



SLOVENSKI STANDARD SIST EN ISO 12402-7:2020

01-december-2020

Nadomešča:

SIST EN ISO 12402-7:2007

SIST EN ISO 12402-7:2007/A1:2011

Osebni plavajoči pripomočki - 7. del: Materiali in sestavni deli - Varnostne zahteve in preskusne metode (ISO 12402-7:2020)

Personal flotation devices - Part 7: Materials and components - Safety requirements and test methods (ISO 12402-7:2020)

iTeh STANDARD PREVIEW

Persönliche Auftriebsmittel - Teil 7: Werkstoffe und Bestandteile - Sicherheitstechnische Anforderungen und Prüfverfahren (ISO 12402-7:2020)

Équipements individuels de flottabilité - Partie 7: Matériaux et composants - Exigences de sécurité et méthodes d'essai (ISO 12402-7:2020)

Ta slovenski standard je istoveten z: EN ISO 12402-7:2020

ICS:

13.340.70	Rešilni jopiči, vzgonska pomagala in plavajoči pripomočki	Lifejackets, buoyancy aids and floating devices
-----------	-----------------------------------------------------------	-------------------------------------------------

SIST EN ISO 12402-7:2020

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 12402-7:2020

<https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020>

EUROPEAN STANDARD

EN ISO 12402-7

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2020

ICS 13.340.70

Supersedes EN ISO 12402-7:2006

English Version

Personal flotation devices - Part 7: Materials and components - Safety requirements and test methods (ISO 12402-7:2020)

Équipements individuels de flottabilité - Partie 7:
Matériaux et composants - Exigences de sécurité et
méthodes d'essai (ISO 12402-7:2020)

Persönliche Auftriebsmittel - Teil 7: Werkstoffe und
Bestandteile - Sicherheitstechnische Anforderungen
und Prüfverfahren (ISO 12402-7:2020)

This European Standard was approved by CEN on 10 June 2019.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

iTeh STANDARD PREVIEW

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	3

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 12402-7:2020](https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020)
<https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020>

European foreword

This document (EN ISO 12402-7:2020) has been prepared by Technical Committee ISO/TC 188 "Small craft" in collaboration with 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 2021, and conflicting national standards shall be withdrawn at the latest by April 2021.

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 ISO 12402-7:2006.

According to the CEN-CENELEC Internal Regulations, the national standards organizations 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.

iTeh STANDARD PREVIEW
Endorsement notice
(standards.iteh.ai)

The text of ISO 12402-7:2020 has been approved by CEN as EN ISO 12402-7:2020 without any modification.

[SIST EN ISO 12402-7:2020
https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020](https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020)

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 12402-7:2020](#)

<https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020>

INTERNATIONAL
STANDARD

ISO
12402-7

Second edition
2020-07

Personal flotation devices —

Part 7:

**Materials and components — Safety
requirements and test methods**

Équipements individuels de flottabilité —

*Partie 7: Matériaux et composants — Exigences de sécurité et
méthodes d'essai*

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

[SIST EN ISO 12402-7:2020](https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020)

<https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020>



Reference number
ISO 12402-7:2020(E)

