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Personal flotation devices —

Part 9: Test methods

AMENDMENT 1

Équipements individuels de flottabilité —

Partie 9: Méthodes d'essai

AMENDEMENT 1

Reference number
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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.

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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 12402-9:2006 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 9: Test methods

AMENDMENT 1

Page 1, Normative references

In the last reference, replace "ISO 12402-7:—[1)]" with "ISO 12402-7:2006" and delete footnote 1).

Page 2, Normative references

Replace "[2)]" at the end of the last reference with "[1)]" and change the footnote number from "2)" to "1)".

Page 4, 5.1

Delete the second paragraph:

"When material and components of PFDs specified in ISO 12402-7 are conditioned as specified therein and successfully tested according to this part of ISO 12402, they can be assumed to meet the requirements of ISO 12402-7 for the PFD design test."

Page 4, 5.1

Delete the last paragraph:

"All tests according to 5.5 shall be carried out after submitting the samples to the temperature cycling test (see 5.5.3) and the rotating shock bin test (see 5.5.2)."

Page 4, 5.2.1

Replace the complete clause with the following:

"At least one sample of each size of the device to be tested shall be provided, if not specified otherwise in this part of ISO 12402."

Page 5, 5.5

Add the following new subclause, and renumber the current 5.5.1, subsequent subclauses and existing tables accordingly:

5.5.1 General

The material properties tests shall be conducted in accordance with Table 1 or Table 2 on device(s) of the size that has been determined to represent the weakest construction. When different device sizes have substantially the same construction, any representative size may be tested.

Table 1 — Mechanical properties tests for inherently buoyant PFDs

Applicable tests	Applicable samples					
	A[a]	B[b]	C[c]	D[d]	E[d]	F[d]
5.5.3 Rotating shock bin test method	X	X	X	X	X	X
5.5.4 Temperature cycling test	X	X	X	X	X	X
5.5.2.3.2 Horizontal load test		X[e]				
5.5.2.3.3 Vertical load test		X[e]				
5.5.2.4 Lifting loop test		X[e]				
5.5.2.5 Buddy line test		X[e]				
5.5.7 Over-pressure test						
5.5.9 Measurement of buoyancy of the whole device	X					
5.5.10 Inflation test						
5.5.11 Test of the resistance to inadvertent inflation						
5.5.12 Test of the resistance to burning	X					

[a] For each size.

[b] For adult devices, this sample may be the smallest size. For child devices, the sample may be the smallest size.

[c] For adult devices, this sample may be the largest size. For child devices, the sample may be the largest size.

[d] When substantially the same construction is used in adult and child devices, any size may be tested.

[e] An alternative sample subjected to 5.5.4 of the smallest size may be substituted for this test.

Table 2 — Mechanical properties tests for inflatable PFDs

Applicable tests	Applicable samples			
	A[a]	B[b]	C[c]	D[d]
5.5.3 Rotating shock bin test method	X	X	X	X
5.5.4 Temperature cycling test	X	X	X	X
5.5.2.3.2 Horizontal load test		X[e]		
5.5.2.3.3 Vertical load test		X[e]		
5.5.2.4 Lifting loop test		X[e]		
5.5.2.5 Buddy line test		X[e]		
5.5.7 Over-pressure test			X	
5.5.9 Measurement of buoyancy of the whole device	X			
5.5.10 Inflation test		X		
5.5.11 Test of the resistance to inadvertent inflation	X			
5.5.12 Test of the resistance to burning			X	

[a] For each size.

[b] For adult devices, this sample may be the smallest size. For child devices, the sample may be the smallest size.

[c] For adult devices, this sample may be the largest size. For child devices, the sample may be the largest size.

[d] When substantially the same construction is used in adult and child devices, any size may be tested.

[e] An alternative sample subjected to 5.5.4 of the smallest size may be substituted for this test.

Page 5, 5.5.1.2

Replace the last paragraph with the following:

“For all load tests, any load from the test fixtures applied to the device shall be included in the test load.”

Page 6, 5.5.1.3.1

At the end of the subclause, add the following paragraph:

“A different sample is acceptable to test each configuration. Except for hardware closures on buoyancy aids, the tests shall be repeated on each closure independently. For buoyancy aids, all closures shall be fastened and adjusted to the mid-range to approximate even loading.”

