SLOVENSKI STANDARD
SIST EN 395:1996

01-december-1996

Rešilni jopiči in osebni plavalni pripomočki - Reševalni jopiči - 100 N

Lifejackets and personal buoyancy aids - Lifejackets - 100 N

Rettungswesten und Schwimmhilfen - Rettungswesten - 100 N

Gilets de sauvetage et équipement individuel d'aide a la flottaison - Gilets de sauvetage - 100 N

Ta slovenski standard je istoveten z: **EN 395:1993**

ICS:

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

SIST EN 395:1996 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 395

November 1993

UDC 614.895:62-784.323:685.73:331.45:620.1

Descriptors: Rescue equipment, life jackets, safety, accident prevention, buoyancy, specifications, dimensions, tests, marking

English version

Lifejackets and personal buoyancy aids - Lifejackets - 100 N

Gilets de sauvetage et équipement individuel d'aide à la flottaison - Gilets de sauvetage - 100 N

Rettungswesten und Schwimmhilfen - Rettungswesten - 100 N

This European Standard was approved by CEN on 1993-11-22. 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 Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Contents list

Foreword

This European Standard was prepared by CEN/TC 162 "Protective clothing including hand and arm protection and lifejackets" which secretariat is held by DIN.

This European Standard has been prepared under a Mandate given to CEN by the Commission of the European Communities (and the Secretariat of the European Free Trade Association), and supports essential requirements of EC Directive(s).

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 May 1994, and conflicting national standards shall be withdrawn at the latest by May 1994.

In accordance with the CEN/CENELEC Internal Regulations, following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This standard has been prepared to meet the needs of persons engaged in activities, whether in relation to their work or their leisure, in or near water. Lifejackets manufactured and maintained to this standard will give a reasonable assurance of safety from drowning to a person who is immersed in relatively calm waters. It is not intended to replace the standard agreed by the International Maritime Organisation, or those specified for use in aircraft by the Federal Aviation Authority, the Civil Aviation Authority, and other aviation regulatory bodies, rather to apply to those people who would not be required to comply with those standards.

This standard allows for the buoyancy of a lifejacket to be provided by a wide variety of materials, 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, this broad group of buoyant devices is divided into two main types, those which require the user to initiate the buoyancy provision (whether by oral or gas inflation), and those which provide full buoyancy without any user intervention (i.e. those with inherently buoyant materials, or inflated by a fully automatic method), as well as combinations thereof. Automatically-operated lifejackets are those suited to persons likely to enter the water unexpectedly, whereas manually-operated lifejackets should only be used if it is certain that the wearer will have sufficient time to produce full buoyancy. In every circumstance, the user should ensure that the correct operation of the lifejacket is suited to the specific application. The compliance of a lifejacket with this standard does not imply that it is suitable for all circumstances. The requirement for regular maintenance is another factor of paramount importance in the choice and application of specific lifejackets.

This standard 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 stowed in a locker for emergency use.

The primary reason for the existence of this standard in contrast with EN 396 is the recognition that comfort and mobility are important factors in determining whether or not lifejackets are worn. By offering lifejackets which are of lower buoyancies, it is likely to result in the greatly increased use of such lifejackets, which in both leisure and industrial applications is of benefit in the prevention of drowning. However, the use of lower buoyancies also reduces the margin of safety, so that whilst 100 N devices perform almost as well as those of higher buoyancy in calm water, their effectiveness diminishes considerably in rough water, or when other factors such as the wearing of immersion suits come into play.

The primary aims in wearing a lifejacket are:

a) to support the wearer in reasonable safety in the water, particularly if that person is unable to swim, is exhausted, injured, or otherwise incapacitated. 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;

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

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

d) to assist the recovery of the wearer.

A lifejacket should provide a sufficient degree of buoyancy in a garment which is light in weight, not unnecessarily bulky, and allows freedom of movement. It should be secure in wear, providing positive support in the water, allowing the wearer to swim or actively assist himself or others. The amount of buoyancy specified, and its distribution, should ensure that the wearer is supported with his mouth and nose clear of the water, and at a correct attitude with the trunk inclined backwards.

