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AMENDMENT 1
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Personal flotation devices —

Part 7: Materials and components — Safety requirements and test methods

AMENDMENT 1

Équipements individuels de flottabilité —

Partie 7: Matériaux et composants — Exigences de sécurité et méthodes d'essai

AMENDEMENT 1

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Foreword

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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.

Amendment 1 to ISO 12402-7:2006 was prepared by Technical Committee ISO/TC 188, *Small craft*, Subcommittee SC 1, *Personal safety equipment,* in collaboration with Technical Committee CEN/TC 162, *Protective clothing including hand and arm protection and lifejackets*.

Personal flotation devices —

Part 7: Materials and components — Safety requirements and test methods

AMENDMENT 1

Page 1, Normative references

Replace:

"ISO 31 (all parts), *Quantities and units*"

with

"ISO 80000 (all parts), *Quantities and units*

IEC 80000 (all parts), *Quantities and units*"

Replace:

"ISO 2062, *Textiles — Yarns from packages — Determination or single-end breaking force and elongation at break*"

with

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

Page 3, Normative references

Replace:

"ASTM D 471-98, *Standard Test Method for Rubber Property-Effect of Liquids*"

with

"ASTM D 471-06, *Standard Test Method for Rubber Property — Effect of Liquids*"

Page 5, 4.1.4

In the first line, replace "ISO 31" with "ISO 80000 and IEC 80000".

"*Page 6, 4.1.6.3*

Replace the first sentence with the following:

"Where required by the test method, the component or sample of fabric shall be conditioned, in its normal storage state, and then immediately exposed for (24 ± 0,5) h at a temperature of (–30 ± 2) °C, then for (24 ± 0,5) h at a temperature of (60 ± 2) °C."

Page 7, 4.1.6.4

Add the following after the last list item:

"NOTE This test is not applicable to fabrics related to PFDs complying with ISO 12402-5."

Page 8, 4.3.2.2

Replace the complete subclause with the following:

"**4.3.2.2** Textile woven fabrics shall have an as-received tensile strength as specified in Table 2, measured using the grab method given in ISO 13934-2."

Page 8, 4.3.2.3

Replace the complete subclause with the following:

"**4.3.2.3** Textile knitted fabrics shall have an as-received burst strength as specified in Table 2, measured using the method given in ISO 13938-1 or ISO 13938-2."

Page 9, Table 2

Replace Table 2 with the following:

Table 2 — Fabric

Property	Exposure	Test method	Number of samples	Sample size[a] (mm × mm)	Compliance criteria
Tensile strength (woven fabrics only)	1 Standard conditioning 2 Accelerated weathering according to 4.1.6.4 3 70 h immersion in: 3.1 fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[b] 3.2 0,5 % detergent according to ISO 6330	ISO 13934-2, except that jaw breaks may be included in the average results.	5 warp and 5 weft for each separate exposure	As specified by test method	Following exposure 1, the average of 5 samples shall be at least 400 N for each direction. Following each separate exposure 2 and 3, the average of 5 samples shall be at least 260 N.

Table 2 (*continued*)

Property	Exposure	Test method	Number of samples	Sample size[a] (mm × mm)	Compliance criteria
Bursting strength (knitted fabrics only)	1 Standard conditioning 2 Accelerated weathering according to 4.1.6.4 3 70 h immersion in: 3.1 fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[b] 3.2 0,5 % detergent according to ISO 6330	ISO 13938-1 or ISO 13938-2	10 for each separate exposure	130 × 130	Following exposure 1, the average of 10 samples shall be at least 800 kPa. Following each separate exposure in 2 and 3, the average of 10 samples shall retain at least 60 % of the strength determined following standard conditioning.
Elongation at break (woven fabrics only)	Standard conditioning	ISO 13934-1	5 warp and 5 weft	As specified by test method	Following standard conditioning, the average of 5 samples shall not exceed a 60 % increase of elongation at break.
Tearing strength (woven fabrics only)	Standard conditioning	ISO 13937-2	5 warp 5 weft	50 × 200	The average of 5 samples shall be at least 25 N for each direction.
Yarn slippage (woven fabrics only)	Standard conditioning	See 4.3.2.6	5 warp 5 weft	100 × 150	The average of 5 samples shall be at least 220 N.
Openness of weave[c]	Standard conditioning	See 4.3.2.7			The openness of weave shall not exceed 20 %.
Adhesion strength[d]	Standard conditioning	ISO 2411	2 warp and 2 weft or 5 warp and 5 weft	50 × 200 or 75 × 200	The coating adhesion shall be at least 7 N/cm.