Page 6, 5.5.1.3.2

In the third paragraph, replace the second sentence with the following:

“The load shall be maintained for 30 min, if not specified otherwise.”

In the third paragraph, add a new last sentence:

“For buoyancy aids (level 50), the load is maintained for 5 min only, see ISO 12402-5:2006, 5.3.3.2.”

Page 6, 5.5.1.4

In the second paragraph, replace the first sentence with the following:

“Then apply the loads F_1 or F_2 (see Figure 1) to the lifting loop using the lower attachment point of the dummy (in accordance with ISO 12401:2004, 5.2.2.1).”

Page 7, Figure 1

In the key, add “, mass of the dummy included” before the final parenthesis in lines 1 and 2.

Page 11, 5.5.3.1

In the first paragraph, first sentence, replace “(+ 65 ± 2) °C” with “(60 ± 2) °C”.

In the second paragraph, first sentence, replace “(+ 65 ± 2) °C” with “(60 ± 2) °C”.

Page 11, 5.5.3.2

In list item a), first sentence, replace “(+ 65 ± 2) °C” with “(60 ± 2) °C”.

Page 12, 5.5.6

In the first paragraph, replace the fifth sentence with the following:

“The pressure shall be measured and then that pressure shall be increased by 20 % in all chambers through the oral inflation tube.”

Page 13, 5.5.7

Delete the complete subclause.

Page 13, 5.5.8

Replace “ISO 12402-7:—[3)]” with “ISO 12402-7:2006” and delete footnote 3).

Page 13, 5.5.9.1

Replace the third paragraph with the following:

“For inherently buoyant PFDs, the buoyancy of the PFD shall be measured upon initial stabilisation (buoyancy without entrapped air) and after 24 h complete submersion.”

Page 13, 5.5.9.2

Replace the first two paragraphs with the following:

“The standard equipment required consists of a weighted cage, whose submerged weight is greater than 1,1 times the expected buoyancy value.

Weighing takes place in a tank of water, deep enough to accommodate the device horizontally with its upper surface at a depth of 100 mm to 150 mm below the water surface without contacting the sides of the tank or the bottom, and with a calibrated load cell or balance supporting it.”

Page 14, 5.5.9.3

In the second paragraph, replace the first sentence with the following:

“The cage shall be suspended in fresh water at a temperature of (20 ± 5) °C from the load cell so that the upper surface of the horizontally positioned PFD is submerged at 100 mm to 150 mm below the surface.”

Page 14, 5.5.10.2.3

Replace the third sentence with the following:

“The head shall not fire below 13 N and shall fire between 13 N and 67 N.”

Page 14, 5.5.10.2.4

Delete the complete subclause and renumber the subsequent subclause accordingly.

Page 14, 5.5.10.2.5

Delete the second paragraph:

“The time from immersion until initiation of inflation in automatic mode shall be reported. It shall not exceed 5 s.”

Page 17, 5.5.12.3

In the first paragraph, replace “petrol” with “petrol or n-heptane”.

Page 18, 5.6.1.1

Insert the following new last paragraph:

“The tests shall be carried out in the order 5.6.4, 5.6.7, 5.6.5, 5.6.6, 5.6.8, 5.6.2, 5.6.3 and 5.6.9.”

Page 18, 5.6.1.2

In the first paragraph, replace the first sentence with the following:

“PFDs shall be tested using at least eight subjects if the device is sized to accommodate a range of chest sizes in excess of 400 mm or a body mass range greater than 30 kg.”

Page 18, 5.6.1.2

In the first paragraph, second sentence, delete the words “at least”.

Page 18, 5.6.1.2

In the second paragraph, second sentence, replace “weight” with ”mass”.

