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Lifejackets

Part 2: Materials and components — Requirements and test methods



AS 4758.2:2022

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Part 2: Materials and components — Requirements and test methods

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Preface

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee CS-060, Lifejackets and Personal Safety Equipment for Small Craft, to supersede AS 4758.2:2015.

AS 4758.2:2015 will also remain current for 12 months after the date of publication of this document and after this time it will be superseded by AS 4758.2:2022. Regulatory authorities that reference this Standard in regulation may apply these requirements at a different time. Users of this Standard should consult with these authorities to confirm their requirements.

The objective of this document is to provide manufacturers with the requirements and test methods for the materials and components for use in the construction of lifejackets [also known as “personal flotation devices” (PFDs)].

The major changes in this edition are as follows:

- (a) Accelerated weathering.
- (b) Foam floatation material.
- (c) Inflation systems for lifejackets.

This document is Part 2 of the following series:

AS 4758.1, *Lifejackets, Part 1: General requirements*

AS 4758.2, *Lifejackets, Part 2: Materials and components — Requirements and test methods* (this document)

AS 4758.3, *Lifejackets, Part 3: Test methods*

This document is based on but not equivalent to ISO 12402-7:2020, *Personal flotation devices, Part 7: Materials and components — Safety requirements and test methods*. Content from this Standard has been reproduced with the permission of ISO. The International Standard is available from SAI Global. Copyright remains with ISO.

The term “normative” has been used in this Standard to define the application of the appendix to which it applies. A “normative” appendix is an integral part of a Standard.

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Australian Standard®

Lifejackets

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Section 1 Scope and general

1.1 Scope

This document specifies the requirements for the structural materials and components and test methods for the construction of lifejackets.

1.2 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.

AS 4758.1, *Lifejackets, Part 1: General requirements*

AS 4758.3, *Lifejackets, Part 3: Test methods*

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

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

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

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

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

ISO 2411, *Rubber- or plastics-coated fabrics — Determination of coating adhesion*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

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

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

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

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

ISO 7229, *Rubber- or plastics-coated fabrics — Measurement of gas permeability*

ISO 7854, *Rubber- or plastics-coated fabrics — Determination of resistance to damage by flexing*

ISO 9073-4, *Nonwovens — Test methods — Part 4: Determination of tear resistance by the trapezoid procedure*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 13934-1, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method*

ISO 13934-2, *Textiles — Tensile properties of fabrics — Part 2: Determination of maximum force using the grab method*

ISO 13937-2, *Textiles — Tear properties of fabrics — Part 2: Determination of tear force of trouser-shaped test specimens (Single tear method)*

ISO 13938-1, *Textiles — Bursting properties of fabrics — Part 1: Hydraulic method for determination of bursting strength and bursting distension*

ISO 13938-2, *Textiles — Bursting properties of fabrics — Part 2: Pneumatic method for determination of bursting strength and bursting distension*

ASTM D412-16, *Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension*

ASTM D471-16, *Standard Test Method for Rubber Property — Effect of Liquids*

ASTM D882, *Standard Test Method for Tensile Properties of Thin Plastic Sheeting*

ASTM D2061, *Standard Test Methods for Strength Tests for Zippers*

ASTM D2062, *Standard Test Methods for Operability of Zippers*

ASTM D4157, *Standard Test Method for Abrasion Resistance of Textile Fabrics (Oscillatory Cylinder Method)*

EN 590, *Automotive fuels — Diesel — Requirements and test methods*

1.3 Terms and definitions

For the purposes of this document, the definitions given in AS 4758.1 and those below apply.

1.3.1

coated fabric

flexible materials composed of a textile fabric and an adherent polymeric material

1.3.2

filling density

mass of the gas charge for inflation medium containers, in kilograms, divided by the volume of the inflation medium container, in litres

1.3.3

foam flotation material

closed-cell (cells not interconnecting) foamed polymeric material

1.3.4

inflation system

means of inflating one or more compartments to make the lifejacket buoyant or more buoyant on demand, either actively or passively of the user's action

1.3.5

selvage

uncut edge portion of a fabric

1.3.6

status indicator

part or parts of an inflation system that provide user feedback to assist in keeping an inflatable lifejacket in an armed and ready condition

1.3.7

warp

yarn running lengthwise, parallel to the selvage, in a woven fabric

1.3.8

weft

yarn running from selvage to selvage at right angles to the warp in woven fabrics

1.4 Sample conditioning

1.4.1 Standard conditioning

Standard conditions shall be as follows:

- (a) Except for textile products (e.g. fabric, webbing, thread, tie tape), the applicable number of samples specified in each section shall be conditioned at 23 ± 2 °C and 50 ± 5 % relative humidity for not less than 24 h prior to the tests.
- (b) For textile products, the samples shall be conditioned in accordance with ISO 139:2005/Amd 1:2011 for not less than 24 h.
- (c) Where required to be tested under “wet conditions”, the sample shall be soaked for 6 ± 0.2 –0 h in fresh water, or as specified in the procedure itself.

1.4.2 Accelerated weathering

This clause has been reproduced with modification from ISO 12402-7:2020 Clause 4.1.6.4 with permission.

