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Personal flotation devices —

Part 10:
Selection and application of flotation devices and other relevant devices

Équipements individuels de flottabilité —

Partie 10: Sélection et application des équipements de flottabilité et d'autres équipements apparentés

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ISO/CEN PARALLEL ENQUIRY

This draft International Standard is a draft European Standard developed within the European Committee for Standardization (CEN) and processed under the CEN-lead mode of collaboration as defined in the Vienna Agreement. The document has been transmitted by CEN to ISO for circulation for ISO member body voting in parallel with CEN enquiry. Comments received from ISO member bodies, including those from non-CEN members, will be considered by the appropriate CEN technical body. **Accordingly, ISO member bodies who are not CEN members are requested to send *a copy* of their comments on this DIS directly to CEN/TC 162** (DIN, Burggrafenstraße, 6, D-10787 Berlin) **as well as returning their vote and comments in the normal way to the ISO Central Secretariat.** Should this DIS be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

In accordance with the provisions of Council Resolution 15/1993 this document is circulated in the English language only.

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Personal flotation devices - Part 10: Selection and application of flotation devices and other relevant devices (ISO/DIS 12402-10:2002)

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This draft European Standard is submitted to CEN members for parallel enquiry. It has been drawn up by the Technical Committee CEN/TC 162.

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Foreword

This document (prEN ISO 12402-10:2002) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand am protection and lifejackets”, the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 188 “Small craft”.

This document is currently submitted to the parallel Enquiry.

It is the tenth part of a series covering personal flotation devices. The series consists of:

— Part 1: Lifejackets for seagoing ships — Safety requirements

— Part 2: Lifejackets for extreme offshore conditions (level 275) — Safety requirements

— Part 3: Lifejackets for offshore conditions (level 150) — Safety requirements

— Part 4: Lifejackets for inland/close to shore conditions (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 flotation devices and other relevant devices

The annexes A and B are informative.

Introduction

This standard is intended to provide support for the selection and application of personal flotation devices (hereafter referred to as PFD) and other relevant devices based on the relevant standards prepared in CEN and ISO.

This standard is of value to those responsible for specifying the carriage or use of lifejackets and to those who are contemplating the purchase of such garments. The primary aim of the guide is to increase awareness of those factors which should inform a purchaser or user in the choice of a PFD. There is much that can be done at the point of sale to bring important information to the attention of the consumer, or end user. Information can be provided to the user on the packaging, swing tags, or on labels attached to the garment. A particular important role can be performed by leaflets or booklets prepared by manufacturers and other that explain the contribution of different types of PFDs to enhanced safety on or near water.

However, the most important factor for the PFDs is to ensure that they are used. Use will be maximised when the garments have been designed to be attractive in appearance, comfortable, and economical.

PFDs are remarkably recent innovations. In spite of various well-intentioned attempts to design personal flotation gear during the 18th and 19th centuries, it was not until 1852, that Alexander Carte introduced a cork lifejacket, and the First World War before that apparatus was issued to sailors in an attempt to protect them. However the basic requirements of personal flotation devices were not properly investigated until the Second World War, and most National Standards were evolved in the 1960s and later.

To date there have been three main groups who have specified requirements for PFDs.

a) The International Maritime Organisation's Safety of Life at Sea (IMO SOLAS) for those lifejackets to be used internationally in larger surface vessels operating in the open sea.

b) The US Federal Aviation Authority, UK Civil Aviation Authority, and other associated national bodies for those lifejackets to be carried and used in Civil aviation settings.

c) Various national Standards Bodies (such as AFNOR, DIN, and BSI) have produced specific national Standards which have been applied to certain national circumstances for lifejackets and buoyancy aids required by national law or by rules of the governing bodies of sports.

Preparation for the implementation of a single market within the EU led to the requirements for that PFDs have to be considered as personal protective equipment. This has also been reflected in the EU Directive for PPE (89/686 EWG).

The work to develop harmonised European standards for PFDs was started in June 1989 by experts from nearly all nations of EN and EFTA, representing interests of researchers, Standard Setting Bodies, test houses, manufacturers, suppliers, users, consumer organisations and sporting associations.

Meanwhile the work has been extended as a common work within CEN and ISO.

1 Scope

This part of EN ISO 12402-10 gives guidance for the selection and application of personal flotation devices complying with the other relevant parts of EN ISO 12402.

It also applies to the selection and application of safety harnesses and immersion suits.

