



UL 1177

STANDARD FOR SAFETY

Buoyant Vests

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UL Standard for Safety for Buoyant Vests, UL 1177

Third Edition, Dated June 19, 2007

Summary of Topics

This revision to UL 1177 dated September 23, 2021 is issued to remove the ANSI designation from the titlepage, as ANSI has been withdrawn from the standard.

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UL 1177

Standard for Buoyant Vests

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First Edition – January, 1982

Second Edition – July, 1999

Third Edition

June 19, 2007

This UL Standard for Safety consists of the Third Edition including revisions through September 23, 2021.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <https://csds.ul.com>.

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INTRODUCTION

1 Scope

1.1 These requirements cover marine buoyant vests that use kapok, fibrous glass, or unicellular polyvinyl chloride or polyethylene foam flotation material, and are intended to be used in accordance with the applicable Regulations of the United States Coast Guard (USCG).

1.2 The devices covered by these requirements are intended for USCG approval under 46 CFR 160.047, 160.052, or 160.060.

2 Units of Measurement

2.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

3 Undated References

3.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

4 Components

4.1 Except as indicated in [4.2](#), a component of a product covered by this standard shall comply with the requirements for that component.

4.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

4.3 A component shall be used in accordance with its rating established for the intended conditions of use.

4.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

4.5 A component part of a buoyant vest shall also comply with the Federal and Mil Spec documents referenced in 46 CFR 160.047, 160.052, and 160.060.

5 General

5.1 A device for which the intended use is indicated as "General Purpose Vest," "Boating Vest," or the like, shall be considered to include "Skiing" unless this is specifically excluded in the marking provided with the device. Statements such as "Hiking" are not considered general use statements.

6 Glossary

6.1 For the purpose of this standard, the following definitions apply.

6.2 BUOYANT INSERT PAD COVERING – The water-protective cover of plastic film that encloses kapok or fibrous glass material.

6.3 BUOYANT MATERIAL – That part of a personal flotation device (PFD) that has inherent buoyancy and that complies with the component requirements for such materials specified in Sections [11](#) and [24](#), and the Standard for Components for Personal Flotation Devices, UL 1191.

6.4 BUOYANT PAD INSERTS – A quantity of buoyant material that has been cut or formed for insertion into a buoyant vest.

6.5 CLOSING SEAM – The final structural seam sewn on a device, resulting in the containment of the buoyant material.

6.6 CLOSURES:

a) Primary – Means of securing the device on the body that causes the device to function in its intended manner without employing any other means of fastening the device to the body.

b) Secondary – A closure that, when used alone, does not make the device appear to be donned as intended and is not required to be closed in order to comply with the requirements of this standard.

6.7 DEVICE – Any marine buoyant vest.

6.8 FOAM – Closed-cell foamed polymeric material.

6.9 FREEBOARD – A distance measured perpendicularly from the surface of the water to the lowest point where the wearer's respiration may be impeded.

6.10 LOCK STITCH – A stitch that will not unravel when a force is applied in the direction of the seam to any of the threads forming the stitch.

6.11 NONSTANDARD VEST – A buoyant vest that is assembled according to the manufacturer's drawings rather than according to the drawings in this standard, but determined to be equivalent to a standard vest.

6.12 OPTIONAL CONSTRUCTION – A construction element, the use or nonuse of which does not affect compliance of the device with the performance requirements of this standard.

6.13 REFERENCE VESTS – The standard USCG vests: Model AK-1 (adult); Model CKM-1 (child medium); and Model CKS-2 (child small).

6.14 SEAM – A joint consisting of a sequence or series of stitches uniting two or more pieces of material.

6.15 SERVICEABLE – Acceptable for continued intended use. Exhibits no signs of functional deterioration.

6.16 STANDARD VEST – A buoyant vest assembled according to the drawings in this standard.

6.17 STRUCTURAL SEAM – A seam that serves a functional purpose in the end product as distinguished from a decorative purpose.

6.18 TYPE II DEVICE – A device designed to turn an unconscious person from a face-down in the water to a position where the wearer's respiration is not impeded.

6.19 UNIVERSAL SIZE – A device sized for the 5th – 95th percentile of the adult U. S. population. This size shall include chest sizes 30 – 52 inches (0.76 – 1.3 m).