Certain circumstances may alter this performance, such as waves, or the wearing of garments which provide (intentionally or otherwise) additional buoyancy, such as immersion suits. Users, owners and employers should ensure that any additional garments or equipment to be worn in conjunction with the lifejacket do not impair its performance. Similarly, certain lifejackets may not perform as well in extremes of temperature, although fully approved under this standard. Lifejackets 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. If the user intends taking a lifejacket into such conditions, then he should satisfy himself that it will not be adversely affected. The standard also allows the lifejacket to be an integral part of a safety harness designed to comply with the European standard. Lifejackets may also be made an integral part of a more substantial garment, for example to provide thermal protection during immersion, in which case the complete assembly as worn is required to comply with this standard.

In compiling the standards required of a lifejacket, consideration has also been given to the potential length of service which the user might expect. Whilst a lifejacket which complies with the specification should be of substantial construction and material, its potential length of service depends mainly 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 intended to be accurate simulations of it. For example, the fact that a device which passes the self-righting tests described herein does not guarantee that it will self-right an unconscious user wearing waterproof clothing, neither should it be expected to protect the airway of an unconscious person in rough water.

European standards exist for a range of four types of buoyancy garments, of which this standard defines just one. The four are each intended as being suitable for different activities in different risk situations, and include:

a) 275 N lifejackets - these have a buoyancy of no less than 275 N for the average adult and are intended for use offshore in extreme conditions, when heavy protective clothing is being used, or loads such as toolbelts are being carried (see EN 399);

b) 150 N lifejackets - these have a buoyancy of no less than 150 N for the average adult and are intended for use offshore or when foul weather clothing is being used (see EN 396);

c) 100 N lifejackets - these have a buoyancy of no less than 100 N for the average adult and are intended for use in relatively sheltered waters (this standard);

d) 50 N buoyancy aids - these have a buoyancy of no less than 50 N for the average adult and are intended for use in sheltered waters when help is close at hand and the user is a swimmer, in circumstances where more bulky or buoyant devices would impair the user's activity or actually endanger him (see EN 393).

It is essential that owners, users and employers choose garments which meet the correct standards for the circumstances in which they may be used, and those selling them should make clear to prospective purchasers to which category each product belongs, alternative garments in other categories, and the limitations to normal use of each of the four categories, prior to the purchase. Similarly, those framing legislation regarding the wearing of these garments should consider carefully which type is most appropriate for the foreseeable conditions of use, allowing for the more severe circumstances which often pertain in emergencies.

1 Scope

This standard specifies the requirements for construction, performance, sizing, marking and test methods for lifejackets of 100 N nominal buoyancy excluding the IMO lifejacket and those specified for use in aircraft (by the Federal Aviation Authority, Civil Aviation Authority and other aviation regulatory bodies).

2 Normative references

This European Standard incorporates by dated or undated reference, provisions 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 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.

EN 393	Lifejackets and personal buoyancy aids - Buoyancy aids 50 N
EN 394	Lifejackets and personal buoyancy aids - Additional items
EN 396	Lifejackets and personal buoyancy aids - Lifejackets 150 N
EN 399	Lifejackets and personal buoyancy aids - Lifejackets 275 N
ISO 105-B04:1988	Textiles - Tests for colour fastness - Part B04: Colour fastness to weathering: Xenon arc
ISO 105-E02:1989	Textiles - Tests for colour fastness - Part E02: Colour fastness to sea water
ISO 105-X12:1987	Textiles - Tests for colour fastness - Part X12: Colour fastness to rubbing
ISO 188 : 1982	Rubber, vulcanized - Accelerated ageing or heat-resistance tests
ISO 1421:1977	Fabrics coated with rubber or plastics - Determination breaking strength and elongation at break
ISO 2411:1991	Rubber- or plastics-coated fabrics - Determination of coating adhesion
ISO 3801:1977	Textiles - Woven fabrics - Determination of mass per unit length and mass per unit area
ISO 4674:1977	Fabrics coated with rubber or plastic - Determination of tear resistance

