

SLOVENSKI STANDARD
oSIST prEN ISO 12402-9:2015
01-september-2015

Osebni plavajoči pripomočki - 9. del: Preskusne metode (ISO/DIS 12402-9:2015)

Personal flotation devices - Part 9: Test methods (ISO/DIS 12402-9:2015)

Persönliche Auftriebsmittel - Teil 9: Prüfverfahren (ISO/DIS 12402-9:2015)

Équipements individuels de flottabilité - Partie 9 : Méthodes d'essai (ISO/DIS 12402-9:2015)

Ta slovenski standard je istoveten z: prEN ISO 12402-9

ICS:

13.340.70	Rešilni jopiči, vzgonska pomagala in plavajoči pripomočki	Lifejackets, buoyancy aids and floating devices
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DRAFT INTERNATIONAL STANDARD

ISO/DIS 12402-9

ISO/TC 188/SC 1

Secretariat: DIN

Voting begins on:
2015-06-11Voting terminates on:
2015-09-11

Personal flotation devices —

Part 9: Test methods

Équipements individuels de flottabilité —

Partie 9: Méthodes d'essai

ICS: 13.340.70

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<https://standards.itih.ai/catalog/standards/sist/0152136a-022c-4e0c-8eb6-091e3b2312c8/ksist-1pren-iso-12402-9-2019>

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

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Reference number
ISO/DIS 12402-9:2015(E)

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Published in Switzerland

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 12402-9 was prepared by Technical Committee ISO/TC 188, *Small craft*, Subcommittee SC 1, *Personal safety Equipment*.

This second edition cancels and replaces the first edition (ISO 12402-9:2006, ISO 12402-9:2006/A.1:2010), of which have been technically revised. The main changes with respect to the previous edition are listed below:

- new Table 1 (A) Mechanical properties test for inherently buoyant PFDs (see 5.5.1);
- new Table 2 (B) Mechanical properties test for inflatable PFDs (see 5.5.1);
- horizontal and vertical load test amended (5.5.4);
- requirements on collar handles added (see 5.5.7);
- temperature cycling test amended (see 5.5.3);
- over-pressure test amended (see 5.5.14);
- air retention test deleted;
- requirement for the colour deleted;
- measurement of buoyancy of the whole device amended (see 5.5.9);
- inflation tests amended (see 5.5.13);
- strength of attachment test for inflatable chambers added (see 5.5.15);
- human subject performance tests amended (see 5.6);
- performance levels amended (see A.2);
- Figures B.15 to B.17 added.

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ISO 12402 consists of the following parts, under the general title *Personal flotation devices*:

- *Part 2: Lifejackets, performance level 275 - Safety requirements;*
- *Part 3: Lifejackets, performance level 150 - Safety requirements;*
- *Part 4: Lifejackets, performance level 100 - Safety requirements;*
- *Part 5: Buoyancy aids (level 50) - Safety requirements;*
- *Part 6: Special purpose lifejackets and buoyancy aids - Safety requirements and additional test methods;*
- *Part 7: Materials and components - Safety requirements and test methods;*
- *Part 8: Safety requirements and test methods;*
- *Part 9: Test methods;*
- *Part 10: Selection and application of personal flotation devices and other relevant devices.*

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Introduction

ISO 12402 has been prepared to give guidance on the design and application of personal flotation devices (hereafter referred to as PFDs) for persons engaged in activities, whether in relation to their work or their leisure, in or near water. PFDs manufactured, selected, and maintained to this standard should give a reasonable assurance of safety from drowning to a person who is immersed in water.

Requirements for lifejackets on large, commercial seagoing ships are regulated by the International Maritime Organization (IMO) under the International Convention for the Safety of Life at Sea (SOLAS).

ISO 12402 allows for the buoyancy of a PFD to be provided by a wide variety of materials or designs, some of which may require preparation before entering the water (e.g. inflation of chambers by gas from a cylinder or blown in orally). However, PFDs can be divided into the following two main classes:

- those which provide face up in-water support to the user regardless of physical conditions (lifejackets), and
- those which require the user to make swimming and other postural movements to position the user with the face out of the water (buoyancy aids).

Within these main two classes there are a number of levels of support, types of buoyancy, activation methods for inflatable devices, and auxiliary items (such as location aids), all of which will affect the user's probability of survival. Within the different types of buoyancy allowed, inflatable PFDs either provide full buoyancy without any user intervention other than arming (i.e. PFDs inflated by a fully automatic method) or require the user to initiate the inflation. Hybrid PFDs always provide some buoyancy but rely on the same methods as inflatable PFDs to achieve full buoyancy. With inherently buoyant PFDs, the user only needs to put the PFD on to achieve the performance of its class.