PART I – STANDARD KAPOK, FIBROUS GLASS, OR FOAM DEVICES

CONSTRUCTION

7 General

7.1 A standard device shall consist of a vest-cut envelope with collar and without a back panel, containing pads of buoyant kapok or fibrous glass material or inserts of buoyant foam material, arranged and equally distributed as illustrated in [Figure 7.3](#) and [Figure 7.14](#). Standard devices shall comply with all the performance requirements specified in Part II of this standard.

7.2 A vest shall be fitted with tapes, webbing, and hardware to provide adjustment for close and comfortable fit to the bodies of various-sized wearers.

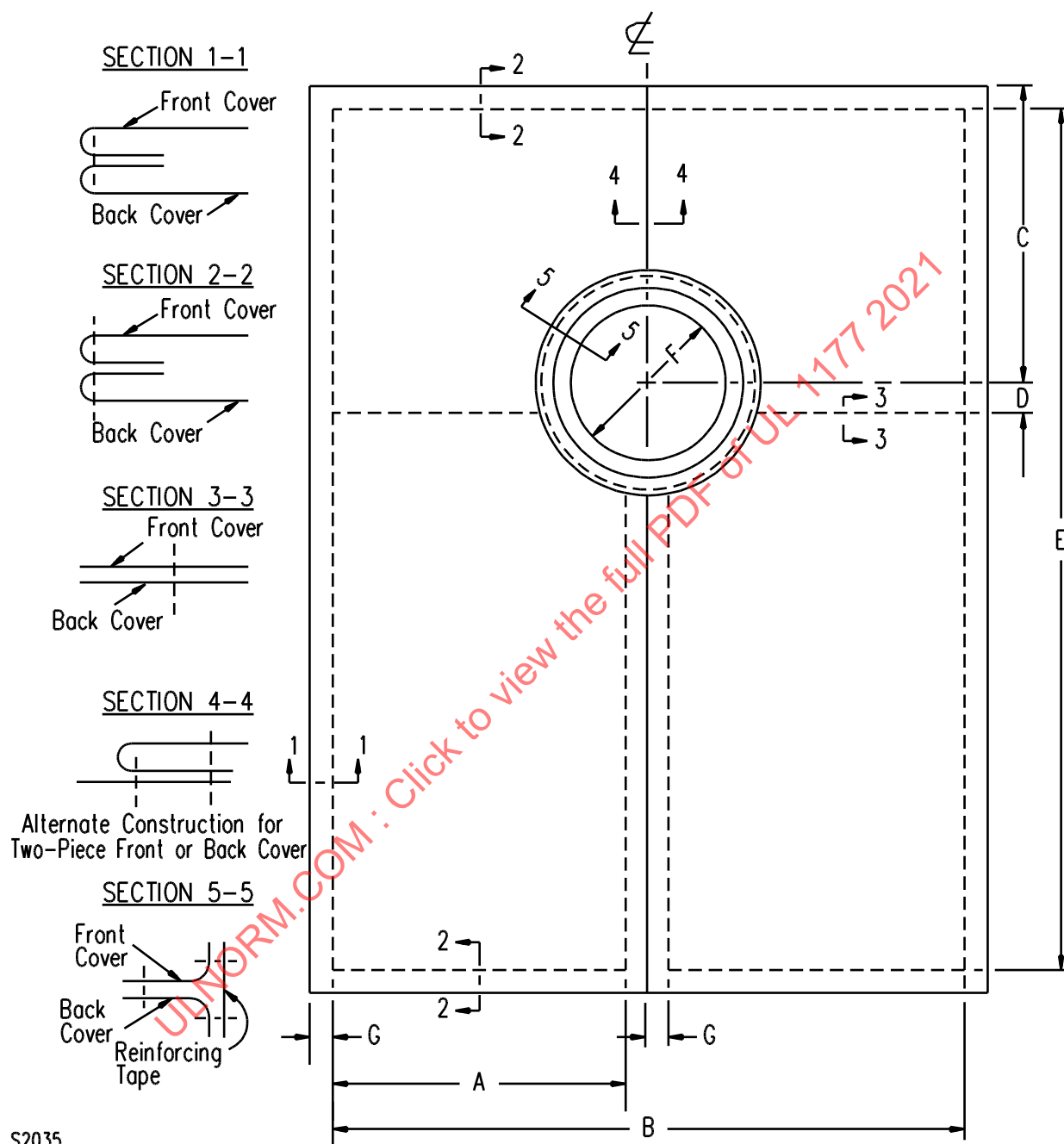
7.3 The construction and assembly of a kapok or fibrous glass vest shall be as illustrated in [Figure 7.1](#) – [Figure 7.7](#).

