years	**mass range** kg	All types of swimming aids as specified in EN 13138-1
Up to 1	**Up to 11**	Apply test manikin I* according to EN 13138-4, Annex A
1 to 2	**11 to 15**	Apply test manikin II* according to EN 13138-4, Annex A
2 to 3	**15 to 18**	Apply test manikin III* according to EN 13138-4, Annex A
3 to 6	**18 to 30**	Apply test manikin VII according to EN 13138-4, Annex B
6 to 12	**30 to 60**	Apply human test subject 1 with a body mass of 50 to 60 kg with body mass index of 20 - 24
Over 12	**Over 60**	Apply human test subject 2 with a body mass of 60 to 80 kg with body mass index of 20 - 24
NOTE The max value of the mass range shall correspond to the weight of the test manikin / human test subject		
* Test manikins I to III shall be fitted with the appropriate arm stumps as required.		

4.2.2 Test methods

The following methods are acceptable for measuring the angles see Clause 5 below, but are not exclusive:

— Suspension Rig see Annex C;

— Underwater Photography/Video.

4.2.3 Test procedure with a Human test subject

For testing purposes the human test subjects shall don the swimming aid correctly and enter the water in an upright posture until sufficient water depth is reached to perform the test. Arms shall be held down against the sides of the torso. Breathing shall be stopped after the last exhalation. When the passive body achieves full buoyancy the influence of the swimming device to the human body shall be verified. This should take between 5 and 10 seconds.

4.2.4 Test procedure for Suspension Rig

After having adjusted the suspension rig to the relevant manikin the test procedure shall be as specified below:

a) Attach swimming device to be tested to the manikin according to manufacturer's instructions

b) Install manikin into the suspension rig and position test rig above water (test pool)

c) Lower rig slowly and gradually into the water until both suspension strings just become loose

d) Check whether:

- the manikin is prevented from sinking, see 5.1
- the manikin's flotation angle in longitudinal direction is as required, see 5.2
- the swimming device gets shall not be displaced when the manikin is moved, see 5.3
- flotation angle after failure of the air chamber most likely to cause failure is as required, see 5.4

NOTE If suspension strings do not become loose even if the manikin is fully immersed, this fact indicates insufficient buoyancy and thus a failure. In cases where the flotation angle or sinking behaviour is beyond the measuring range of the suspension rig (e.g. vertical angle in combination with permanent sinking) the manikin shall be taken out of the rig and immersed freely in order to get prove verify of this behaviour.

4.2.5 Evaluation by Underwater Photography/Video

If underwater photography is utilized cameras shall be installed so that a reliable measurement of all specified angles, longitudinal angle and horizontal angle are obtained. The reference lines of the test manikin/human test subject are the spine and the shoulder axis.

5 Requirements and Testing

5.1 Prevention from sinking

With the swimming aid correctly fitted to the appropriate test manikin or human test subject according to table 2 it shall be shown that the manikin / body is prevented from sinking further than just underneath the water surface.

5.1.1 Testing

Testing shall be performed as specified in 5.5.1.

5.2 Flotation angle (horizontal, vertical)

With the swimming aid correctly fitted to the appropriate test manikin or human test subject according to table 2 it shall be shown that the manikin / human body takes an in-water position which is from horizontal to vertical, feet down. There shall be no forces causing the manikin or test subject to rotate on the longitudinal axis from the initial chest down to a chest up (or supine) or head down position.

5.2.1 Testing

Testing shall be performed as specified in 5.5.1.

NOTE Some body types can cause the hips and buttocks to float near the surface, forcing the head down. This should be taken into account during testing with live subjects.

5.3 Displacement of the device on the body

With the swimming aid correctly fitted to the appropriate test manikin or human test subject according to table 2 it shall be shown that after any all of the specified movements in the water according to 5.3.1 the swimming aid has not becomes displaced to an degree that a floating angle between horizontal to vertical, feet down, can no longer be maintained.

5.3.1 Testing

Testing shall be performed as specified in clause 5.2. If a stable floating position has been achieved the test manikin / test subject shall be moved by external force to:

Test 1: 45° forward, head down from the position achieved in the water.

Test 2: 45° backward, feet down from the position achieved in the water.

Test 3: 45° to the right and left around the torso's longitudinal axis.

5.4 Failure of an air chamber

The failure of the air chamber most likely to cause failure shall neither cause sinking of the manikin / test subject nor shall it cause a head down floating position. Swimming aids made from inherent buoyant material are exempted from this requirement.