[a] Applies to each colour except for fabrics related to PFDs complying with ISO 12402-5, where a minimum of one colour shall be tested.

[b] Exposure tests shall be based on typical fuels used in the intended area of application.

[c] Applies to external cover fabrics only, not to gusset, lining, or drainage fabric.

[d] Applies only to coated fabric with a coating of 185 g/m^2 or more and where the base fabric or scrim does not comply with the applicable strength requirements when fabric is uncoated.

Page 12, 4.3.3.2

Replace the complete subclause with the following:

"**4.3.3.2** The colour of the material samples shall be measured using the procedures defined in CIE publication No. 15.2 with polychromatic illumination D_{65}, 45/0 geometry and 2° standard observer. The specimen shall have a black underlay with a reflectance of less than 0,04. The specimens shall be conditioned for at least 24 h at (20 ± 2) °C and (65 ± 5) % relative humidity. If the test is carried out in other conditions, the test shall be conducted within 5 min after withdrawal from the conditioning atmosphere."

Page 12, 4.3.3.3

Delete the complete subclause 4.3.3.3 and renumber current subclause 4.3.3.4 as 4.3.3.3.

Page 12, Table 3

Replace Table 3 with the following:

Table 3 — Chromaticity coordinates x and y and luminance factor β for yellow, orange and red non-fluorescent colours of lifejacket material

Colour	Chromaticity coordinates		Luminance factor
	x	y	β
Yellow	0,389 0,320 0,405 0,500	0,610 0,490 0,400 0,500	> 0,35
Orange	0,500 0,405 0,470 0,600	0,500 0,400 0,330 0,400	> 0,25
Red	0,600 0,470 0,525 0,700	0,400 0,330 0,270 0,300	> 0,15

Page 13, Table 4

Replace Table 4 with the following:

Table 4 — Chromaticity coordinates x and y and luminance factor β for yellow, yellow-orange, orange, orange-red and red fluorescent colours of lifejacket material

Colour	Chromaticity coordinates		Luminance factor
	x	y	β
Fluorescent yellow	0,380 0,320 0,370 0,440	0,610 0,490 0,440 0,550	> 0,60
Fluorescent yellow–orange	0,440 0,370 0,420 0,505	0,550 0,440 0,390 0,490	> 0,50
Fluorescent orange	0,505 0,420 0,460 0,575	0,490 0,390 0,350 0,425	> 0,40
Fluorescent orange–red	0,575 0,460 0,488 0,630	0,425 0,350 0,320 0,360	> 0,30
Fluorescent red	0,630 0,488 0,525 0,695	0,360 0,320 0,280 0,300	> 0,20

Page 16, Table 8

Replace Table 8 with the following:

Table 8 — Zippers

Property	Exposure	Test method	Number of samples[a]	Sample length mm	Compliance criteria
Operability force	1 Standard conditioning 2 70 h immersion in fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[b,c] 3 70 h immersion in 0,5 % detergent according to ISO 6330 4 720 h of salt spray according to 4.1.5.2[d] 5 Accelerated weathering according to 4.1.6.4	ASTM D 2062	Six for each separate exposure	150	Following each separate exposure 1 to 5, the force exerted to open or close the zipper shall not exceed 65 N. Additionally, the same samples shall comply with the applicable requirements in the crosswise strength test following this test.
Crosswise strength	1 Standard conditioning 2 70 h immersion in fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[b,c] 3 70 h immersion in 0,5 % detergent according to ISO 6330 4 720 h of salt spray according to 4.1.5.2[d] 5 Accelerated weathering according to 4.1.6.4	See 4.6.2.3	Samples used in the operability force tests	150	Following each separate exposure 1 to 5, the average strength shall be not less than a) 220 N for the top (including slider); b) 220 N for the chain (crosswise); and c) 130 N for the separating unit (crosswise). Following exposures 2 to 4, the average of six samples shall retain at least 60 % of the strength determined following standard conditioning. Following exposure 5, the average of six samples shall retain at least 40 % of the strength determined following standard conditioning.
Resistance to pull-off of slider pull	Standard conditioning	ASTM D 2061	3	150	The pull-and-slider zipper assembly shall not dislodge when subjected to a force of 180 N.
Resistance to twist of pull and slider	Standard conditioning	ASTM D 2061	4 (2 for each direction)	150	The pull and slider shall resist a force of 0,79 Nm torsional stress without significant deformation or rupture.
Holding strength of slider lock	Standard conditioning	ASTM D 2061	3	150	The locking mechanism shall remain locked when subjected to a force of 20 N and the slider shall be operable.

[a] Applies to each colour.

[b] Exposure tests shall be based on typical fuels used in the intended area of application.

[c] Samples shall be blotted dry to remove surface moisture and shall rest for 30 min at ambient temperature prior to the operability force and strength tests.

[d] Applies to zippers employing metallic parts, except those made of stainless steel or equivalent corrosion-resistant metals.

Page 19, Table 9

Replace Table 9 with the following:

Table 9 — Webbing closures and adjusters

Property	Exposure	Test method	Number of samples[a,b]	Compliance criteria
Tensile strength	1 Standard conditioning 2 70 h immersion in fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[c,d] 3 70 h immersion in 0,5 % detergent according to ISO 6330 4 (70 ± 2) °C for 7 days[c] 5 (−30 ± 2) °C for 24 h[e] 6 720 h of salt spray according to 4.1.5.2 7 Fatigue[f] 8 Accelerated weathering according to 4.1.6.4	See 4.7.1.2.1	5 for each separate conditioning	Following each separate exposure 1 to 8 a) hardware shall have a minimum strength of 890 N; or b) where hardware is intended for use in meeting the PFD horizontal load test requirement for lifejackets, or is a single load-bearing member intended for use in meeting the PFD horizontal load test requirement for buoyancy aids, hardware shall have a minimum tensile strength of 1 600 N. For exposures 2 to 8, the average of 5 samples shall retain at least 60 % of the strength that determined from standard conditioning.

Table 9 (*continued*)

Property	Exposure	Test method	Number of samples[a, b]	Compliance criteria
Strength/ slippage	1 Standard conditioning 2 2 min water soak[f] 3 The same exposure as tensile strength exposure that resulted in greatest percentage strength loss[g]	See 4.7.1.2.2	5 for each separate exposure	For exposures 1 to 3, each sample shall support, without breaking, distorting, or slipping more than 25 mm, a load of: a) 890 N[h]; b) 1 600 N for 30 min where hardware is intended for use in meeting the PFD horizontal load test requirement for lifejackets, or is a single load-bearing member intended for use in meeting the PFD horizontal load test requirement for buoyancy aids.
Inadvertent release test (dual-tab closures only)	Standard conditioning	See 4.7.1.2.3	5	Each sample shall support for 5 min, without breaking, disengagement, or similar condition, a load of at least 50 % of the minimum tensile strength specified for exposure 1 in the tensile strength test for the standard conditioning using webbing for PFDs.

[a] Applies to each colour.

[b] A minimum of 75 hardware/webbing samples.

[c] Samples shall be blotted dry to remove surface moisture and shall rest for 30 min at ambient temperature prior to the strength test.

[d] Exposure tests shall be based on typical fuels used in the intended area of application.