7.4 The construction and assembly of a foam vest shall be as illustrated in [Figure 7.4](#) – [Figure 7.14](#).

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Figure 7.1

Kapok and fibrous glass vest cutting pattern and construction of cloth cover



S2035

Model	A	B ^a	C ^a	D ^a	E ^a	F ^a	G ^b
AK-1 and AF-1	9-1/4	18-1/2	8	1	26	4-1/2	1/2
CKM-1 and CFM-1	8-1/4	16-1/2	6-3/4	3/4	21-1/2	3	1/2
CKS-1 and CFS-1	7-1/4	14-1/2	5-7/8	5/8	18-1/2	2-1/4	1/2

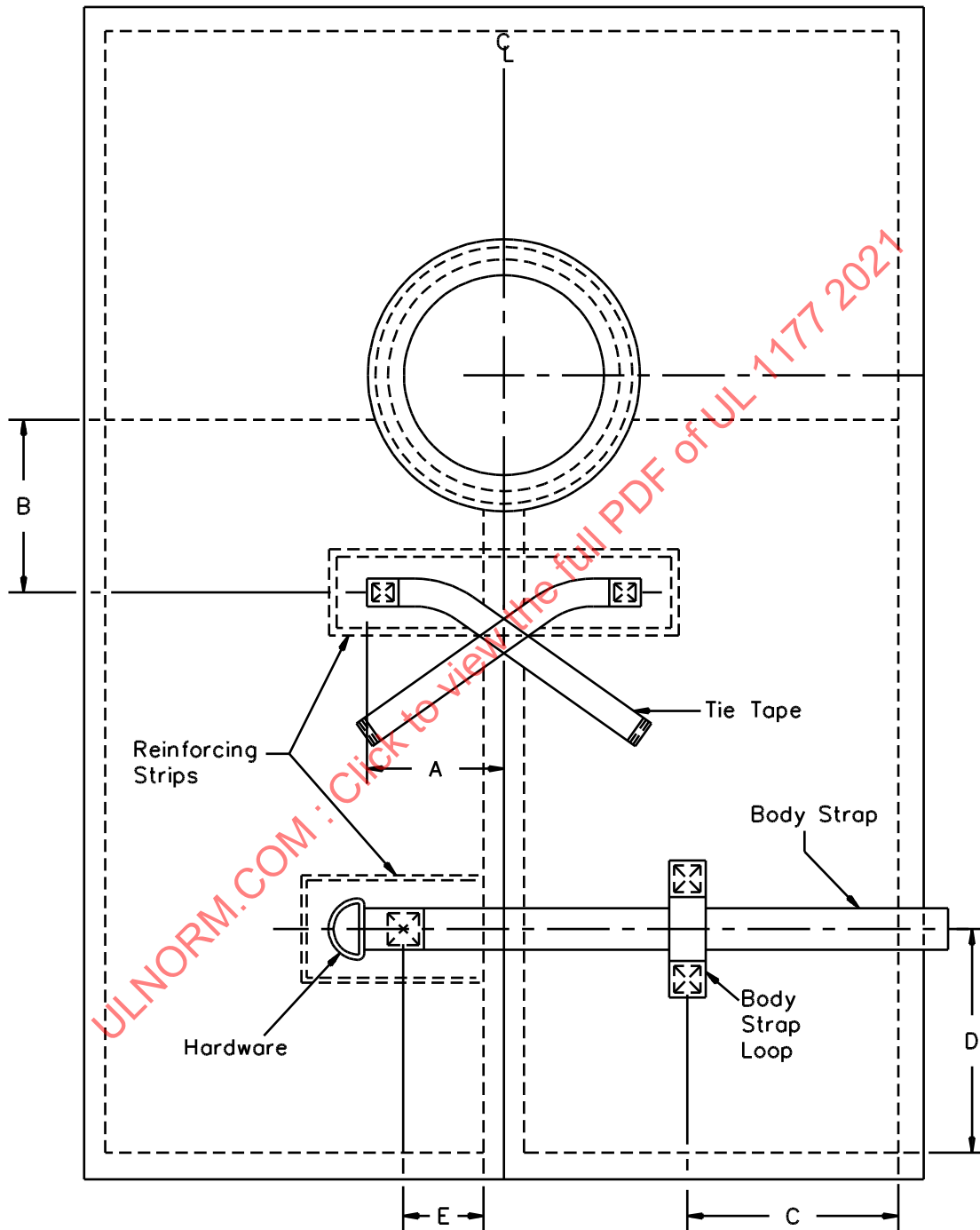
NOTE— Dimensions in inches (1 inch = 25.4 mm)

^a Dimensions plus 1/4 inch, minus 0 inch.

