
Personal flotation devices —

Part 4:

**Lifejackets, performance level 100 —
Safety requirements**

*Équipements individuels de flottabilité —
Partie 4: Gilets de sauvetage, niveau de performance 100 — Exigences
de sécurité*

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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 12402-4 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 162, *Protective clothing including hand and arm protection and lifejackets*, in collaboration with Technical Committee ISO/TC 188, *Small craft*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

- *Part 1: Lifejackets for seagoing ships — Safety requirements*
- *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: Accessories — Safety requirements and test methods*
- *Part 9: Test methods*
- *Part 10: Selection and application of personal flotation devices and other relevant devices*

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 12402-1 addresses lifejackets for seagoing ships.

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 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 this. 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 waterproof 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 impede 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 4: Lifejackets, performance level 100 — Safety requirements

1 Scope

This part of ISO 12402 specifies the safety requirements for lifejackets, performance level 100. It applies to lifejackets used by adults or children.

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 12402-5:2006, *Personal flotation devices — Part 5: Buoyancy aids (level 50) — Safety requirements*

ISO 12402-7:—¹⁾, *Personal flotation devices — Part 7: Materials and components — Safety requirements and test methods*

ISO 12402-8:2006, *Personal flotation devices — Part 8: Accessories — Safety requirements and test methods*

ISO 12402-9:2006, *Personal flotation devices — Part 9: Test methods*

IMO Resolution A.658 (16), *Use and fitting of retro-reflective materials on life-saving appliances, International Maritime Organization*²⁾

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

1) To be published.

2) IMO is an institution with domicile in London issuing regulations which are then published as laws by its Member States.

3.3

automatically operating PFD

PFD in which buoyancy is provided by permanent means (inherently buoyant material) or by suitable means (gas inflation) effected by a system which automatically activates upon immersion and which, except for the inspection and rearming of inflatable types, when correctly donned requires no further action by the user

3.4

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

3.5

manually inflated PFD

PFD in which inflation is effected as a result of the user operating a mechanism

3.6

orally inflated PFD

PFD inflated by mouth to produce buoyancy

3.7

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 Pouch-type devices are examples of the type of PFDs which usually require such additional positioning.

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3.8

vest-type PFD

PFD covering the upper trunk of the user like a vest

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3.9

yoke-type PFD

PFD in a style worn around the back of the neck and secured by a waist strap

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3.10

emergency light

device which emits light so as to increase the chances of a user being located

3.11

multi-chamber buoyancy system

system that divides the buoyancy provided by an inflatable lifejacket into two or more separate compartments, such that if mechanical damage occurs to one, others can still operate and provide buoyancy so as to aid the user when immersed

3.12

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

3.13

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

3.14

lifting loop

device which facilitates manual recovery of a person from water

3.15**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 to promote the survival of the user in rough water conditions

3.16**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 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 The inflatable chamber of an inflatable PFD is an example of a functional element.

3.17**overpressure relief valve**

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

3.18**whistle**

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

3.19**hybrid-type PFD**

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

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4 Classification

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4.1 Classes**4.1.1 Lifejackets**

These devices provide face-up flotation with levels of support sufficient for various open and rough water uses. Lifejackets have a buoyancy distribution sufficient to turn most users, when tested on users wearing swimming costumes according to ISO 12402, to a position where the mouth has a defined freeboard above the water's surface, even when the user is unconscious.

4.1.2 Buoyancy aids

These devices should be comfortable for continuous wear and provide lift, without significant face-up turning ability, to float the conscious user with the level of support marked on the device. Buoyancy aids shall at least be suitable for sheltered waters, but at higher performance levels may be suitable for some users in other waters.

4.1.3 Special purpose lifejackets and buoyancy aids

These devices perform as in 4.1.1 and 4.1.2 with different levels of support, but have modifications related to special applications for use. These applications shall not relate to essential requirements such as in-water performance, stability and safety in use. The specific conditions for use shall be stated on their label to maintain essential requirements.