ISO 5081:1977	Textiles - Woven fabrics - Determination of breaking strength and elongation (Strip method)
ISO 5082:1982	Textiles - Woven fabrics - Determination of breaking strength - Grab method
ISO 7854:1984	Rubber- or plastics-coated fabrics - Determination of resistance to damage by flexing (dynamic method)
ISO 9227:1990	Corrosion tests in artificial atmospheres - Salt spray tests
AATC Method 30:1981	Fungicides, evaluation on textiles: mildew and rot-resistance of textiles

3 Definitions

For the purposes of this standard, the definitions of EN 394:1993 and 396:1993 apply.

4. Requirements

4.1 General

The lifejacket may incorporate additional items compliant with EN 394, none of which shall impair its performance with respect to the requirements of this standard.

4.2 Materials and components

4.2.1 Materials and components shall not be damaged by storage at temperatures of - 30 °C to + 60 °C when tested according to 6.1, nor shall they be damaged by salt water with oil on the surface, when tested according to 6.2.

4.2.2 Resistance to rot and illumination shall be tested according to the methods of AATCC Method 30:1981, and ISO 105-B04:1988. Illumination shall take place to class 5-6 with 1/2 unit tolerance. Materials which are screened by some form of cover when in normal use shall not undergo illumination testing. Following exposure to rot or illumination, the tensile strength shall be measured using the grab method given in ISO 5082, using specimens of at least 60 mm width and with at least 100 mm of material on each side of the test point, with 4 similar seams for each type of seam.

4.2.3 If inherently buoyant, the whole lifejacket shall be tested using the method at annex E, in which case the area of charred, melted or destroyed material shall not exceed 300 mm from the point of ignition after burning for 30 s.

4.3 Textile and fabric materials and components

4.3.1 Textiles shall be rot proof to 4.2.2 and of sufficient strength to withstand all tests in clause 6 without sustaining damage. After testing of resistance to rot and/or illumination according to 4.2.2, cloth, seams (joints), and fastening devices (including zip fasteners) shall have a tensile strength of at least 300 N per 25 mm, when tested according to the method of ISO 5082.

4.3.2 Coated fabrics used in the construction of inflatable buoyancy chambers shall comply with the following requirements:

a) coating adhesion shall be tested in accordance with ISO 2411:1991 using the method described at 5.2.2.1 at 100 mm/min, and shall be not less than 50 N per 50 mm width;

b) coating adhesion shall also be tested when wet following ageing according to ISO 188, with an exposure of (336,0 ± 0,5) h in fresh water at (70,0 ± 1,0) °C, following which the method at ISO 2411:1991, 5.2.2.1 shall be applied at 100 mm/min, and shall not be less than 40 N per 50 mm width;

c) tear strength shall be tested in accordance with ISO 4674:1977 using method A1, and shall not be less than 35 N;

d) resistance to flex cracking shall be tested in accordance with ISO 7854:1984 method A using 9 000 flex cycles, following which there shall be no visible cracking or deterioration;

e) breaking strength shall be tested in accordance with ISO 1421:1977 using the CRE or CRT methods following conditioning of (24,0 ± 0,5) h at room temperature, and shall be not less than 200 N per 50 mm width when tested;

f) breaking strength shall be tested in accordance with ISO 1421:1977 using the CRE or CRT methods following conditioning of (24,0 ± 0,5) h immersion in fresh water at room temperature, and shall be not less than 200 N per 50 mm width when tested;

g) elongation at break shall be tested in accordance with ISO 1421:1977 using the CRE or CRT methods following conditioning of (24,0 ± 0,5) h at room temperature, and shall be not more than 60%;

h) elongation at break shall be tested in accordance with ISO 1421:1977 using the CRE or CRT methods following conditioning of (24,0 ± 0,5) h immersion in fresh water at room temperature, and shall be not more than 60%.