© ISO 2020

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 12402-7:2020

<https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	v
Introduction	vii
1 Scope	1
2 Normative references	1
3 Terms and definitions	3
4 Materials and components	4
4.1 General.....	4
4.1.1 Principles.....	4
4.1.2 Sampling.....	5
4.1.3 Pass or fail criteria.....	5
4.1.4 Units of measurement.....	5
4.1.5 Material.....	5
4.1.6 Sample conditioning.....	6
4.2 Sewing thread.....	6
4.2.1 Construction.....	6
4.2.2 Performance.....	7
4.2.3 Loop breaking strength.....	7
4.3 Fabric.....	7
4.3.1 General.....	7
4.3.2 Performance.....	7
4.3.3 Colour.....	11
4.4 Structural webbing and tie tape.....	12
4.4.1 General.....	12
4.4.2 Torsional stiffness.....	12
4.5 Structural lacing.....	13
4.5.1 General.....	13
4.5.2 Construction.....	13
4.5.3 Performance.....	14
4.6 Structural zippers.....	14
4.6.1 Construction.....	14
4.6.2 Performance.....	14
4.7 Hardware.....	17
4.7.1 Webbing closures and adjusters.....	17
4.7.2 Lacing closures and adjusters.....	21
4.7.3 Multi-eyelet guides.....	24
4.8 Foam flotation material.....	25
4.8.1 General.....	25
4.8.2 Performance.....	26
4.8.3 Knitted fabric laminated to foam flotation material.....	31
4.9 Inflation chamber materials.....	33
4.9.1 General.....	33
4.9.2 Performance.....	34
4.10 Polymeric foam coatings.....	36
4.10.1 Construction.....	36
4.10.2 Performance.....	37
4.11 Inflation systems for hybrid and solely inflatable lifejackets.....	39
4.11.1 Construction.....	39
4.11.2 Performance.....	42
4.11.3 Performance tests using human subjects.....	49
4.11.4 Operability test of automatic inflation systems.....	50
4.11.5 Operability test of manual inflation systems.....	51
4.11.6 Operability test of oral systems.....	51
4.11.7 Discharge test of automatic and manual inflation systems.....	52

ISO 12402-7:2020(E)

4.11.8	Humid atmosphere test of automatic inflation systems.....	53
4.11.9	System durability test of automatic and manual inflation systems.....	54
4.11.10	Operability test of over-pressure relief valves.....	54
4.11.11	Pull test of automatic and manual inflation systems, and cylinder-seal- indicating cylinders.....	54
4.11.12	Window material.....	55
4.12	Gas-filled cylinders.....	56
4.12.1	Construction.....	56
4.12.2	Tests and acceptance criteria.....	58
4.12.3	Marking.....	70
Annex A	(informative) Mildew resistance of materials: Soil burial method.....	71
Annex B	(informative) Abrasion resistance of cloth: Oscillatory method (Wyzenbeek method).....	73
Annex C	(informative) Example of a design drawing.....	76
Bibliography	77

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 12402-7:2020](https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020)

<https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020>

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document 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 12402-7:2006), which has been technically revised. It also incorporates the Amendment ISO 12402-7:2006/Amd. 1:2011.

The main changes with respect to the previous edition are as follows:

- a) temperature of temperature cycling (4.1.6.3) was changed from $(65 \pm 2) ^\circ\text{C}$ into $(60 \pm 2) ^\circ\text{C}$;
- b) compliance criteria in Table 1, Sewing thread, were changed;
- c) requirements for fabrics performance were changed (see 4.3.2 and Table 2);
- d) new chromaticity coordinates x and y and luminance factor β for yellow, orange and red non-fluorescent colours of lifejacket material were added (see Table 3);
- e) new chromaticity coordinates x and y and luminance factor β for yellow, yellow-orange, orange and orange-red fluorescent colours of lifejacket material were added (see Table 4);
- f) compliance criteria of structural webbing (see Table 5) were modified;
- g) compliance criteria of structural tie tape (see Table 6) were modified;
- h) new subclause "General" to structural lacing was added (see 4.5.1);
- i) immersion of zippers, automatic and manual inflation systems in IRM 902 oil was deleted and ambient temperature replaced by $(20 \pm 2) ^\circ\text{C}$ (see Tables 8, 17 and 18);
- j) compliance criteria of webbing closures and adjusters were modified (see Table 9);
- k) compliance criteria of lacing closures and adjusters were modified (see Table 10);
- l) number of samples reduced for density test on foam flotation material (see Table 12);

ISO 12402-7:2020(E)

- m) dimensional test for foam flotation material deleted;
- n) test method for the compressibility of inherently buoyant material was modified (see [4.8.2.4](#));
- o) compliance criteria of inflation chamber materials were modified (see [Table 15](#)).