[e] Immediately following removal from the cold chamber, the samples shall be dropped using different orientations onto a concrete floor five times from a height of 1 800 mm. Each sample shall then be manually operated five times and examined for signs of cracking. The samples shall then be returned to the cold chamber for 15 min. Finally, the samples shall be individually removed and subjected to the tensile strength test and strength/slippage test.

[f] The webbing which is used for the applicable tests in 4.7.1.2.1 shall be soaked in fresh water for 2 min prior to the strength/slippage test.

[g] Each flexible or moveable tab of a polymeric part shall be mechanically operated for 5 000 cycles at a rate of 1 cycle/s. The tab shall be completely engaged/disengaged. Also, for hardware which is designed to separate into two parts (i.e. buckles), the parts shall be completely engaged/disengaged. In addition, the samples shall be manually operated five times prior to the tensile strength test and strength/slippage test.

[h] Strength values are for the fixed-straight-length body strap method. The values shall be doubled for the closed-loop assembly method.

Page 23, Table 10

Replace Table 10 with the following:

Table 10 — Lacing closures and adjusters

Property	Exposure	Test method	Number of samples[a, b]	Compliance criteria
Tensile strength	1 Standard conditioning 2 70 h immersion in fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[c,d] 3 70 h immersion in 0,5 % detergent according to ISO 6330 4 (70 ± 2) °C for 7 d[c] 5 (−30 ± 2) °C for 24 h[e] 6 720 h of salt spray according to 4.1.5.2 7 Fatigue[f] 8 Accelerated weathering according to 4.1.6.4	See 4.7.2.2.1	5 for each separate exposure	Following each separate exposure 1 to 7, each sample shall have a minimum breaking strength of 1 000 N. Also, for exposures 2 to 8, the average of 5 samples shall retain at least 60 % of the strength determined from standard conditioning.
Strength/ slippage	1 Standard conditioning 2 2 min water soak[g]	See 4.7.2.2.2	5 for each separate exposure	For exposures 1 and 2, each sample shall support, without breaking, distorting, or slipping more than 25 mm, a weight of 1 000 N for 10 min using the fixed-straight-length body strap method. The load is to be doubled for the closed-loop assembly method.
Tab disen-gagement test	Standard conditioning	See 4.7.2.2.3	5	A moveable tab shall remain engaged and operable when subjected to a shock load of (6,8 ± 0,2) J.

[a] Applies to each colour.

[b] For polymeric hardware, a minimum of 80 samples. For metal hardware, 35 hardware samples.

[c] Samples shall be blotted dry to remove surface moisture and shall rest for 30 min at ambient temperature prior to the strength test.

[d] Exposure tests shall be based on typical fuels used in the intended area of application.

[e] Immediately following removal from the cold chamber, the samples shall be dropped using different orientations onto a concrete floor five times from a height of 1 800 mm. Each sample shall then be manually operated five times and examined for signs of cracking. The samples shall then be returned to the cold chamber for 15 min. Finally, the samples shall be individually removed and subjected to the tensile strength test and strength/slippage test.

[f] Each flexible or moveable tab of a polymeric part shall be mechanically operated for 5 000 cycles at a rate of 1 cycle/s. The tab shall be completely engaged/disengaged. Also, for hardware which is designed to separate into two parts (i.e. buckles), the parts shall be completely engaged/disengaged. In addition, the samples shall be manually operated five times prior to the tensile strength test and strength/slippage test.

[g] The lacing which is used for the applicable tests in 4.7.2.2.2 shall be soaked in fresh water for 2 min prior to the strength/slippage test.