4.3.3 The other fabrics used in the construction of covers of inherently buoyant compartments, the retention system, and any other component the failure of which would render the entire item non-conformant with this standard, shall comply with the following requirements:

a) breaking strength shall be tested to ISO 5081:1977 using the CRE or CRT methods, following (24,0 ± 0,5) h conditioning at room temperature, and shall be not less than 10 N/mm;

b) elongation at break shall be tested to ISO 5081:1977 using the CRE or CRT methods, following (24,0 ± 0,5) h conditioning at room temperature, and shall be not more than 60%;

c) tear resistance shall be tested according to ISO 4674:1977 (method A2, tensile speed (100 ± 10) mm/min, with a pretension of 2 N for materials of up to 200 g/m², 5 N for materials of over 200 g/m² and up to 500 g/m², and 10 N for materials of over 500 g/m²), and shall be not less than 10 N.

4.3.4 Where the mass per unit area of a material is required to be measured, then it shall be measured according to method 5 of ISO 3801:1977.

4.4 Metal components

4.4.1 When tested in accordance with ISO 9227:1990 for a period of 96 h, metal components shall not be significantly affected by corrosion. This shall be tested by a functional test.

4.4.2 No component shall affect a magnetic compass of a type commonly used in small boats by more than 1 degree, when placed at a distance of 500 mm from it.

4.5 Oral inflation tubes

4.5.1 An inflatable lifejacket shall have a simple and rapid method of deflation, which shall also be used for oral inflation. This oral inflation tube shall be free from burrs and shall incorporate an effective non-return valve.

4.5.2 An inflatable lifejacket shall have a minimum air flow through the oral inflation tube of 85 l/min, and the non-return valve shall open initially at an applied air pressure of between 1,0 kPa and 3,0 kPa, when tested according to 6.3.

4.5.3 If an oral inflation tube protrudes from the surface of the device, and the non-return valve either protrudes from the tube when in normal use or the valve can be separated from the tube, then it shall be tested according to 6.4. It shall not be removed by a force of (90 $^{+1}_{0}$) N.

4.6 Inflation operating head

An external inflation operating head shall withstand a force of 220 N applied to it as described in 6.5 without any evidence of fracture, leakage of gas from the buoyancy chamber, or other damage.

4.7 Gas cylinder

4.7.1 A cylinder shall be seamless and of a type which is not rechargeable following release of its contents.

4.7.2 A cylinder excluding the sealing disk shall be capable of withstanding an internal pressure of 54 MPa without bursting.

4.7.3 The material from which a cylinder is made shall resist corrosion in a marine environment or shall be suitably protected to resist corrosion.

4.7.4 A charged cylinder shall not, when conditioned for (96,0 ± 0,5) h at a temperature of (65 $^{+2}_{0}$) °C, lose gas or suffer any permanent change, except that a slight deformation of the cap which does not impair normal performance is permitted.

4.7.5 If filled with carbon dioxide, the maximum acceptable nominal mass in grams of carbon dioxide shall be no more than 75% of the volume in ml of the cylinder.

4.8 Types of buoyancy

4.8.1 At least the minimum amount of buoyancy required by this standard shall be provided by inherently buoyant material, or by the inflation of chambers with gas or air, or by a combination of these. The use of chambers permanently inflated with gas, or filled with inherently buoyant material which does not comply with this standard, shall not be permitted.

4.8.2 If a lifejacket contains inherently buoyant material which is divided itself into more than 150 separable pieces (for example, granules), then the inherently buoyant material shall be retained in at least six separate compartments in the device, each compartment being of approximately equal size, so as to reduce the risk of physical damage to a part of the device resulting in severe loss of buoyancy.

4.8.3 If the manufacturer makes the claim that the lifejacket is partially inherently buoyant, then it shall provide by its inherent buoyancy alone at least the buoyancy required of an equivalently sized device under EN 393.

4.8.4 In the case of a lifejacket dependent upon inflatable chambers for reaching the buoyancy specified, in whole or in part, and manufactured for use by children of under 30 kg in body weight, the lifejacket shall either be automatically inflated or shall additionally function as an inherently buoyant lifejacket to EN 393.