2 Normative references

This European Standard incorporates by dated or undated references, provision from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

prEN ISO 12401-1, *Personal flotation devices — Part 1: Lifejackets for seagoing ships — Safety requirements.*

prEN ISO 12402-2, *Personal flotation devices — Part 2: Lifejackets for extreme offshore conditions (level 275) — Safety requirements.*

prEN ISO 12402-3, *Personal flotation devices — Part 3: Lifejackets for offshore conditions (level 150) — Safety requirements.*

prEN ISO 12402-4, *Personal flotation devices — Part 4: Lifejackets for inland/close to shore conditions (level 100) seagoing ships — Safety requirements.*

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

prEN ISO 12402-6, *Personal flotation devices — Part 6: Special purpose lifejackets and buoyancy — Safety requirements.*

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

prEN ISO 12402-8, *Personal flotation devices — Part 8: Accessories (additional items) — Safety requirements and test methods.*

prEN ISO 12401-9, *Personal flotation devices — Part 9: Test methods for lifejackets and buoyancy aids.*

EN ISO 15027-1, *Immersion suits — Part 1: Constant wear suits, requirements including safety (ISO 15027-1:2001).*

EN ISO 15027-2, *Immersion suits — Part 2: Abandonment suits, requirements including safety (ISO 15027-2:2001).*

EN ISO 15027-3, *Immersion suits — Part 3: Test methods (ISO 15027-3:2001).*

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

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in prEN ISO 12402-1 to prEN ISO 12402-9 apply.

4 Classification, risks and recommended areas of application of PFDs

The standards EN ISO 12402-1 to EN ISO 12402-10 have been developed to set minimum safety requirements and test methods as well as to give support for designing application of PFDs for persons engaged in activities, whether in relation to their work or leisure, in or near water.

A system of various classes and performance levels (see Table 1) was established to serve the numerous needs. The buoyancy of the device is the ruling factor to indicate performance and to determine the classes. With regard to the recommended standard application the type of clothing is the overriding criteria for the range of lifejackets. The fundamental distinction between lifejackets and buoyancy aids divides the system in PFDs which are reliable also in case of an unconscious victim and those which only assist the victim in staying afloat. PFDs manufactured, selected, and maintained in accordance with the relevant part of EN ISO 12402 standards are to be used to provide a reasonable assurance of safety from drowning to a person who is immersed in water. Non of the PFDs however guarantee rescue. They are always to be seen as means to reduce the risk of drowning.

Table 1 — Classification and application of PFDs

PERSONAL FLOTATION DEVICES	EN ISO 12402-1 to –5
Standard Application	Level
offshore extreme conditions, heavy protective clothing (lifejackets)	275
offshore, foul weather clothing (lifejackets)	150
sheltered waters (lifejackets)	100
swimmers only, sheltered waters help at hand no protection against drowning (buoyancy aids)	50
special purpose device	all levels
sea going ships	SOLAS
Manufactured by: ....., ..., ..., ...	
WARNING — Flotation devices only reduce the risk of drowning They do not guarantee rescue	

PFDs can be provided by a wide variety of materials or design. Some of them may require preparation before entering the water, e. g. inflation of chamber by gas from a cylinder or blown in orally.

Lifejackets provide face up in-water support to the user regardless of his condition. Buoyancy aids require the user to be conscious to either orient himself with the face out of the water or to deploy the device to achieve face flotation.

Among the lifejackets and buoyancy aids there are a number of levels of support, type of buoyancy media, activation methods for inflatable types, and auxiliary items (such as location aids), all of which will affect the user's probability of survival. Within the types of buoyancy mediums allowed, inflatable PFDs either provide full buoyancy without any user intervention (e. g., those inflated by a fully automatic method) or require the user to initiate the buoyancy provision. Hybrid PFDs always provide some buoyancy but rely on these same methods to achieve full buoyancy. With inherently buoyant PFDs, the user only needs to put the PFD on to achieve the performance required.

PFDs that do not require intervention 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 wearer believes there will be sufficient time to produce full buoyancy, benign conditions, or help close at hand. In every circumstance, the user has to ensure that the operation of the PFD is suited to the specific application. The conformity of a PFD to the relevant part of EN 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 selection and application of PFDs.

The primary function of a PFD according to the relevant parts of EN ISO 12402 is to support the wearer in reasonable safety in water. 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 the relevant parts of EN ISO 12402 are the following:

a) to provide higher levels of support (level 100,150, or 275) that generally float the wearer with greater water clearance, enabling his efforts to be expended in recovery rather than avoiding waves, or to provide lighter or less bulky PFDs (levels 100, 70 or 50);

b) to provide the kinds of flotation media (inherently buoyant foam, hybrid, and inflatable) that will accommodate the sometimes conflicting needs of reliability and durability, in-water performance, and continuous wear;

c) to provide self-acting (inherently buoyant or automatically inflated) PFDs that float wearers 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 with manual and oral operation;

d) to support the wearer in reasonable safety in the water. In the case of automatically-operated lifejackets, to perform in this way without any intervention on the part of the wearer, except in initially donning the lifejacket;

e) to enable the wearer to propel himself in the water without it being an encumbrance;

f) to support the wearer, enabling his efforts to be expended in recovery rather than in remaining afloat;

g) to assist in detection (location aids) and recovery of the wearer.