Page 25, Table 12

Replace Table 12 with the following:

Table 12 — Foam flotation material

Property	Test method	Number of samples	Compliance criteria[a]
Density	See 4.8.2.1	18[b]	Baseline test.
Specific buoyancy	See 4.8.2.2	18	Baseline test.
Compression[c]	See 4.8.2.4 or 4.8.2.5[d]	3[e]	The maximum loss of buoyancy for the average of all samples shall not exceed 10 %.
Thermal stability[c]	See 4.8.2.3 or 4.8.2.5[d]	3[c]	The maximum loss of volume in any sample shall not exceed 5 % and there shall be no sign of damage such as shrinking, cracking, swelling, dissolution or change of mechanical qualities, when compared with unconditioned specimens.[d]
Buoyancy retention factors, alternative to compression and thermal stability:[c,d] V-factor (for wearable devices)	4.8.2.5	9[e,f]	94 V for material used to make up at least 85 % of the required buoyancy in a PFD meeting the requirements of ISO 12402-1 to ISO 12402-3. 85 V for material used to make up at least 85 % of the required buoyancy in a PFD meeting the requirements of ISO 12402-4 to ISO 12402-6. 80 V for material making up no more than 15 % of the required buoyancy in any PFD.
Tensile strength	See 4.8.2.6	5[g]	The average tensile strength shall be not less than 140 kPa for foam that is a structural part of the device, i.e. not retained by a cover fabric.
Oil resistance	See 4.8.2.7	3[f]	There shall be no visible volume change, softening, or deterioration of a material when compared with unconditioned specimens, and the average tensile strength of the material shall be not less than 75 % of the value determined for the unconditioned specimens.
Cold flexibility	See 4.8.2.8	3[f]	There shall be no cracking when examined under a magnification of 5 ×.
Compression deflection	See 4.8.2.9	3[g]	The force required to deflect the material to 75 % of its original thickness shall be at least 7 kPa.
Dimensional analysis	See 4.8.2.10	1	Baseline test.
Thickness	See 4.8.2.11	4[h]	The average thickness shall be within ± 10 % of the design values.

[a] The use of foam buoyant material is dependent on (but not limited to) the thickness, the buoyancy retention factor, the type of the personal flotation device for which it is intended, and on how it is enclosed in the personal flotation device.

[b] Six samples shall be taken from each of three lots of foam flotation material.

[c] This property shall be investigated for each nominal thickness in which the foam flotation material is produced, except that for material produced in thicknesses greater than 25 mm, a plot of property values versus thickness based upon at least three thicknesses (thinnest, mid-range, and thickest) of 25 mm and greater shall be used to obtain values for intermediate thickness.

[d] When the alternative tests in 4.8.2.5 are used, the resulting retention factors shall be used to compensate for the projected loss of buoyancy as specified in 5.3.4.2 of ISO 12402-1 to ISO 12402-6.

[e] The samples shall be the same samples used in the specific buoyancy measurements.

[f] Samples from one or more lots.

[g] One sample from each lot.

[h] Two samples from batch 1 and one sample each from batches 2 and 3.

Page 27, 4.8.2.3

Replace the complete subclause with the following:

"**4.8.2.3 Thermal stability of buoyancy material**

Three test specimens of dimensions (200 ± 2) mm × (200 ± 2) mm and of thickness (20 ± 2) mm shall be conditioned initially in air at (23 ± 2) °C and (50 ± 5) % relative humidity for at least 24 h before carrying out the test. If the buoyancy material is of a granular form or consists of sheets thinner than 20 mm, then either a number of layers shall be used to achieve a minimum total thickness of 20 mm, or a minimum volume of material of 0,1 l shall be tested, as appropriate.

Each specimen shall then be weighed in air, and undergo measurements to determine its volume. If the volume is measured by displacement of water, the specimens shall be conditioned in air at (23 ± 2) °C and a relative humidity of (50 ± 5) % for (24 ± 0,5) h.

They shall then be placed on a flat surface in an oven maintained at an even temperature of (60 ± 1) °C with air circulating at the rate of 3 to 10 changes per hour, for a period of (7 ± 0,1) h. Only test specimens from the same type of material shall be conditioned in one oven at a given time.

Following removal from the oven, specimens shall be laid on a flat surface for (17 ± 0,1) h at (23 ± 2) °C and (50 ± 5) % relative humidity.