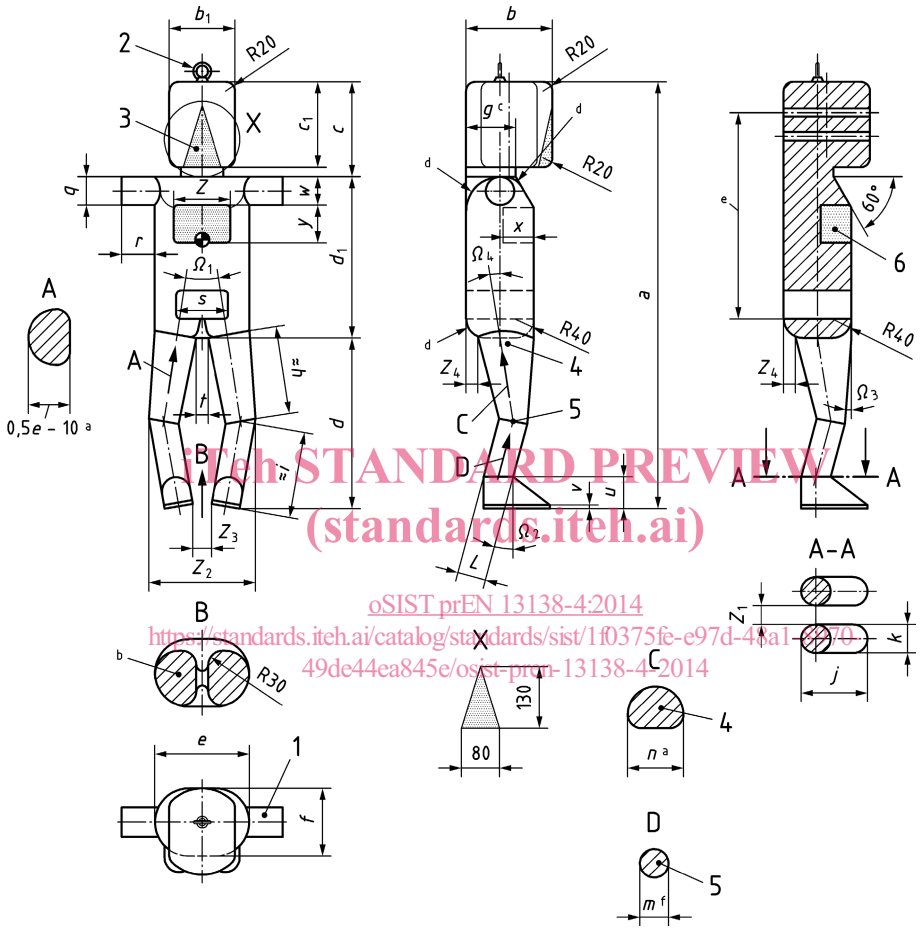
5.4.1 Testing

Testing shall be performed as specified in clause 5.2. but with the air chamber most likely to cause failure deflated.

Annex A
(normative)

Dimensions of test manikins I to III

A.1 Dimensions of test manikins I to III



Key

1 cylindrical arm stumps for testing swimming devices. Detachable (for exchange of arm stumps see EN 13138-3).
2 ring nut, ring screw
3 shaded area (indicating mouth and nose area: width / height 80 x 130 mm)
4 upper thigh, diameter n^a
5 lower thigh, diameter m^f
6 closed cell soft foam pad 6 / 8 / 12 N buoyancy for functional residual lung volume. Foam density (35 0/-3,5) g/dm3
a fit to torso
b leg / body cross section
c oval
d rounded to near anatomical shape
e calibrations holes / openings . Amount, diameter, positions according to the needs ballast holes (ballast symmetrically distributed, no air caverns, no undue torque in relation to centre line in particular to be considered when adding ballast to the head)
f cylindrical, flattened circle or oval, dimension to be measured as width of the part

Figure A.1 — Dimensions

Table A.1 — Dimensions of manikins I to III *(Dimensions in millimetres)*

Manikin	a	b	b_1	c	c_1	d_1	d	e	f	$g^{+/-10}_{oval}$	$\sim h^a$	$\sim i^a$	j	k
I	800	174	134	190	172	300	310	180	133	100x85	141	175	117	55
II	900	182	139	200	180	340	360	200	143	105x90	175	194	140	65
III	1100	184	141	230	190	420	450	205	155	110x95	200	250	160	70
NOTE Grey area shows non-anthropometric dimensions.														
[a] to be measured along centre line of component														

Table A.2 —*(continued)*

Manikin	l	m	n	o	q	$r^{cylindrical}$	t	u	v	w	x	y	Z	Z_1
I	$60^{+/-5}$	$60^{+/-5}$	80	210	60	90	20	60	6	60	66	80	120	38
II	65+/-5	65+/-5	90	257	70/80	120	25	67	8	60	85	80	120	40
III	$70^{+/-5}$	$70^{+/-5}$	100	288	90	15	28	72	10	60	90	100	140	44
NOTE Grey area shows non-anthropometric dimensions.														
[a] to be measured along centre line of component														

Table A.3 —*(continued)*

Manikin	Z_2	Z_3	Z_4	$\sim\Omega_1$	$\sim\Omega_2$	$\sim\Omega_3$	$\sim\Omega_4$
I	200	38	15	20	15	5	12
II	225	40	25	20	15	5	9
III	205	-	-	0	0	13	0
NOTE Grey area shows non-anthropometric dimensions.							
[a] to be measured along centre line of component							