INTERNATIONAL STANDARD

ISO 9650-3

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Small craft — Inflatable liferafts —

Part 3: Material

Petits navires — Radeaux de survie gonflables —

Partie 3: Matériaux

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Foreword

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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 9650-3 was prepared by Technical Committee ISO/TC 188, *Small craft*.

ISO 9650 consists of the following parts, under the general title *Small craft — Inflatable liferafts*:

— *Part 1: Type I*

— *Part 2: Type II*

— *Part 3: Material*

Small craft — Inflatable liferafts —

Part 3: Material

1 Scope

This part of ISO 9650 specifies requirements and test methods for the materials used in the construction of the inflatable liferafts specified in ISO 9650-1 and ISO 9650-2.

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 1419, *Rubber- or plastics-coated fabrics — Accelerated-ageing tests*

ISO 1421:1998, *Rubber- or plastics-coated fabrics — Determination of tensile strength and elongation at break*

ISO 2231, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing*

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

ISO 3011, *Rubber- or plastics-coated fabrics — Determination of resistance to ozone cracking under static conditions*

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

ISO 4675, *Rubber- or plastics-coated fabrics — Low-temperature bend test*

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

3 Fabrics

3.1 Materials

The materials used for the buoyancy chambers, floor, canopy support and canopy shall be single- or double-faced coated fabrics.

The base fabric shall be inherently rot-proof.

NOTE Cotton base fabric will not be considered as rot-proof.

3.2 Tests

When tested by the methods described in Clause 6, the materials shall comply with the requirements specified in Table 1.

Table 1 — Performance requirements

PROPERTY	PERFORMANCE REQUIREMENTS		CLAUSE NUMBER
	BUOYANCY CHAMBERS/FLOOR	CANOPY	
BREAKING STRENGTH	Not less than 1 500 N/50 mm Warp 1 300 N/50 mm Weft	Not less than 650 N/50 mm Warp 650 N/50 mm Warp	6.2
TEAR STRENGTH constant rate of traverse	Not less than 40 N Warp 40 N Weft	Not less than 10 N Warp 10 N Weft	6.3.1
TEAR STRENGTH wound test method	Not less than 800 N Warp 750 N Weft	Not less than 400 N Warp 400 N Weft	6.3.2
COATING ADHESION AND PLY SEPARATION	Not less than 10 N/10 mm	N/A	6.4
LOW-TEMPERATURE BEND TEST [a]	a) buoyancy chamber material No cracking or other visible deterioration when tested at – 30 °C Cracking when tested at – 50 °C is permissible only if an internal insulation-protection system is used, or the inflation medium is a non-liquified gas b) floor material No cracking or other visible deterioration when tested at – 15 °C	No cracking or other visible deterioration when tested at – 15 °C	6.5
OZONE RESISTANCE	No visible cracking.	N/A	6.6
POROSITY [a]	No bubbles visible within 5 min of the start of the test	N/A	6.7
AGEING TEST	No cracking, blistering, stickiness or brittleness	No cracking, blistering, stickiness or brittleness	6.8

N/A: not applicable

[a] For liferafts using an internal bladder construction, these tests (low temperature bend test and porosity test) are applicable only to the inner bladder material.

The outer support material shall meet a – 15 °C low-temperature bend test.

4 Adhesives

Adhesives used in the manufacture of liferaft shall be compatible with the materials used. Whenever a test method requires the use of an adhesive, the method of preparation of the adhesive and its method of application shall be the same as those used during manufacture of the liferaft.

5 Metallic parts

All exposed metallic parts shall be tested in accordance with ISO 9227, for two periods of 24 h with a 2 h drying period in between (i.e. a total test time of 50 h).

There shall be no corrosion that might impair the function of the component.

6 Test methods of for coated materials

6.1 General conditions for tests

6.1.1 Standard environmental conditions

Unless otherwise specified, the standard environmental conditions for the tests shall be in conformance with ISO 2231. There are two possible alternatives: Atmosphere A and atmosphere B. The temperature, humidity and atmospheric pressure at the time of test shall be recorded.

6.1.2 Test specimens

The required number of test specimens shall be taken from the effective width of a coated fabric, well away from the selvages and the ends, and in a direction parallel with the warp or parallel with the weft, as required. This does not apply to the ozone test and the porosity test.

6.2 Breaking strength

This test shall be carried out to determine the breaking strength under a tensile load.

The test shall be performed in accordance with the Constant Rate of Traverse Method (CRT — Method B) specified in ISO 1421 using dry test strips.

6.3 Tear tests

6.3.1 Constant rate of traverse method

This test shall be carried out in accordance with ISO 4674-1 (Method A — Constant rate of tear): traverse speed (100 ± 0,10) mm/min using dry test strips.

6.3.2 Wound test method

6.3.2.1 Apparatus

The apparatus shall be an approved tensile-strength machine complying with Clause 5 of ISO 1421:1998 except that:

a) the constant rate of traverse method may be used, but the rate of jaw separation shall not be more than (70 ± 10) mm/min;

b) the load indicated at any part of the range used shall be correct, within 1 % of the load;

c) the jaws shall initially be 200 mm apart and the maximum elongation at break measured and given as a percentage of the original 200 mm gauge length.