^b When 70 denier uncoated nylon fabric is used, pattern size shall be increased to allow for 3/8-inch (9.5 mm) minimum width.

Figure 7.2

Kapok and fibrous glass vest locations for securing tie tapes, belt loops, and reinforcing strips to front cover



S2036

Model	A	B	C	D	E
AK-1 and AF	3	3-1/2	4-5/8	5-1/2	2
CKM-1 and CFM	3	3-1/2	4-1/8	5	2
CKS-1 and CFS	3	2-3/4	3-5/8	4-1/4	2

NOTE – Dimensions in inches (1 inch = 25.4 mm)

Figure 7.4

Stitching details – location of stitching and tape reinforcing to front and back cover joining at neck hole

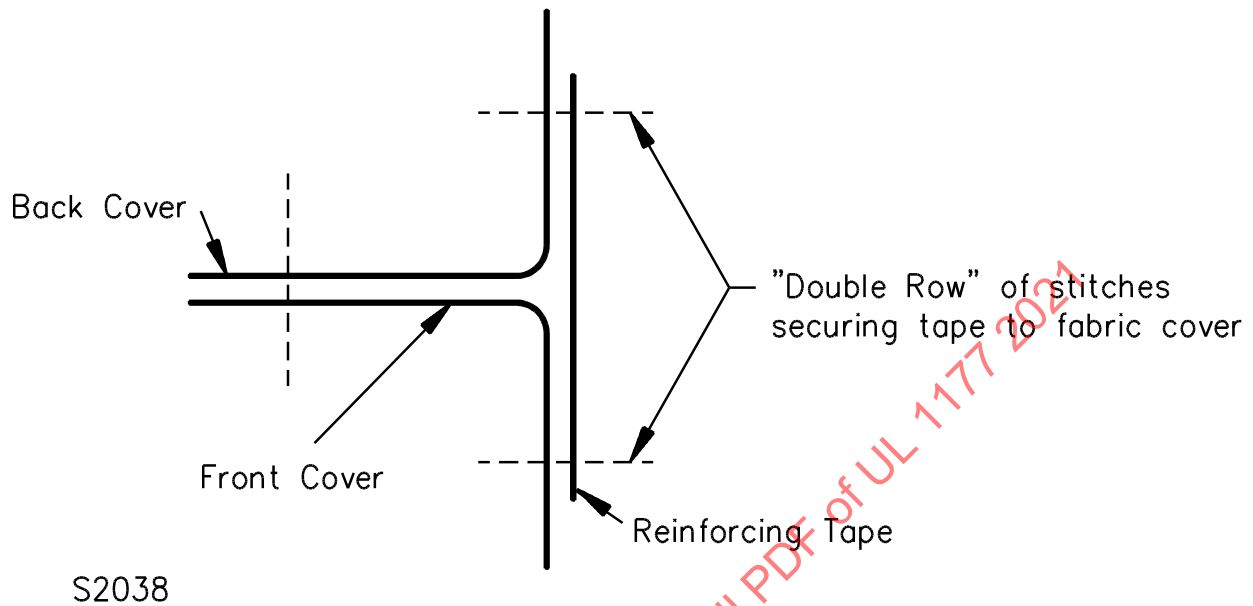


Figure 7.5

Stitching details – location of stitching and forming of webbing at free end of tie tapes