They shall then be exposed in a similar container to an even temperature of (–30 ± 1) °C for a period of (7,0 ± 0,1) h, then removed and laid on the flat surface for (17,0 ± 0,1) h at room temperature as before.

This cycle of exposure to alternating high and low temperatures shall be repeated until the samples have been exposed to each temperature for ten periods. The measurements shall then be repeated, and the percentage volume change calculated."

Page 28, 4.8.2.4

Replace the complete subclause with the following:

"**4.8.2.4 Test method for the compressibility of inherently buoyant material**

4.8.2.4.1 Examine three specimens of each sample of foam of dimensions (100 ± 2) mm × (100 ± 2) mm and of thickness (20 ± 2) mm. If the material consists of granules, then fill three cloth sacks with the granules to the same filling density as the lifejacket or buoyancy aid. Fit them into a metal frame of dimensions (100 × 100) mm and a height equivalent to the thickness of the buoyancy aid. Prior to the test, they shall have been stored at (23 ± 2) °C and a relative humidity of (50 ± 5) % for at least 24 h, and they shall be tested under these conditions.

4.8.2.4.2 Each specimen shall be placed in fresh water under a flat metal plate at least 20 % larger than the specimen size and then compressed at a speed of 200 mm/min until a load of 50 kPa has been reached. This lower position shall be set for further compressions. The specimen shall then be completely decompressed, and the cycle of compression repeated a further four times, using the lower set-point as the limit of compression.

4.8.2.4.3 The specimen shall then be kept under the metal plate such that it is only just weighted by the plate to remain under water. The load required to achieve this shall be recorded as the original buoyancy.

NOTE It will almost certainly be necessary to use a different load cell from that required in 4.8.2.4.2.

4.8.2.4.4 The specimen shall then be dried for 7 d in air at a temperature of (23 ± 2) °C and a relative humidity of (50 ± 5) %. The compression cycle in 4.8.2.4.2 shall then be repeated without water, and for a total of 500 times. If deformation occurs, then the upper set-point might need to be reset in order to keep the decompression time equal during the whole period.

4.8.2.4.5 The specimen shall then be returned to the atmosphere in 4.8.2.4.4 for at least 3 d, and the buoyancy measurement in 4.8.2.4.2 and 4.8.2.4.3 repeated, giving the value B. The loss of buoyancy (calculated as $A - B$) shall then be expressed as a percentage of the original buoyancy (A).”

Page 32, 4.9.1

Replace the third paragraph with the following:

“If the material is susceptible to fungal attack and is used as a water-resistant membrane, a test shall be carried out as specified in Annex A.”

Page 34, Table 13

Replace Table 13 with the following:

Table 13 — Inflation chamber materials

Property	Exposure	Test method	Number of samples	Sample size mm × mm	Compliance criteria
Tensile strength (woven fabrics only)	1 Standard conditioning 2 Accelerated ageing: 168 h at 70 °C 3 After soil burial and fungus resistance (12 weeks' exposure), see Annex A 4 Accelerated weathering according to 4.1.6.4[a,b]	ISO 13934-2	5 warp and 5 weft for each exposure	100 × 150	Following exposure 1, the five-sample average shall be at least 930 N in the direction of greater thread count and 800 N in the direction of lesser thread count. Following exposures 2 and 3, the five-sample average for each direction shall retain at least 90 % of that value determined following standard conditioning. Following exposure 4, the five-sample average for each direction shall retain at least 260 N determined following standard conditioning.
Trapezoid tear strength (woven fabrics only)	1 Standard conditioning 2 Accelerated ageing: 168 h at 70 °C	ISO 9073-4	5 warp and 5 weft for each condi-tioning	75 × 150	Following exposure 1, the five-sample average for each direction shall be at least 45 N in the warp direction and 36 N in the filling direction. Following exposure 2, the five-sample average for each direction shall retain at least 90 % of the value determined following standard conditioning.
Perme-ability	1 Standard conditioning 2 Accelerated ageing: 168 h at 70 °C 3 After soil burial and fungus resistance (12 weeks' exposure), see Annex A 4 (65 ± 1) °C at 95 % relative humidity for 360 h	ISO 7229, using CO_2 gas	3 for each exposure	125 × 125	Following exposure 1, identification test. Following exposures 2 to 4, the three-sample average for each direction shall not exceed 110 % of the value determined following standard conditioning.