PFDs that do not require intervention (automatically operating PFDs) are suited to activities where persons are likely to enter the water unexpectedly; whereas PFDs requiring intervention (e.g. manually inflated PFDs) are only suitable for use if the user believes there will be sufficient time to produce full buoyancy, or help is close at hand. In every circumstance, the user should ensure that the operation of the PFD is suited to the specific application. The conformity of a PFD to this part of ISO 12402 does not imply that it is suitable for all circumstances. The relative amount of required inspection and maintenance is another factor of paramount importance in the choice and application of specific PFDs.

ISO 12402 is intended to serve as a guide to manufacturers, purchasers, and users of such safety equipment in ensuring that the equipment provides an effective standard of performance in use. Equally essential is the need for the designer to encourage the wearing of the equipment by making it comfortable and attractive for continuous wear on or near water, rather than for it to be stored in a locker for emergency use. Throwable devices and flotation cushions are not covered by this part of ISO 12402. The primary function of a PFD is to support the user in reasonable safety in the water. Within the two classes, alternative attributes make some PFDs better suited to some circumstances than others or make them easier to use and care for than others. Important alternatives allowed by ISO 12402 are the following:

- to provide higher levels of support (levels 100, 150, or 275) that generally float the user with greater water clearance, enabling the user's efforts to be expended in recovery rather than avoiding waves; or to provide lighter or less bulky PFDs (levels 50 or 100);
- to provide the kinds of flotation (inherently buoyant foam, hybrid, and inflatable) that will accommodate the sometimes conflicting needs of reliability and durability, in-water performance, and continuous wear;

to provide automatically operating (inherently buoyant or automatically inflated) PFDs that float users without any intervention on their part, except in initially donning the PFD (and regular inspection and

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- rearming of inflatable types), or to provide user control of the inflatable PFD's buoyancy by manual and oral operation; and
- to assist in detection (location aids) and recovery of the user.

PFDs provide various degrees of buoyancy in garments that are light in weight and only as bulky and restrictive as needed for their intended use. They will need to be secure when worn, in order to provide positive support in the water and to allow the user to swim or actively assist herself/himself or others. The PFD selected shall ensure that the user is supported with the mouth and nose clear of the water under the expected conditions of use and the user's ability to assist.

Under certain conditions (such as rough water and waves), the use of watertight and multilayer clothing, which provide (intentionally or otherwise) additional buoyancy, or the use of equipment with additional weight (such as tool belts) will likely alter the performance of the PFD. Users, owners and employers need to ensure that this is taken into account when selecting a PFD. Similarly, PFDs may not perform as well in extremes of temperature, although fully approved under this part of ISO 12402. PFDs may also be affected by other conditions of use, such as chemical exposure and welding, and may require additional protection to meet the specific requirements of use. If the user intends taking a PFD into such conditions, she/he has to be assured that the PFD will not be adversely affected. This part of ISO 12402 also allows a PFD to be an integral part of a safety harness designed to conform to ISO 12401, or an integral part of a garment with other uses, for example to provide thermal protection during immersion, in which case the complete assembly as used is required to conform to this part of ISO 12402.

In compiling the attributes required of a PFD, consideration has also been given to the potential length of service that the user might expect. Whilst a PFD needs to be of substantial construction and material, its potential length of service often depends on the conditions of use and storage, which are the responsibility of the owner, user and/or employer. Furthermore, whilst the performance tests included are believed to assess relevant aspects of performance in real-life use, they do not accurately simulate all conditions of use. For example, the fact that a device passes the self-righting tests in swimming attire, as described herein, does not guarantee that it will self-right an unconscious user wearing clothing; neither can it be expected to completely protect the airway of an unconscious person in rough water. Waterproof clothing can trap air and further impair the self-righting action of a lifejacket.

It is essential that owners, users and employers choose those PFDs that meet the correct standards for the circumstances in which they will be used. Manufacturers and those selling PFDs have to make clear to prospective purchasers the product properties, alternative choices and the limitations to normal use, prior to the purchase.

Similarly, those framing legislation regarding the use of these garments should consider carefully which class and performance levels are most appropriate for the foreseeable conditions of use, allowing for the higher risk circumstances. These higher risk circumstances should account for the highest probabilities of occurrence of accidental immersion and the expected consequences in such emergencies. More information on the selection and application is given in ISO 12402-10.

Personal flotation devices — Part 9: Test methods

1 Scope

This part of ISO 12402 specifies the test methods for personal flotation devices.

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.