4.9 Inflatable buoyancy chambers

4.9.1 Inflatable buoyancy chambers shall be capable of withstanding an internal pressure of 40 kPa without damage or permanent deformation within a temperature range of -5 °C to 30 °C. An inflatable section shall also be tested to an internal pressure of air at 3,5 kPa for 12 h, during which it shall lose no more than 0,25 kPa pressure.

4.9.2 Gas-inflated lifejackets shall be tested according to the double inflation test at 6.8.5. No visible damage shall occur to the buoyancy chamber as a result.

4.10 Inherently buoyant material

4.10.1 Any inherently buoyant material used to provide buoyancy shall be capable of withstanding compression and movement in normal wear without sustaining permanent loss of buoyancy. The maximum loss of buoyancy when three valid samples are tested according to the method at annex H shall not exceed 10% in any foam or granular material providing inherent buoyancy.

4.10.2 Any inherently buoyant material used to provide buoyancy shall be shown to have thermal stability under the conditions of the test described in 6.6, in which the maximum loss of volume in any sample shall not exceed 5%.

4.11 Total buoyancy provided

4.11.1 For the purpose of assessment to this standard, items of different size are to be accompanied by stated minimum and maximum weight range equivalents, which shall be in reasonable accord with the marked size ranges (which may actually be set using other dimensions such as height and girth as desired). However, the primary means of indicating the device's size as regards fit shall be one which is approprite and meaningful to the prospective user, for instance the statement of weight and girth ranges, as required by 8.1 d).

4.11.2 The minimum amount of buoyancy provided shall be calculated according to table 1.

Table 1 : Minimum buoyancy

Wearer's weight in kg	up to 20	over 20 to 30	over 30 to 40	over 40 to 50	over 50 to 60	over 60 to 70	over 70
Minimum buoyancy in N	30	40	50	60	70	80	100

4.11.3 If a lifejacket is intended for two or more weight classes, the buoyancy shall be at least that stipulated for the heaviest class.

4.11.4 The buoyancy of the lifejacket shall be tested according to annex B. The difference between the measurements 24 h apart shall not exceed 5% of the original buoyancy. The buoyancy measured in any test carried out for the purpose of ascertaining conformance with this standard shall not be less than that claimed on the marking of the lifejacket, nor that required by 4.11.2.

4.11.5 Where the lifejacket is also fitted with additional buoyancy to that required by 4.11.2, it shall be manufactured from materials which are not detrimental to the performance of those used in compliance with this standard.

4.11.6 The total buoyancy measured shall for all tests be sufficient that, when diminished by the greater of the two percentage losses determined for any inherently buoyant material as determined at 4.10, it shall still meet the requirements of the respective category in 4.11.2. For example, if for a given device which requires a minimum buoyancy for its size of 50 N (according to 4.11.2), the lowest buoyancy measured under 4.11.4 is 53 N, and the tests according to 4.10.1 return a maximum loss of 4% and according to 4.10.2 a maximum loss of 3%, then the minimum acceptable buoyancy would be 50 N + (4% of 50 N), which equals 52 N.

4.12 Colour

4.12.1 The colour of the portions of the lifejacket exposed above the water surface when in use shall predominantly be in the range from yellow to red, excluding components such as webbing, zips and other fittings. The colour shall be checked against colour samples from the NCS colour atlas, and comparisons shall be made in daylight. These exposed portions shall, after illumination according to 4.2.2, have easily visible colours within the tolerance range defined by the following ranges:

0070 -
1070 - in tones
0080 - Y 30R - Y 80R
1080 -
0090 -

and

0070 -
0080 - in tones
0090 - Y - Y 20R

and the corresponding fluorescent colours in the same tolerance ranges.

4.12.2 The colour of the lifejacket shall be resistant to rubbing, wet and dry, when tested according to ISO 105-X12:1987 to at least class 3, and to salt water when tested according to ISO 105-E02:1989 to at least class 4.

4.13 Retroreflective material

4.13.1 There shall be affixed to the surface of the lifejacket at least 100 cm^2 area of material which is retroreflective of light and complies with the specification at annex D. This material shall be placed on surfaces which are normally above the water when the lifejacket is in use.