Table 13 (*continued*)

Property	Exposure	Test method	Number of samples	Sample size mm × mm	Compliance criteria
Abrasion resistance (woven fabrics)	1 Standard conditioning 2 After abrasion resistance, 9 N pressure, and 100 000 double rubs	ISO 12947-2 See also Annex B	8 warp and 8 weft for each exposure	250 × 50	Except for a material intended for use under a fabric envelope or otherwise protected, the eight-sample average for each direction shall retain at least 75 % of the value determined following standard conditioning.
Adhesion	1 Standard conditioning 2 After 42 d at 70 °C over water	ISO 2411	5	75 × 200	After conditioning 1: 180 N per 50 mm After conditioning 2: 150 N per 50 mm
Flexibility	1 Standard conditioning 2 After 42 d at 70 °C over water	ISO 7854:1995, Method A	3	(37,5 ± 0,1) × 125	After conditioning 1: no cracking after 9 000 cycles After conditioning 2: no cracking after 9 000 cycles

[a] For fully inflated and packed conditions, only exposure 4 weathering shall be conducted for a material not intended to be fully encased within a cover fabric.

[b] Every colour shall be weathered.

Page 39, Table 15

Replace Table 15 with the following:

Table 15 — Fabric tests for knitted fabric laminated foam flotation material having fabric on both sides

Property	Exposure	Test method	Number of samples[a]	Sample size mm × mm	Compliance criteria
Tensile strength 1	1 Standard conditioning 2 70 h immersion in fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[b] 3 70 h immersion in 0,5 % detergent according to ISO 6330 4 Accelerated weathering according to 4.1.6.4	ISO 1421	5 warp and 5 weft for each separate exposure (all F2S thicknesses for exposure 1; and only F1S[c] material of the thinnest corresponding F2S[d] material for exposures 2 to 4)	—	Following each exposure 1 to 3, the average of five samples shall be at least 45 N. Following each separate exposure 2 to 4, the average of five samples shall retain at least 60 % of the strength determined following standard conditioning.
Tensile strength 2	Standard conditioning	ISO 1421	5 warp and 5 weft (thinnest F2S material)	100 × 150	The average of five samples shall be at least 310 N for each direction.
Tear strength 1	Standard conditioning	ISO 4674-1:2003, Method B	5 warp and 5 weft (F1S material of the thinnest corresponding F2S material)	75 × 200	The average of five samples shall be at least 18 N.
Tear strength 2	Standard conditioning	ISO 4674-1	5 warp and 5 weft (all F2S thicknesses)	75 × 200	The average of five samples shall be at least 25 N.
Adhesion to foam	Standard conditioning	ISO 2411:2000, Method B	5 warp and 5 weft (greatest thickness)	75 × 200	Following standard conditioning, the adhesion of the foam to the fabric shall be at least 7 N/cm for the average of five samples for each direction, or the foam shall tear in lieu of peeling.
Effect of abrasion on tensile strength	1 Standard conditioning 2 After abrasion resistance in accordance with Method D5304 of FTMS 191A[e]	ISO 12947-2	8 warp and 8 weft for each separate exposure (thinnest materials)	45 × 225	The average of five samples shall be at least 220 N.

[a] Applies for all colours.

[b] Exposure tests shall be based on typical fuels used in the intended area of application.

[c] F1S = Fabric one-sided material.

[d] F2S = Fabric two-sided material.

[e] See Annex B.