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

In certain circumstances of the environment (such as waves), the wearing of garments which provide intentionally or otherwise additional buoyancy (such as immersion suits) or the use of equipment with additional weight (such as tool belts) will likely alter this performance. Users, owners and employers need to ensure that this is taken into account when selecting a PFD. Similarly, certain PFDs may not perform as well in extremes of temperature, although fully approved under this standard. 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 intents taking a PFD into such conditions, he needs to satisfy himself that it will not be adversely affected.

A PFD can also be an integral part of a safety harness designed to conform to ISO/DIS 12401 or of a garment with other uses, e. g., to provide thermal protection during immersion, in which case the complete assembly as used is required to conform to the relevant part of EN ISO 12402.

In compiling the attributes required of a PFD, consideration has also to be given to the potential length of service that the user might expect. Whilst a PFD which conforms to the specification 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 are not necessarily accurate simulations of it. For example, the fact that a device passes the self-righting tests 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.

It is essential that owners, users and employers select those PFDs that meet the relevant part of EN ISO 12402 for the circumstances in which they will be used. Manufacturers and those selling PFDs have to make clear to prospective purchasers the product properties and alternative choices and the limitations to normal use, prior to the purchase.

Similarly, those framing legislation regarding the wearing of these garments has to consider carefully which PFD and performance level is most appropriate for the foreseeable conditions of use, allowing for the more severe circumstances which often pertain in emergencies.

The set of prEN ISO 12402 standards specifies different performance levels and design criteria to satisfy the need of the users as follows:

a) buoyancy aids (level 50) according to prEN ISO 12402-5 are 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 and cost, but they are of limited use in disturbed water, and cannot be expected to keep the wearer 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 wearer.

b) lifejackets for inland/close to shore conditions (level 100) according to prEN ISO 12402-4 are intended for those who may have to wait for rescue, but are likely to do so in sheltered and calm water. Whilst these lifejackets are less bulky than other types of lifejackets, they should not be used in rough conditions, or when there is wave splash.

c) lifejackets for offshore conditions (level 150) according to prEN ISO 12402-3 are intended for general offshore and rough weather use where a high standard of performance is required. It will turn an unconscious person into a safe position and requires no subsequent action by the wearer to maintain this position.

d) lifejackets for extreme offshore conditions (level 275) according to prEN ISO 12402-2 are intended primarily for offshore use and by people who are carrying significant weights and thus require additional buoyancy. They are also of value to those who are wearing clothing which traps air and which may adversely affect the self-righting capacity of the lifejacket. They are designed to ensure that the wearer is floating in the correct position with his mouth and nose clear of the surface.

e) lifejackets for seagoing ships according to prEN ISO 12402-1 are intended primarily for the use on seagoing ships under IMO rules.

These different devices conform to different levels of buoyancy and performance. Nevertheless, by allowing intermediate steps within the defined performance criteria they create the opportunity for the design and manufacture of PFDs which may enhance the performance of a device and make it suitable for special conditions or applications.

Before purchasing a lifejacket or buoyancy aid the user shall evaluate the risks to which he or she is likely to be exposed. Certain trained and experienced users may consider the use of devices with less buoyancy. Examples include experienced canoeists and dinghy and wind surfing sailors, who may be able to use garments of less than 100 N buoyancy, if help or other buoyant devices are to hand.

In principle, national bodies, in particular those responsible for making recommendations, should be left to determine what is appropriate for the activities under their jurisdiction. The advice of such bodies should be sought by groups, clubs or authorities in order to select a suitable device.

Having made a decision about the appropriate class detailed information with regard to operation sizes, design and buoyancy has to be considered. When selecting a lifejacket, it has to be taken into consideration that this device shall be wearable on foul weather clothing. Additional criteria for selection of PFD see Table 2.