ISO 139, *Textiles — Standard atmospheres for conditioning and testing*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 3386-1:1986, *Polymeric materials, cellular flexible — Determination of stress-strain characteristics in compression — Part 1: Low-density materials*

ISO 12401:2004, *Small craft — Deck safety harness and safety line for use on recreational craft — Safety requirements and test methods*

ISO/DIS 12402-2:2015, *Personal flotation devices — Part 2: Lifejackets, performance level 275 — Safety requirements*

ISO/DIS 12402-3:2015, *Personal flotation devices — Part 3: Lifejackets, performance level 150 — Safety requirements*

ISO/DIS 12402-4:2015, *Personal flotation devices — Part 4: Lifejackets, performance level 100 — Safety requirements*

ISO/DIS 12402-5:2015, *Personal flotation devices — Part 5: Buoyancy aids (level 50) — Safety requirements*

ISO/DIS 12402-6:2015, *Personal flotation devices — Part 6: Special purpose lifejackets and buoyancy aids — Safety requirements and additional test methods¹⁾*

ISO/DIS 12402-7:2015, *Personal flotation devices — Part 7: Materials and components — Safety requirements and test methods*

ISO7DIS 12402-8:2015, *Personal flotation devices — Part 8: Accessories — Safety requirements and test methods*

ISO 12402-10, *Personal flotation devices — Part 10: Selection and application of personal flotation devices and other relevant devices*

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3 Terms and definitions

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

- 3.1 personal flotation device**
PFD
 garment or device which, when correctly worn and used in water, will provide the user with a specific amount of buoyancy which will increase the likelihood of survival
- 3.2 inherently buoyant material**
 material which is permanently less dense than water
- 3.3 automatically inflated PFD**
 PFD in which inflation is effected as a result of immersion without the user carrying out any action at the time of immersion
- 3.4 manually inflated PFD**
 PFD in which inflation is effected as a result of the user operating a mechanism
- 3.5 orally inflated PFD**
 PFD inflated by mouth to produce buoyancy
- 3.6 PFD with secondary donning**
 PFD for which additional donning or adjustment is needed to place the PFD in its functioning position from the position it is normally worn
- Note 1 to entry: Pouch-type devices are examples of the type of PFDs which usually require such additional positioning.
- 3.7 vest-type PFD**
 PFD covering the upper trunk of the user like a vest
- 3.8 yoke-type PFD**
 PFD in a style worn around the back of the neck and secured by a waist strap
- 3.9 emergency position indicating light**
 device which emits light so as to increase the chances of a user being located
- 3.10 multi-chamber buoyancy system**
 PFD with buoyancy to meet the applicable PFD performance requirement provided by multiple sources including, for example, devices with two or more independent inflatable chambers or hybrids, for which each chamber independently provides at least the in-water performance conforming to ISO 12402-5

Note 1 to entry: This excludes supplemental inflation chambers.

3.11**deck safety harness and safety line**

device that allows a user to be securely attached to a strong point on a vessel or on shore, so as to prevent him from falling into the water, or, if he does fall into the water, to prevent him from being separated from the vessel or shore

3.12**buddy line**

length of cord which can be tied or otherwise fixed to another person or to that person's PFD or other objects, so as to keep a user in the vicinity of that person or object with a view to making location and thus rescue easier

3.13**lifting loop**

device which facilitates manual recovery of a person from water

3.14**sprayhood**

cover brought or placed in front of the airways of a user in order to reduce or eliminate the splashing of water from waves or the like onto the airways, and thereby promoting the survival of the user in rough water conditions

3.15**protective cover**

cover that is normally in place over the functional elements of a PFD in order to protect them from physical damage, or snagging on external objects

Note 1 to entry: The protective cover may be designed to provide additional properties, i.e. to make the PFDs suitable for use when the subject is exposed to additional hazards, e.g. significant abrasion, molten metal splash, flame and fire.

Note 2 to entry: The inflatable chamber of an inflatable PFD is an example of a functional element.

3.16**overpressure relief valve**

valve which may be used in an inflatable system to avoid the likelihood of destruction caused by overpressure

3.17**whistle**

device which, when blown by mouth, produces an audible sound which can aid in the location of the user

3.18**hybrid-type PFD**

PFD of combined buoyancy types, i.e. inherent and inflatable

3.19**bunching**

curling or folding of internal buoyant material upon itself, from its original position, within the envelope

3.20**sheltered waters**

water with protection from significant breaking waves, current, or strong winds, where the possibility of being blown or carried away from shore or place of safety is minimal

3.21**offshore**

water that is unprotected and influenced by a variety of threat conditions such as waves, tide, currents, or wind, which may be at sea or on inland waters