Page 19, Table 1

Replace Notes 1 to 5 with the following:

“The following applies:

a) Between one third and one half of test subjects shall be females, including at least one per height category but excluding the highest height.

b) At least one male and one female shall be from the lowest and highest mass groups appropriate to the PFD.

c) At least one subject shall be selected per cell that is appropriate to the PFD and marked with a “1”.

d) Enough additional subjects shall be selected from cells marked “X” to total the required number of test subjects for the size range of PFD, with no more than one subject per cell. A uniform distribution across mass groups shall be maintained.

e) The test subject size selection shall be adjusted for the lowest mass group to test at least one subject within 2 kg of the lowest size for which the PFD is to be certified. Subjects of less than 40 kg may be shorter than 1 400 mm if required. One subject shall be tested for each 4 kg below 40 kg.”

Page 20, Table 2

Replace Notes 1 to 3 with the following:

“The following applies:

a) At least 40 % of the subjects shall be male and at least 40 % female.

b) At least one subject shall be selected per cell which is appropriate to the PFD and marked with a “1”.

c) Enough additional subjects shall be selected from cells marked “X” to total the required number of test subjects for the size range of PFD. A uniform distribution across mass groups shall be maintained.”

Page 21, 5.6.3

In the second paragraph, replace the second and third sentences with the following:

“Each test subject who successfully completes this task shall perform it again while wearing the PFD. At least two thirds of these subjects shall complete the task wearing the PFD. If two thirds of the subjects do not qualify without wearing the PFD, additional subjects may be used until the required number of subjects qualify.”

Page 23, 5.6.5.1

In the fourth paragraph, replace the second sentence with the following:

“The test subject shall be allowed to hold on to the PFD or brace arms during water entry according to 5.6.5.2.2 and 5.6.5.2.3 to avoid possible injury.”

Page 24, 5.6.5.3

Replace the first paragraph with the following:

“Record the individual and average of all subjects' trunk angles from vertical. Record the individual and average of all subjects' face plane (head) angles from horizontal.”

Page 24, 5.6.6.1.1

Replace the first paragraph, including list items a) and b), with the following:

“The tests according to 5.6.6.3 shall demonstrate that a PFD (see ISO 12402-2:2006, 5.6, to ISO 12402-4:2006, 5.6) being evaluated provides,

a) for lifejackets and buoyancy aids, an adequate face-up stability, and associated resistance to being turned face down by waves or other forces, and

b) for buoyancy aids, the intended potential for bringing the user face up in the unlikely event that the user either enters the water face down and unconscious, or becomes unconscious in the water.

Page 24, 5.6.6.1.1

In the fourth paragraph, replace the second sentence ("A relaxed position …") with the following:

"A relaxed position should be achieved by having the subject relax his or her body with arms placed perpendicular to the body (as in mid-position of a breaststroke) and head going into the water at the same time."

Page 25, 5.6.6.2

Replace the complete subclause with the following:

"For testing PFDs according to ISO 12402-1 to ISO 12402-5, the reference vest used shall be constructed in accordance with Annex B, C or D according to the size of the PFD being tested."

Page 25, 5.6.6.3

Add a new list item c) before 5.6.6.4:

c) Flotation attitude test

To assess floating attitude for lifejackets, the angle of the trunk and head shall be measured. Measure the angle of the face in relation to the horizontal, using an imaginary line from the chin to the forehead. Measure the angle of the body trunk in relation to vertical, using an imaginary line from the shoulder to the hip. The angle of the trunk shall be measured underwater to reduce any effect due to the refraction properties of water.

Page 26, 5.6.6.4.3

Replace the complete subclause with the following:

"For buoyancy aids according to ISO 12402-5, report whether

a) any subject's respiration is impeded in an attitude of relaxed static balance at any time,

b) there is any tendency to turn a subject face down from the position of relaxed static balance in the water,

c) there is any negative freeboard.

If any one of these conditions is reported, the device is considered to have failed."

Page 26

Add the following new subclause before 5.6.7:

5.6.6.4.4 Floating attitude

For both lifejackets and buoyancy aids, report the measured trunk and face angles.

Page 26, 5.6.7.2.3

Replace the complete subclause with the following:

"With each test subject in the water, the PFD shall permit secondary donning and oral inflation sufficient to provide the test subject with positive freeboard within 45 s for any PFD up to 150 N buoyancy. For PFDs over 150 N buoyancy, an additional 15 s is allowed for each additional 50 N buoyancy."