A list of all parts in the ISO 12402 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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 12402-7:2020

<https://standards.iteh.ai/catalog/standards/sist/9872d24a-b818-4892-b16f-98370b3a75c2/sist-en-iso-12402-7-2020>

Introduction

ISO 12402 (all parts):2020 deals with personal floatation devices (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 International Standard give a reasonable assurance of safety from drowning to a person who is immersed in water. ISO 12402 (all parts):2020 does not include the following:

- requirements for lifejackets on seagoing ships, which are regulated by the International Maritime Organization (IMO)¹⁾ under the International Convention for the Safety of Life at Sea (SOLAS);
- throwable devices and flotation cushions.

ISO 12402 (all parts):2020 allows for the buoyancy of a PFD to be provided by a variety of materials or designs, some of which can require preparation before entering the water (e.g. inflation of chambers by gas from a cylinder or blown in orally). 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), which all 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, if automatic operation would result in entrapment, or if 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 the ISO 12402 series:2020 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 (all parts):2020 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. 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 provided by ISO 12402 (all parts):2020 are the following:

- to provide higher levels of support (levels 100, 150, or 275) that generally float the user with greater water clearance, when required for increasingly severe conditions; 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 accommodate the sometimes conflicting needs of reliability and durability, in-water performance, and continuous wear;

1) The International Maritime Organization (IMO) is an institution with domicile in London issuing regulations which are then published as laws by its Member States.

ISO 12402-7:2020(E)

- 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 rearming of inflatable types), or to provide user control of the inflatable PFDs 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 need to be secure when worn, in order to provide positive support in the water and to allow users to swim or actively assist themselves or others. The PFD selected ensures 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) can alter the performance of the PFD. Users, owners and employers need to ensure that this is taken into account when selecting a PFD. Similarly, it is possible that PFDs do not perform as well in extremes of temperature, although meeting ISO 12402 (all parts):2020 requirements. PFDs can also be affected by other conditions of use, such as chemical exposure and welding, and can require additional protection to meet the specific requirements of use. Taking a PFD into such conditions necessitates the assurance that the PFD will not be adversely affected. ISO 12402 (all parts):2020 also allows a PFD to be an integral part of a safety harness designed to conform to ISO 12401:2009, 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 expected to conform to ISO 12402 (all parts):2020.

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.

The characteristics of the product properties, alternative choices and the limitations to normal use are to be explained to potential buyers by manufacturers and distributors of PFDs prior to purchase.

Similarly, it is advised that regulators regarding the use of these garments 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 expected consequences. Requirements and recommendations for the correct selection and application of PFDs are given in ISO 12402-10:2020.

Personal flotation devices —

Part 7:

Materials and components — Safety requirements and test methods

1 Scope

This document specifies the minimum requirements for the construction and performance of materials and components of personal flotation devices, as well as the relevant test methods.

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-E02:2013, *Textiles — Tests for colour fastness — Part E02: Colour fastness to sea water*

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

ISO 139:2005/Amd 1:2011, *Textiles — Standard atmospheres for conditioning and testing*

ISO 188:2011, *Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests*

ISO 846:2019, *Plastics — Evaluation of the action of microorganisms*

ISO 1302:2002, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO 13688:2013, *Protective clothing — General requirements*

ISO 1421:2016, *Rubber- or plastics-coated fabrics — Determination of tensile strength and elongation at break*

ISO 1926:2009, *Rigid cellular plastics — Determination of tensile properties*

ISO 2062:2009, *Textiles — Yarns from packages — Determination of single-end breaking force and elongation at break using constant rate of extension (CRE) tester*

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 4674-1:2016, *Rubber- or plastics-coated fabrics — Determination of tear resistance — Part 1: Constant rate of tear methods*

ISO 4892-1:2016, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance*

ISO 4892-2:2013, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 5470-2:2003, *Rubber- or plastics-coated fabrics — Determination of abrasion resistance — Part 2: Martindale abrader*