6.3.2.2 Preparation of specimen

From the test sample, cut three rectangular specimens each (75 ± 0,5) mm wide and 300 mm to 400 mm long as convenient, with the length closely parallel to the direction of the warp threads, and also three specimens with the length closely parallel to the direction of the weft threads.

Space the selection across the full width and length of the sample.

Make a 12,5 mm cut across the middle of each specimen at right angles to the length.

6.3.2.3 Test procedure

Grip the specimen under test accurately and evenly in the jaws so that they are 200 mm apart, and so that the specimen length is close to the direction of the pull.

Start the test machine at the specified rate of traverse, and continue tearing until the test piece is completely torn.

As the load is applied, the specimen yields by tearing outwards from both ends of the 12,5 mm cut, and in the case of 2-ply fabric by parting of the plies. The maximum load sustained, whilst the fabric is being torn, is recorded as the wound tearing strength, and the average of the results for the three specimens is calculated.

6.4 Coating adhesion and ply separation

The adhesion between coating and fabric shall be tested in accordance with the method specified in ISO 2411 at a speed of (100 ± 10) mm/min. All coated surfaces are to be tested.

The adhesion strength is expressed as the arithmetic mean of the results of test specimens.

6.5 Low-temperature bend test

This test shall be carried out in accordance with ISO 4675 on each surface of the material.

Test specimens for all materials shall be exposed at the test temperature for 1 h before tests are carried out.

6.6 Ozone resistance test

This test shall be carried out in accordance with ISO 3011.

Three test specimens 25 mm wide x 100 mm long shall be tested under the following conditions:

— concentration of ozone (50 ± 5) parts per hundred million by volume;

— temperature (30 ± 2) °C;

— time of testing 24 h;

— mandrel diameter 10 × material thickness.

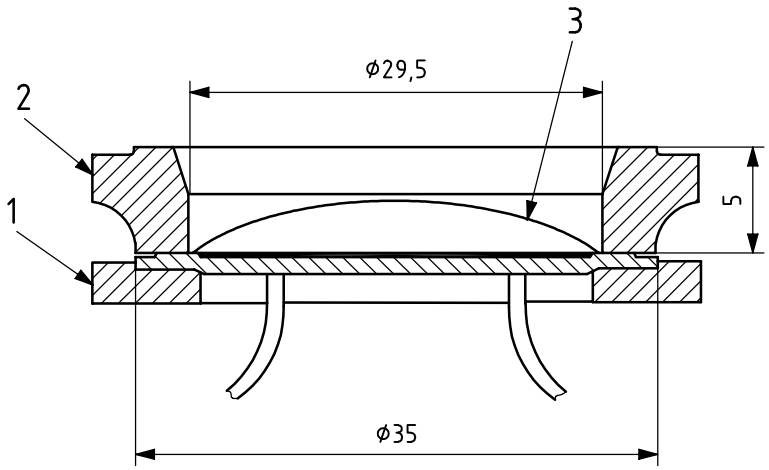
Inspect the specimens under a magnification of × 5, on a mandrel of diameter × 10 of the thickness of the material.

6.7 Porosity test

6.7.1 Apparatus

The apparatus required is shown diagrammatically in Figure 1.

Dimensions in centimetres



Key

1 base plate with air inlet and connection to gauge, having grooved margin for clamping

2 grooved mating clamping ring having sufficient depth to permit flooding of specimen with water. The fabric shall be gripped tightly between the clamping ring and base by the use of G–clamps. Alternatively, the ring and base shall have eight equally spaced lugs cast on them, drilled to take bolts

3 fabric specimen

Figure 1 — Apparatus for air porosity test

6.7.2 Preparation of specimen

Cut, from the test sample, a disc 350 mm in diameter and seal at the periphery on both surfaces and the edge by dipping in molten wax to leave a wax-free central test area 290 mm in diameter. Air the specimen for 24 h before testing.

NOTE A mixture of 7 parts petroleum jelly and 2 parts beeswax is suitable.

6.7.3 Procedure

Carry out the following procedure at a temperature of not less than 19 °C:

a) clamp the specimen, with the outer face uppermost, firmly in the apparatus;

b) apply and maintain, beneath the fabric, an air pressure of 27,5 kN/m^2 or as otherwise specified in the appropriate textile specification;

c) not less than 10 min nor more than 15 min after the pressure has become steady, flood the fabric with water so that the crown of the bulge is immersed to a depth of about 13 mm;

d) allow to stand for 1 min and then brush the surface all over with a fairly soft brush to remove adherent air bubbles;

e) record zero time and count the number of bubbles breaking the surface of the water in 5 min;

f) if the specimen contains a leak at a single site, disregard the result and repeat the test on two further specimens from the same piece, and report the occurrence.

6.8 Ageing test

This test shall be carried out in accordance with ISO 1419 using the “oven method” for a duration of 7 days at a temperature of (70 ± 1) °C.