Page 27, 5.6.9.1

Replace the first sentence with the following:

"The test can be used as a supplementary tool to assess PFDs in accordance with 5.6.3.1 of ISO 12402-2:2006, ISO 12402-3:2006, and ISO 12402-4:2006, designed for children of less than 20 kg, using manikins."

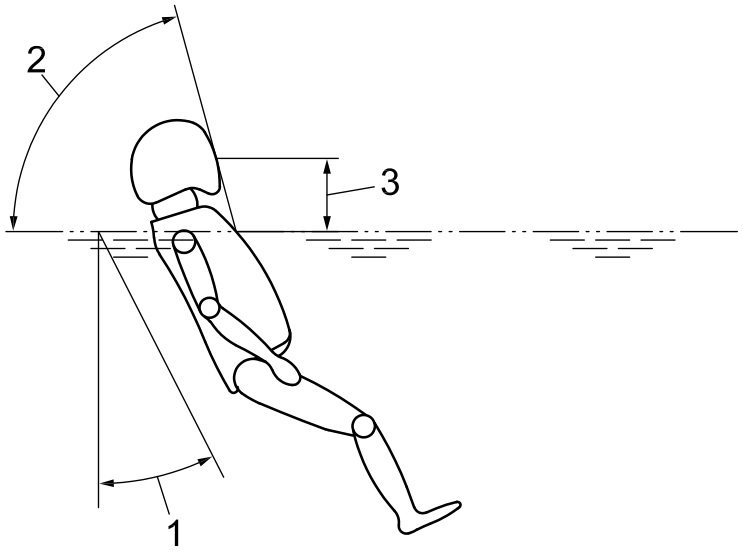
Page 31, 5.6.9.4.2

Replace the eighth paragraph with the following:

"Measure the angle of the body trunk in relation to the vertical, using an imaginary line from the shoulder to the hip."

Page 31, Figure 15

Replace Figure 15 and its title with the following:



1 trunk angle
2 face-plane angle
3 mouth freeboard

Figure 15 — Mouth freeboard and flotation attitude

Page 35, B.4.1

Replace the complete subclause with the following:

"The construction and assembly of the device shall be in accordance with Tables B.2 to B.5 and Figures B.2 to B.17."

Page 37, Table B.2

In the second column, "3.2 Waist belt", replace "152 mm, black" with "203 mm, black".

Page 38, Table B.3

Replace the title with the following:

"Table B.3 — Foam insert buoyancy specifications"

Page 38, Table B.3

Replace the third row ("Buoyancy") with the following:

Buoyancy[b]	34 ± 1,1	34 ± 1,1	17,5 ± 0,65	17,5 ± 0,65	18 ± 0,7	28 ± 0,8

Page 38, Table B.4

Replace the complete table with the following:

Table B.4 — List of dimensions shown in Figures B.2 to B.14

Dimensions in millimetres

Dimension	Figure											
	B.2	**B.3**	**B.4**	**B.5**	**B.6, B.7**	**B.8**	**B.9**	**B.10**	**B.11**	**B.12**	**B.13**	**B.14**
a	66	298	23	308	73	198	76	20	188	120	138	19
b	298	100	497	75	73	46	46	56	274	18	18	155
c	427	1 106	586	10	130	76	394	51	414	35	35	53
d	430	199	102	288	205	84	38	216	343	5	295	25
e	423	398		342	72	76	51	229	147	95	55	45
f	141	597		396	470	157	165	259	223	320		
g	100	1 124		65		394		45		90		
R								70				
h	705	141				46				40		
i	199					8				55		
j	398					20				255		
k	197					20				80		
l	723					76						
m						46						
n						38						
o						165						
p						25						

Page 41, Figure B.5

Replace with the following:

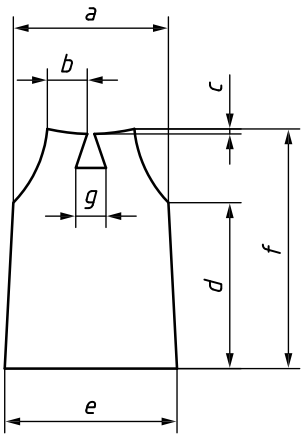


Figure B.5 — Outer and inside cover, collar

Page 44, Figure B.12

Replace the title with the following:

“Figure B.12 — Attachments to front and back cover (dimensions on pattern, before sewing)”

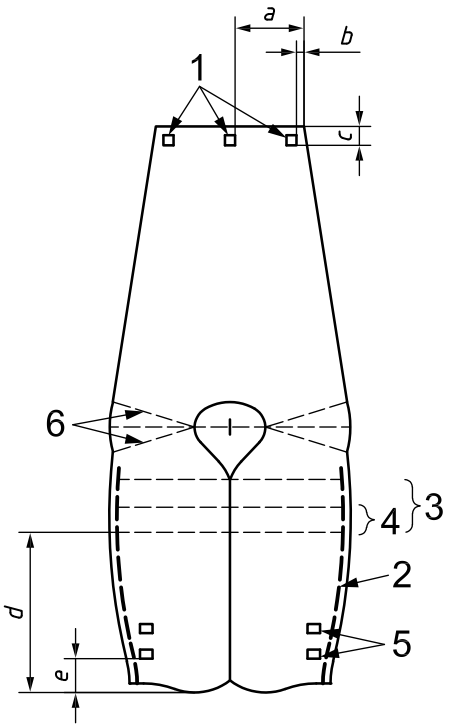
Replace the key with the following:

Key

1 waist belt (1 867 mm) attachment to outside of back cover
2 belt loop webbing (76 mm) attachment to outside of front cover
3 chest strap webbing (127 mm) attachment to outside of front cover
4 waist belt (203 mm) attachment to outside of front cover
5 zipper (440 mm) attachment to front
6 zipper (370 mm) attachment to front and back covers
7 dart

Page 45, Figure B.13

Replace the figure and its title with the following:



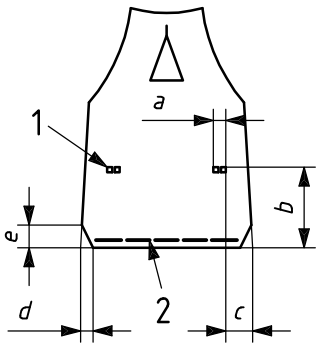
Key

1 waist belt (1 867 mm) attachment to outside of back cover and inside cover (see Figure B.12)
2 zipper (440 mm) attachment
3 interior fabric retainer attachment to centre and outer edge of inside front cover
4 interior fabric retainer attachment to centre of inside front cover
5 belt loop webbing (89 mm) attachment to outside of cover
6 dart

Figure B.13 — Attachments to inside cover (dimensions on pattern, before sewing)

Page 45, Figure B.14

Replace the figure and its title with the following:



Key

1 collar webbing (1 384 mm) attachment on the outside of the inner cover with reinforcement fabric inside
2 zipper (280 mm) attachment to the outer and inner covers

Figure B.14 — Attachments to outer and inside collar cover (dimensions on pattern, before sewing)

Page 45

After Figure B.14, add the following new table and figures:

Table B.5 — List of dimensions shown in Figures B.16 and B.17

Dimensions in millimetres

Figure	Dimension											
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*	*l*
B.16	450	530	980[a]	90	60	340	20	310	70	50	60	260
B.17	260	340	230	120	215	210	60	290				
	m	*n*	*o*	*p*	*q*	*r*						
B.16	240	270	130	80	70	30						
B.17												

[a] Dimension c in Figure B.16 = dimensions $a + b$ (i.e. dart closed).