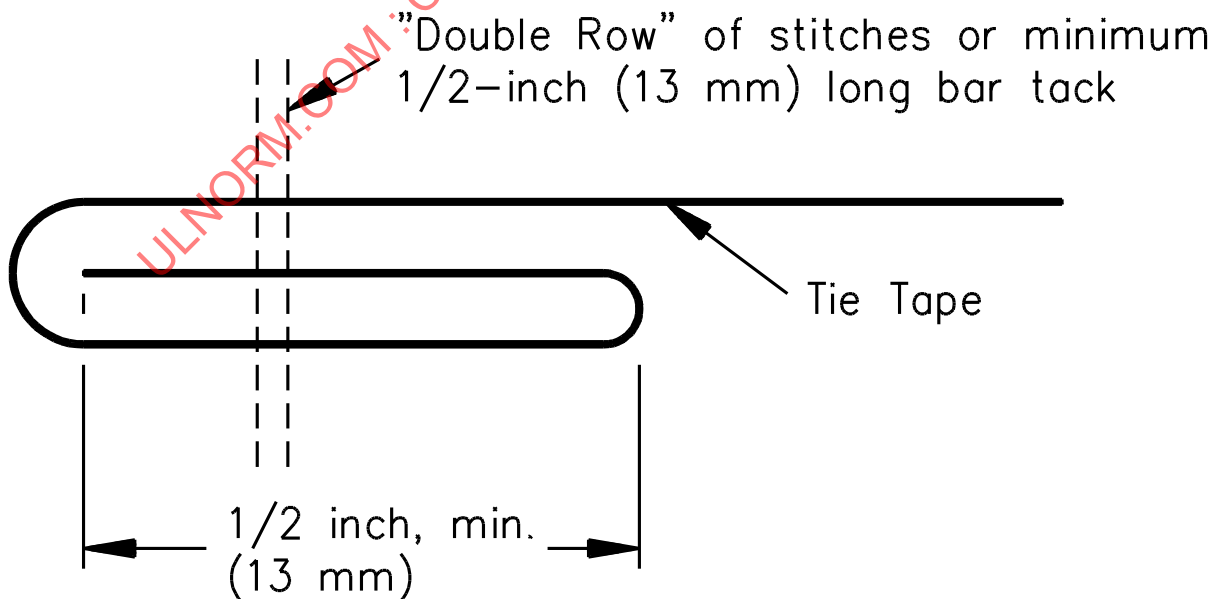
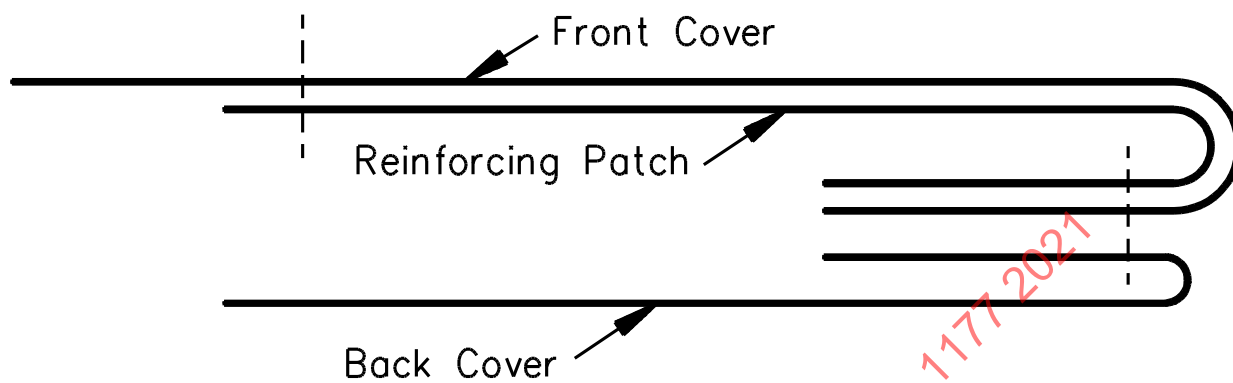


Figure 7.6

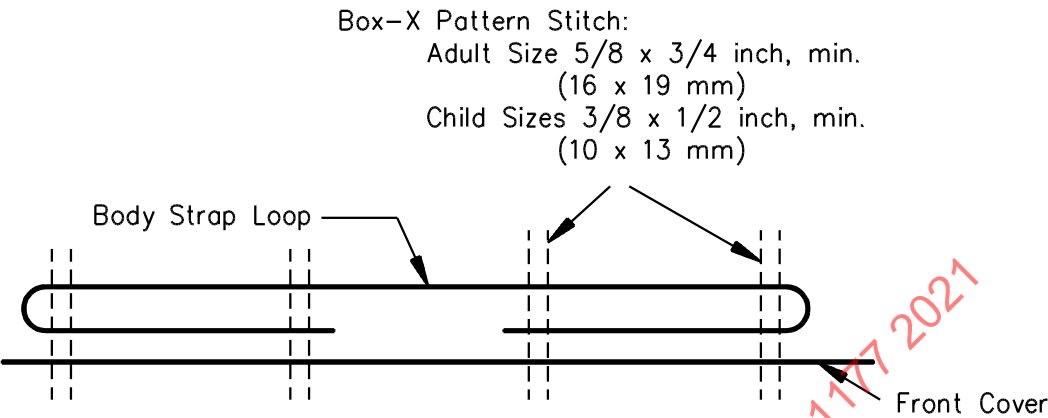
Stitching details – location of stitching and seam construction for securing reinforcing strips to front cover