Table 2 — Additional criteria for selection of PFD

SPECIAL FEATURES:			integrated emergency light and spray cap				
SPECIAL APPLICATION:			offshore use / yachting / leisure mariners / not industrial				
OPERATION MODE			DESIGN				
automatically operated	manually operated	oral inflation only	multi-chamber system	amount of inflatable buoyancy (N)	amount of inherent buoyancy (N)	integrated harness	may not be used with harness
√	√			80	70	√	

Size		Chest (cm)	Body weight (kg)	Levels of minimum buoyancy (N) for:	
				lifejackets	buoyancy aids
	large	112 to 127	≥ 70	275 / 150 / 100	50
√	medium	99 to 112	60 to 70	230 / 130 / 80	45
	small	86 to 99	55 to 60	200 / 110 / 70	40
	youth	76 to 86	40 to 50	170 / 90 / 60	40
	child	66 to 76	30 to 40	140 / 75 / 50	35
	infant	50 to 66	20 to 30	120 / 60 / 40	—
	infant	34 to 50	< 20	90 / 45 / 30	—

5 Essential items to be observed by legislative authorities, manufacturers, retailers and users

5.1 PFDs

The performance of a PFD may be altered when it is worn in addition or in combination with other personal protective equipment. For example the interaction between protective clothing, in particular immersion suits and PFDs is difficult. Furthermore attempting to specify the amount of buoyancy protection of a PFD in isolation is always likely to be a problem when integrated assemblies are used. The ideal situation is one in which it is possible to identify the buoyancy of an integrated assembly intended for an individual in a specified water environment.

Certain occupational use, such as welding, is to be observed.

There is no protective value in a PFD if it has become damaged in normal use so that it no longer functions as intended.

Also the use of protective covers and multi-chamber buoyancy devices is very essential. A user can come into contact with some corrosive or noxious chemicals and it may be they require elaborate PPE. No two applications are precisely the same; but the additional items detailed in these standards are designed to cover most common hazards. PPE manufacturers have to be advised by the purchaser of special industrial circumstances when specifying equipment for such applications.

Another fundamental decision which influences all requirements for PFDs is whether or not the item will be worn all the time that immersion is a possibility. The aim is to ensure that no one enters the water without having donned a PFD. Once more, however, some element of compromise may be necessary. If a device is to be worn for prolonged periods, then it should not hinder the mobility of the wearer and it is essential that it does not endanger his safety in other respects. Persons working in confined spaces, or where there is rigging or other material which could entrap them, should also have a cover specified as an additional item to reduce snagging hazards. They will also not be able to use inherently buoyant devices and automatically inflatable PFDs shall be required. Consideration shall be given first to use safety harnesses or other technical means to prevent accidental immersion altogether.

PFDs need to be simple to don and to doff. Although the relevant standards include timed tests for donning, it may be necessary in certain circumstances to consider additional requirements beyond those required by the standards. For example, the requirement to ensure rapid and reliable donning in complete darkness or in confined spaces or when wearing gloves or mittens. Donning is also effected by the compatibility of the PFD with other equipment.

The physical circumstances of intended use are also of importance in determining the specification required of a PFD. If inflatable PFDs are stored or worn in temperature below 0 °C, carbon dioxide, the traditional inflation gas, may be adversely affected and result in only partial inflation. Other components such as nylon poppers may become rigid and difficult to open. The set of prEN ISO 12402 is intended to provide a reasonable performance for all PFDs from the tropics to cold temperate but do not require all devices to meet the more severe cold conditions likely to be encountered in polar regions. Temperatures have a considerable influence on the performance of the inflation mechanism. This occurs not just by the slowing of carbon dioxide inflation but also by the increasing activation times of the firing heads. It is very important to specify the lowest performance temperature for firing-tests, if the PFD is to be exposed to temperatures much below 0 °C. Another feature of the environment of higher latitudes in winter is short day length. All those who are at all likely to use their PFDs during the hours of darkness should also use emergency lights that comply with the additional items specified in prEN ISO 12402-8.

The EU Directive for Occupational Health and Safety (89/391 EWG) requires a risk-analysis that evaluates all surrounding conditions and influences. The outcome has to be a system of management activities and at least a proposal for the choice of adequate personal protection equipment.

It is become popular belief that most immersion deaths result form hypothermia and exhaustion after some time in water, but in fact recent research has shown that it is often the first few minutes that are most critical. Therefore effective PFDs shall be fully functional immediately on entry into the water.

For "Inflatables" therefore the most obvious which needs careful consideration, is the mode of inflation, as it is this that determines how rapidly and effectively the lifejacket can perform. In foreseeable conditions of use in which the wearer can enter cold water suddenly, or in a disabled or unconscious condition, then the PFD shall be of an automatically operated type. Thus once it has been donned; it requires no further action by the wearer.

Once it has brought the user to the surface, an effective PFD then has to maintain the wearer in a safe position so that he or she can continue to breathe. The water has two main ways in which to counteract that ability:

— by waves and water-splash and spray entering the air-ways and

— by waves inverting the wearer.