Laboratory exposure of components and fabrics for lifejackets to conditions representative of elements found in a severe outdoor environment, including light and water, shall be conducted by exposing samples in a xenon weathering machine in accordance with ISO 4892-1:2016 and ISO 4892-2:2013 as further defined by the following specifications —

- (a) exposure: $500 \text{ kJ}/(\text{m}^2 \times \text{nm})$ at 340 nm of UV radiation;
- (b) sample mounting: mount samples with the face side (the side normally exposed to sunlight in service) toward the light so that the centre of each sample is in the same plane as the perpendicular to the centerline of the light source;
- (c) irradiance: $0.55 \text{ W}/\text{m}^2$ at 340 nm;
- (d) filters: daylight filters;
- (e) black panel temperature: (63 ± 2) °C;
- (f) dry bulb temperature: (42 ± 2) °C;
- (g) relative humidity: 50 % (during light-only cycle);
- (h) water temperature: (20 ± 5) °C;
- (i) test cycles: 102 min of light/18 min of light and continuous water spray/24 min dark and water spray.

[SOURCE: ISO 12402-7:2020 Clause 4.1.6.4. Copyright ISO. All rights reserved.]

Section 2 Sewing thread

2.1 Construction

Sewing thread shall not contain natural fibres or be monofilament.

2.2 Performance

Sewing threads shall conform to the requirements specified in [Table 2.1](#) where they contribute to the structural strength of the lifejacket.

2.3 Loop breaking strength

The loop breaking strength shall be determined using a constant rate of extension tensile testing machine described in ISO 2062 as follows:

- (a) Secure both ends of one piece of sewing thread in one clamp of the testing machine so that the length of the loop equals half the distance between the jaws.
- (b) Pass one end of the second piece through the loop formed by the first and secure both ends in the other clamp of the testing machine.
- (c) Operate the tensile testing machine at a constant rate of extension of 300 ± 10 mm/min.
- (d) Record the breaking strength.

Table 2.1 — Sewing thread

Property	Conditioning	Test method	Number of samples	Sample size mm	Conformity criteria
Single thread breaking and elongation	(a) Standard conditioning in accordance with Clause 1.4.1 .	ISO 2062:2009 Method A	5 for each colour for each exposure	1 000 $\pm$ 10	After conditioning (a), the average breaking strength shall be at least 25 N.
	(b) Accelerated weathering in accordance with Clause 1.4.2 .				After conditioning (b), the average breaking strength shall be at least 15 N.
Loop breaking strength	Standard conditioning	See Clause 2.3	5 (each consisting of two pieces)	500 $\pm$ 10	Average loop breaking strength shall be at least 44 N.

[SOURCE: ISO 12402-7:2020, Table 1, modified]

Section 3 Fabric

Fabric used for structural components of lifejackets shall conform to the requirements specified in [Table 3.1](#).

Table 3.1 — Fabric

Property	Conditioning	Test method	Number of samples	Sample size mm	Conformity criteria
Tensile strength (woven fabrics only)	(a) Standard conditioning in accordance with Clause 1.4.1 . (b) Accelerated weathering in accordance with Clause 1.4.2 .	ISO 13934-2:2014	5 warp and 5 weft for each separate exposure	As specified by test method	After conditioning (a), the average tensile breaking load shall be not less than 400 N in each direction. After conditioning (a) and (b), the average tensile load shall be not less than 260 N in each direction.
Burst strength (knitted fabrics only)	(a) Standard conditioning in accordance with Clause 1.4.1 . (b) Accelerated weathering in accordance with Clause 1.4.2 .	ISO 13938-1:2019 or ISO 13938-2:2019	6 for each separate exposure	130 × 130	After conditioning (a) the bursting strength shall be at least 800 kPa. After conditioning (b) the bursting strength shall be at least 480 kPa. Results shall be given as average of six samples.
Tearing strength (woven fabrics only)	Standard conditioning in accordance with Clause 1.4.1 .	ISO 13937-2:2000	5 warp 5 weft	50 × 200	After conditioning, the average tearing strength shall be not less than 25 N in both directions.
Adhesion strength ^a	Standard conditioning in accordance with Clause 1.4.1 .	ISO 2411:2017	2 warp and 2 weft or 5 warp and 5 weft	50 × 200 or 75 × 200	After conditioning, the coating adhesion shall be not less than 7 N/cm.

^a Applies to coated fabrics with a coating of 185 g/m² or more and where the base fabric or scrim does not conform to the applicable strength requirements for uncoated fabric.

[SOURCE: ISO 12402-7:2020, Table 2, modified]

Section 4 Structural webbing

Structural webbing shall conform to the requirements specified in [Table 4.1](#).

Table 4.1 — Structural webbing

Property	Conditioning	Test method	Number of samples	Sample length mm	Conformity criteria
Tensile strength	(a) Standard conditioning in accordance with Clause 1.4.1 .	ISO 13934-1:2013	5 for each separate conditioning	≥ 300	After conditioning (a), the average tensile strength shall be at least 1 600 N.
	(b) Accelerated weathering in accordance with Clause 1.4.2 .				After conditioning (b), the average tensile strength shall be at least 960 N.

[SOURCE: ISO 12402-7:2020, Table 5, modified]