S2040

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Figure 7.7
Stitching details – location of stitching and seam construction for securing body strap loop to front cover

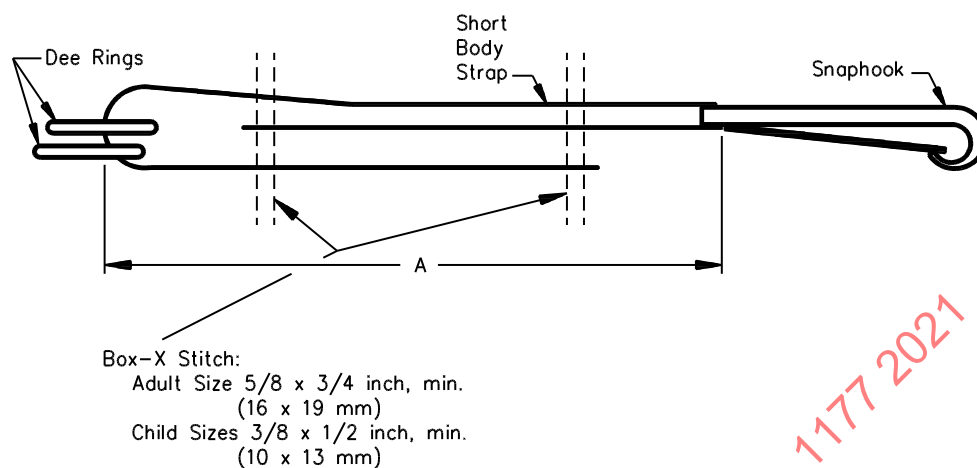


S2041

Model	Length, inches (mm)			
	Cut		Finished	
Adult	4-1/2	(114)	3	(76)
Child, medium	4-1/2	(108)	2-3/4	(70)
Child, small	4-1/4	(108)	2-3/4	(70)

Figure 7.8

Stitching details - location of stitching and folding of webbing for securing hardware to body strap

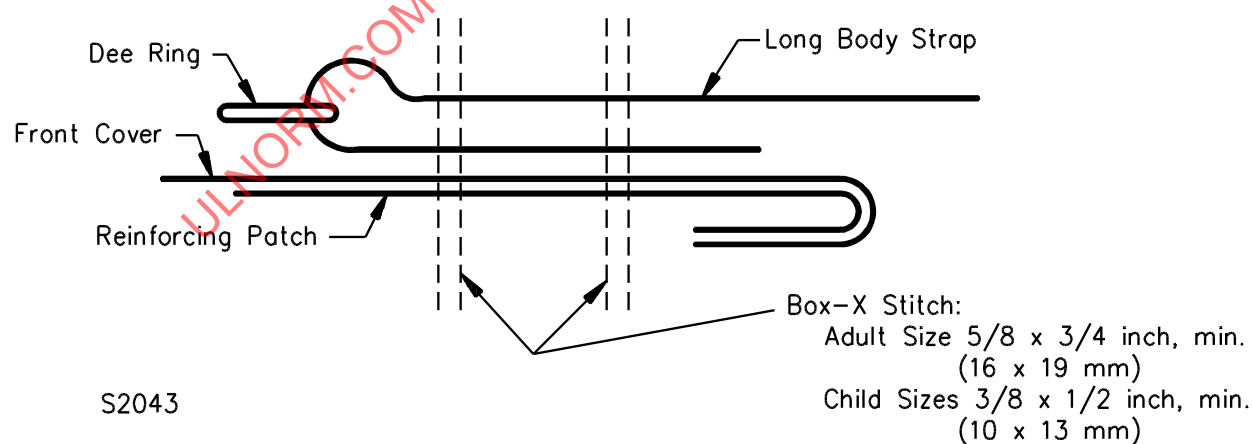


S2042

Model	Dimensions, inches (mm) ^a	
	A	
All adult sizes	2-1/4	(57)
All child, medium	2	(51)
All child, small	2	(51)
^a ±1/4 inch, (±6 mm)		