Page 40, Table 16

Replace Table 16 with the following:

Table 16 — Fabric tests for knitted fabric laminated foam flotation material having fabric on one side

Property	Exposure	Test method	Number of samples[a]	Sample size mm × mm	Compliance criteria
Tensile strength 1	1 Standard conditioning 2 70 h immersion in fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[b] 3 70 h immersion in 0,5 % detergent according to ISO 6330 4 Accelerated weathering according to 4.1.6.4	ISO 1421	5 warp and 5 weft for each separate exposure (all thicknesses for exposure 1; and only thinnest material for exposures 2 to 4)	—	Following each exposure 1 to 3, the average of five samples shall be at least 45 N. Following each separate exposure 2 to 4, the average of five samples shall retain at least 60 % of the strength determined following standard conditioning.
Tensile strength 2	Standard conditioning	ISO 1421	5 warp and 5 weft (thinnest material)	100 × 150	The average of five samples shall be at least 310 N for each direction.
Tear strength	Standard conditioning	ISO 4674-1:2003, Method B	5 warp and 5 weft (all thicknesses)	75 × 200	The average of five samples shall be at least 25 N.
Adhesion to foam	Standard conditioning	ISO 2411	5 warp and 5 weft (greatest thickness)	75 × 200	Following standard conditioning, the adhesion of the foam to the fabric shall be at least 7 N/cm for the average of five samples for each direction or the foam shall tear in lieu of peeling.
Effect of abrasion on tensile strength	Standard conditioning	See Annex B	8 warp and 8 weft for each separate exposure (thinnest materials)	45 × 225	The average of five samples shall be at least 220 N.

[a] Applies for all colours.

[b] Exposure tests shall be based on typical fuels used in the intended area of application.

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Replace Table 17 with the following:

Table 17 — Automatic inflation systems

Property	Exposure	Test method	Number of samples[a,b]	Compliance criteria
Use characteristics	Standard conditioning	See 4.11.2.4 and 4.11.3.3	As required by design features	1 For automatic inflation systems for use with PDFs, correct identification regarding system status, including cylinder seal condition, shall be accomplished by at least 96 % of the 25 or more subjects performing the status indicator evaluation. 2 For automatic inflation systems for use with PDFs, proper rearming of the inflation system shall be accomplished by at least 93 % of the 15 or more subjects performing the rearming evaluation.
Automatic operability	1 Standard conditioning 2 Accelerated weathering according to 4.1.6.4 3 70 h immersion in fuel B according to ASTM D 471-06 or diesel fuel according to EN 590[c] 4 70 h immersion in 0,5 % detergent according to ISO 6330 5 (70 ± 2)°C for 168 h[d] 6 a) (–30 ± 2) °C for 24 h 6 b) (0 ± 2) °C for 24 h[d] 6 c) high to low temperature[e] 6 d) low to high temperature[f] 7 720 h of salt spray according to 4.1.5.2	See 4.11.4	For exposure 1: 6 plus 2 extra water-sensing elements (when expendable) for each sample For exposure 2: 4 but without water-sensing element during exposure For exposure 3: 4 For exposure 4: 4 but without water-sensing element during exposure For exposure 5: 100 (may be 10 trials on 10 complete samples) For exposures 6 a), 6 b), 6 c), and 6 d): 4 For exposure 7: 4 but without water-sensing element during exposure	1 Following exposures 1 to 5, 6 c), 6 d), and 7, the actuation time shall be not more than 5 s following immersion for each of the trials (i.e. half in fresh water, half in salt water). Except for minimal residual vapour, the gas in the cylinders shall be completely discharged after each trial. 2 Starting within 10 s of removal from the cold chamber following exposure 6 a), samples shall be dropped three times onto a concrete surface from a height of (180 ± 5) cm. The samples shall then be subjected to exposure 6 b). Following exposure 6 b), the actuation time shall be not more than 5 s following immersion for each of the six trials (i.e. three in fresh water, three in salt water). 3 Following exposure 7, samples shall have no visible pitting or other damage on any surface.