4.2 Performance levels

4.2.1 Level 275

This level is intended primarily for offshore use under extreme conditions. It is also of value to those who are wearing clothing which traps air and which may adversely affect the self-righting capacity of the lifejacket. It is designed to ensure that the user is floating in the correct position with his mouth and nose clear of the surface.

See ISO 12402-2.

4.2.2 Level 150

This level is intended for general application or for use with foul weather clothing. It will turn an unconscious person into a safe position and requires no subsequent action by the user to maintain this position.

See ISO 12402-3.

4.2.3 Level 100

This level is intended for those who may have to wait for rescue, but are likely to do so in sheltered water. The device should not be used in rough conditions.

See this part of ISO 12402.

4.2.4 Level 50

This level is intended for use by those who are competent swimmers and who are near to bank or shore, or who have help and a means of rescue close at hand. These garments have minimal bulk, but they are of limited use in disturbed water, and cannot be expected to keep the user safe for a long period of time. They do not have sufficient buoyancy to protect people who are unable to help themselves. They require active participation by the user.

See ISO 12402-5.

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5 Requirements

5.1 General

A lifejacket, performance level 100, shall meet the requirements specified in Clause 5 when tested in accordance with ISO 12402-9. The temperature cycling test and the rotating shock bin test shall be considered as reliability against wear and tear and shall be conducted prior to the appropriate physical properties test.

Materials and components used for a lifejacket, performance level 100, shall comply with ISO 12402-7.

An inflatable lifejacket complying with this part of ISO 12402 shall have automatic, manual and oral inflation that allows for full compliance with all performance requirements of this part of ISO 12402. Each chamber of the inflatable lifejacket shall have at least manual and oral inflation. The inflatable lifejacket shall meet the performance requirements of this part of ISO 12402 with any one chamber deflated. Inflatable lifejackets shall be tested against inadvertent inflation according to ISO 12402-7:—³⁾, 4.11 and ISO 12402-9:2006, 5.5.11.

3) To be published.

5.2 Combination of lifejackets and accessories

5.2.1 General

Accessories used on lifejackets, performance level 100 shall comply with ISO 12402-8 as specified in Table 1.

A combination of a lifejacket and accessories shall not impair the performance of either item. This shall be proved during the test required for the lifejacket as well as accessories. If necessary the test sequence has to be arranged accordingly. Requirements and test methods for accessories are specified in ISO 12402-8.

Table 1 — Accessories for lifejackets, performance level 100

Accessory	Mandatory (M) / Optional (O)
Emergency light	O
Whistle	M
Lifting loop	O
Buddy line	O
Retroreflective material	M
Deck safety harness	O
Overpressure relief valve	O
Multi-chamber system	O
Protective covers	O
Sprayhood	O

Lifejackets can be equipped with further accessories. Such accessories shall comply at least with ISO 12402-8.

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5.2.2 Lifting loop

If a lifejacket, performance level 100, will be provided with a lifting loop, it shall be tested according to ISO 12402-9:2006, 5.5.1.4.

The lifting loop shall be affixed to the lifejacket in front of the chest anterior to two lines, each axial to the midline between the lower end of the sternum and the umbilicus and no more than 100 mm to the side of the midline.

The minimum length of the loop shall be 150 mm, measured from attachment to end of the loop.

The lifting loop shall have a minimum width of 20 mm and shall be of a colour distinctive from that of the lifejacket.

The lifting loop shall be conspicuous when the user is floating.

See also 5.5.

5.2.3 Whistle

The lifejacket shall be provided with a whistle. The whistle shall comply with ISO 12402-8:2006, 5.2.

5.2.4 Sprayhood

If any form of hood or sprayhood is fitted to cover the face in whole or in part, it shall comply with ISO 12402-8:2006, 5.5 and be marked as specified therein.