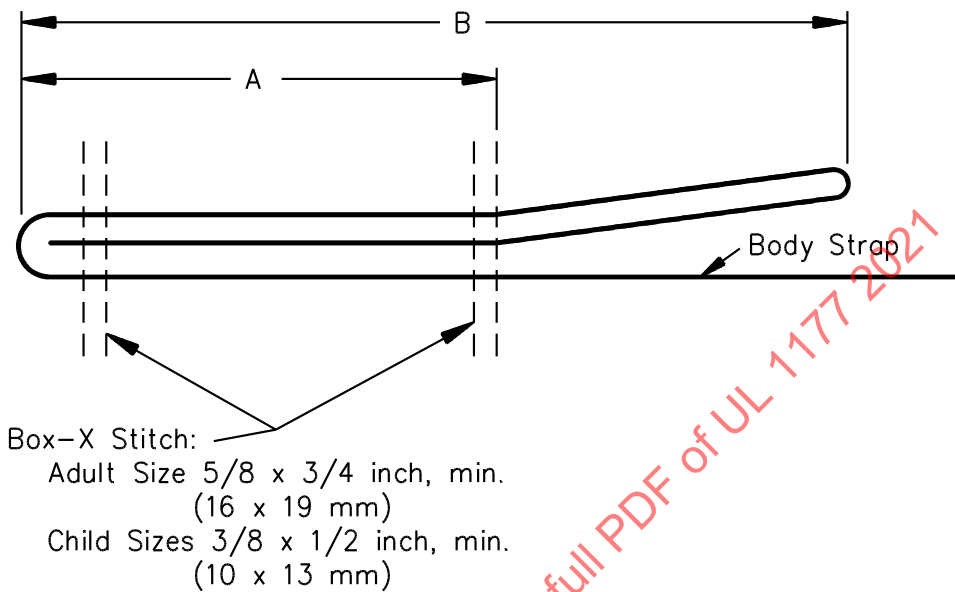
Figure 7.9

Stitching details - location of stitching and folding of webbing for securing body strap to front cover



S2043

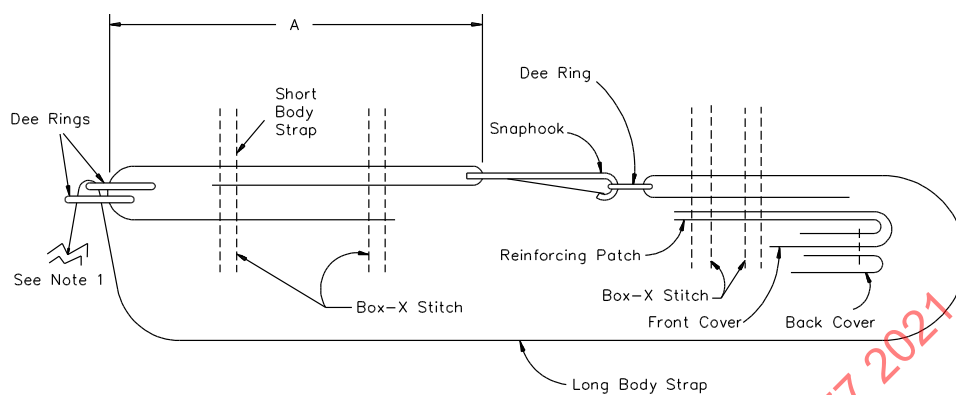
Figure 7.10
Stitching details – location of stitching and folding of webbing for securing body strap to front cover



S2044

Model	Dimensions, inches (mm) ^a	
	A	B
All adult sizes	7/8 (22)	1-1/2 (38)
All child, medium	3/4 (19)	1-3/4 (44)
All child, small	3/4 (19)	1-3/4 (44)
^a ±1/8 inch (±3 mm)		

Figure 7.11
Body strap assembly



S2045

Note: Free end incorporates tab as shown in [Figure 7.10](#).