The wave, above which a spray hood becomes necessary, varies according to many factors. In the first instance, higher wind speeds and steeper waves increase the likelihood, so that even waves of only 30 cm height may constantly threaten the unprotected airway.

The design of the PFD and the orientation of the wearer with respect to waves are also very important. A PFD with a widely split front or keyholes through which the head is inserted may funnel water onto the face in the right circumstances. However, it is generally accepted that conditions in which a spray hood is required are very seldom encountered in inland waters unless they are very large; but such conditions are relatively common in the sea. No matter how high the freeboard between mouth and waves, if the conditions are right the face may be continually splashed. This results in inhalation of water and drowning if the victim is unconscious, or if breathing is rapid and uncontrollable — as occurs on first being immersed in water below about 20 °C without good immersion protective garments. This process has the additional effect of accelerating body cooling.

The self-righting ability of PFDs is of importance if an unconscious or disabled person is capsized by a wave. An unconscious person with the buoyancy of a PFD may surface inverted following initial entry into the water if air has been trapped in their every day clothing. The reason for self-righting tests is to try to provide for this event. Experience has shown that if an otherwise well-designed PFD performs well in this test, it is generally good in its overall performance in water in the sense of having good stability. The tests are to be undertaken on subjects wearing bathing costumes in order to ensure a degree of test reproducibility although it is recognised that self-righting is usually a much greater problem when wearing clothing.

The developments of modem clothing systems for foul weather gear also create the risk of trapping air and unpredictable buoyancy distribution. This has to be taken into consideration by selecting a PFD in combination with this gear. In particular application of lifejackets to infants and children needs careful consideration. Counter buoyancy arising from napkins has led to accidents. The anthropometric differences in the proportions of body configuration and centre of gravity needs to be adopted by design. Furthermore the user shall be aware of the risk of hypothermia. The user shall be informed on the principles of temperature loss, the reaction of his body to temperature loss such as uncontrolled cold shivering, disorientation up to local confusion and amnesia.

5.2 Accessories (additional items)

Performance, safety and quality of accessories have to comply with prEN ISO 12402-8. This standard realises the conception of a construction kit from which optional items can be chosen to meet special applications and or risks.

Emergency lights are an important location aid during the hours of darkness, when they are much more effective than retro-reflective tape alone. Lights not necessarily conforming to prEN ISO 12402-10 are also useful aids particularly when legislation does not demand the fitting of a conforming light.

Whistles are a useful location aid at all times.

Multi-chamber buoyancy systems may ensure that even damaged or punctured lifejackets can still save the life of the wearer, and may thus be of value in some occupational uses. Multi-chamber construction adds considerably to the cost and complexity of a lifejacket. Nevertheless for special application or in extreme conditions combined with the risk of wear and tear, such as offshore work, coastal fishing or pilot-transfer the responsible authorities should consider making the use of such jackets mandatory. Alternatively inherent buoyancy is unlikely to be damaged but it is extremely bulky to be worn with comfort.

Buddy-lines are of value if a number of survivors are likely to be in the water together but unlikely to be able to enter a life raft. Buddy-lines can however pose snag and trip hazards.

Spray hoods are of important value in protecting the airways, in rough water, but add to the cost and complexity of the lifejacket. They should not restrict the vision and must be easy to don and doff.

Protective covers are suitable for preventing damage to less robust lifejacket components, such as inflatable chambers and gas inflation heads. They reduce snagging hazards, but add to the cost and complexity of lifejackets. Protective covers shall be used in addition against risks such as chemical fluids, heat impact, molten metal splash due to welding, or the risks of fire fighting. Protective covers can be used to provide tailor-made solutions for special applications.

It is essential, however, that the correct functioning of the PFDs used in hazardous working environments is not in any way compromised by the use of such a cover. The materials out of which protective covers are made may make them less popular with certain potential wearers.

Safety harnesses and lines conforming to ISO/DIS 12401 are useful tools to reduce the risk of immersion. If they are to be used they must not compromise the performance of the lifejacket or hazard survival.

5.3 Immersion suits

Immersion of a person in water, accidentally or otherwise, carries the risk of harmful physiological effects which include cold shock, gasp reflex, hypothermia, unconsciousness and cardiac arrest, in addition to the obvious drowning hazard. Immersion suits, as defined in EN ISO 15027-1 to -3 are intended to be worn by persons in circumstances where there is exposure to a risk of accidental immersion in water. Immersion suits are intended to provide thermal protection which will reduce or delay the harmful physiological effects and therefore extend the survival time of the wearer, thus providing emergency services with a greater opportunity to effect a rescue.