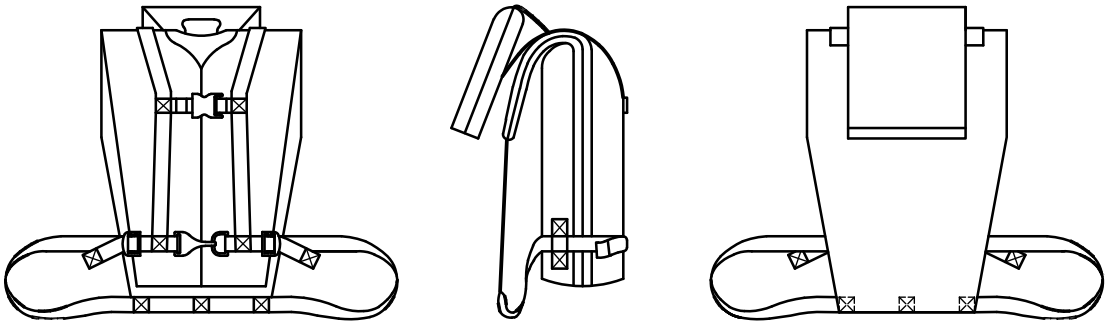
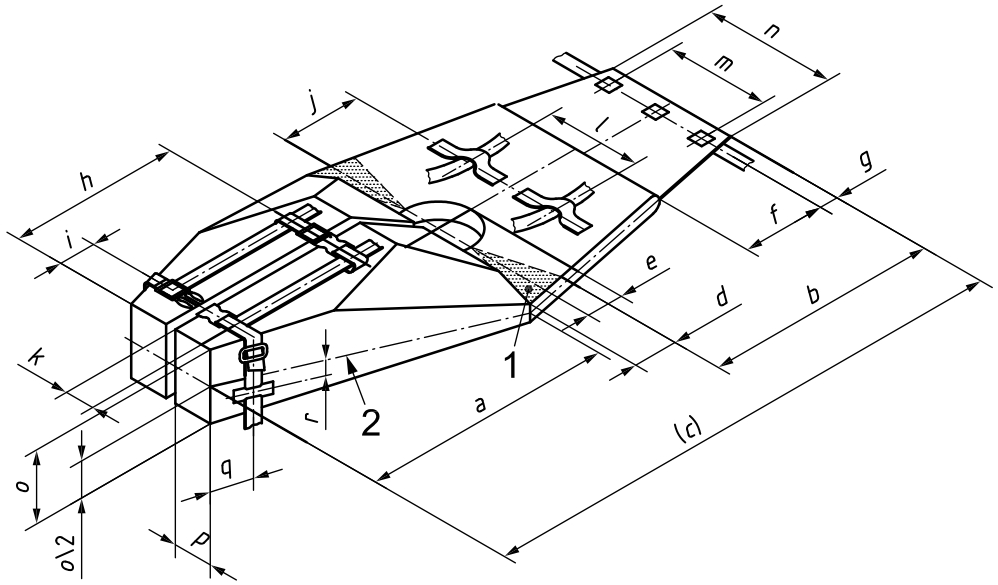


Figure B.15 — Assembly views of finished reference vest

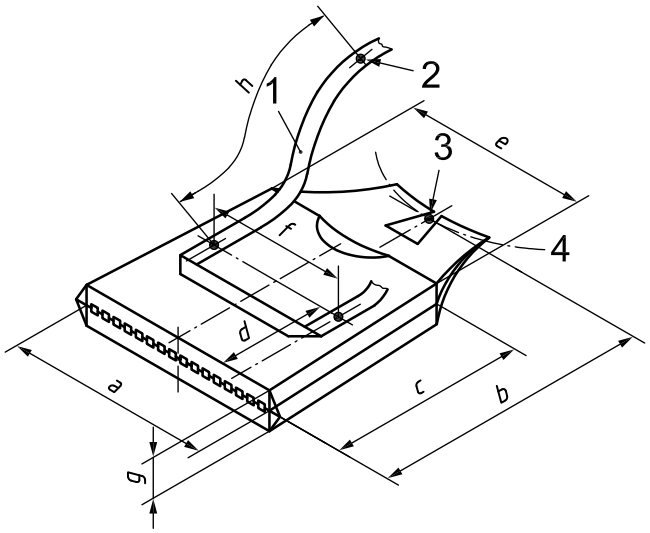


Key

1 dart at shoulder seam; shown spread out

2 seam line and side zipper location

Figure B.16 — Assembly dimensions of finished reference vest body with collar removed



Key

1 collar attachment webbing

2 nearest point of attachment to chest of vest

3 centre of neck seam on vest

4 assembly seam in neck of vest

NOTE h is measured along the webbing to the nearest point of attachment.

Figure B.17 — Assembly dimensions of finished reference vest collar

ICS 13.340.70

Price based on 13 pages