Box-X stitch:

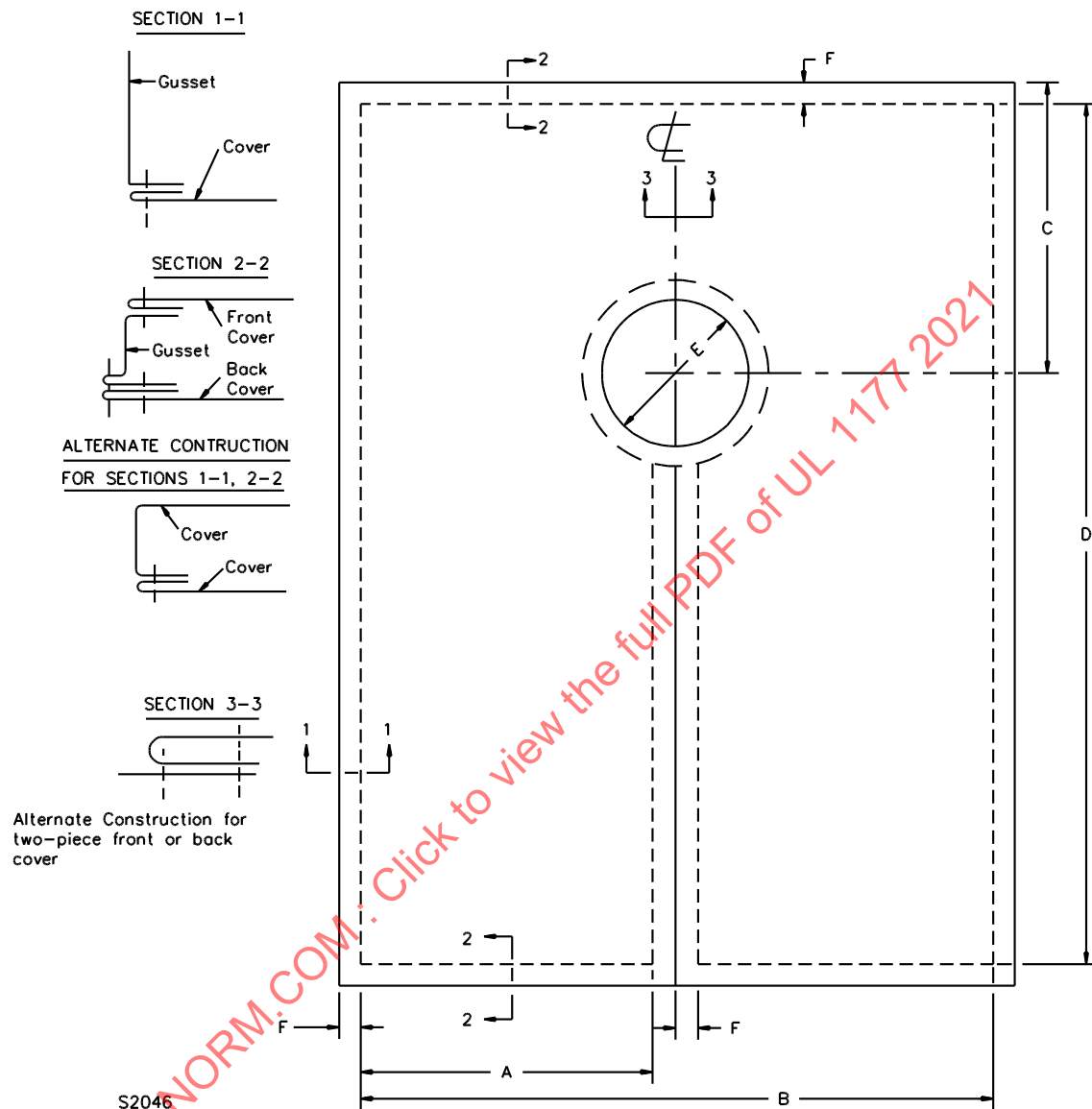
Adult size – 5/8 x 3/4 inch (16 x 19 mm) min.

Child sizes – 3/8 x 1/2 inch (10 x 13 mm) min.

Model	Dimensions, inches (mm) ^a	
	A	
All adult sizes	2 1/4	(57)
All child, medium	2	(51)
All child, small	2	(51)
^a ±1/4 inch (±6 mm)		

Figure 7.12

Foam vest cutting pattern and construction of cloth cover



Model	A	B ^a	C ^a	D ^a	E ^a	F ^b	Finished gusset width
AP	7	14	9	28	4-1/2	1/2	2
CPM	6-1/2	13	7-1/4	22-1/2	3	1/2	2
CPS	5-1/2	11	6-1/2	18-3/4	2-1/4	1/2	2
AY	7	14	8	28	4-1/2	1/2	2-1/4
CYM	6-1/2	13	6-3/4	22-1/2	3	1/2	2-1/4
CYS	5-1/2	11	5-3/4	18-3/4	2-1/4	1/2	2-1/4

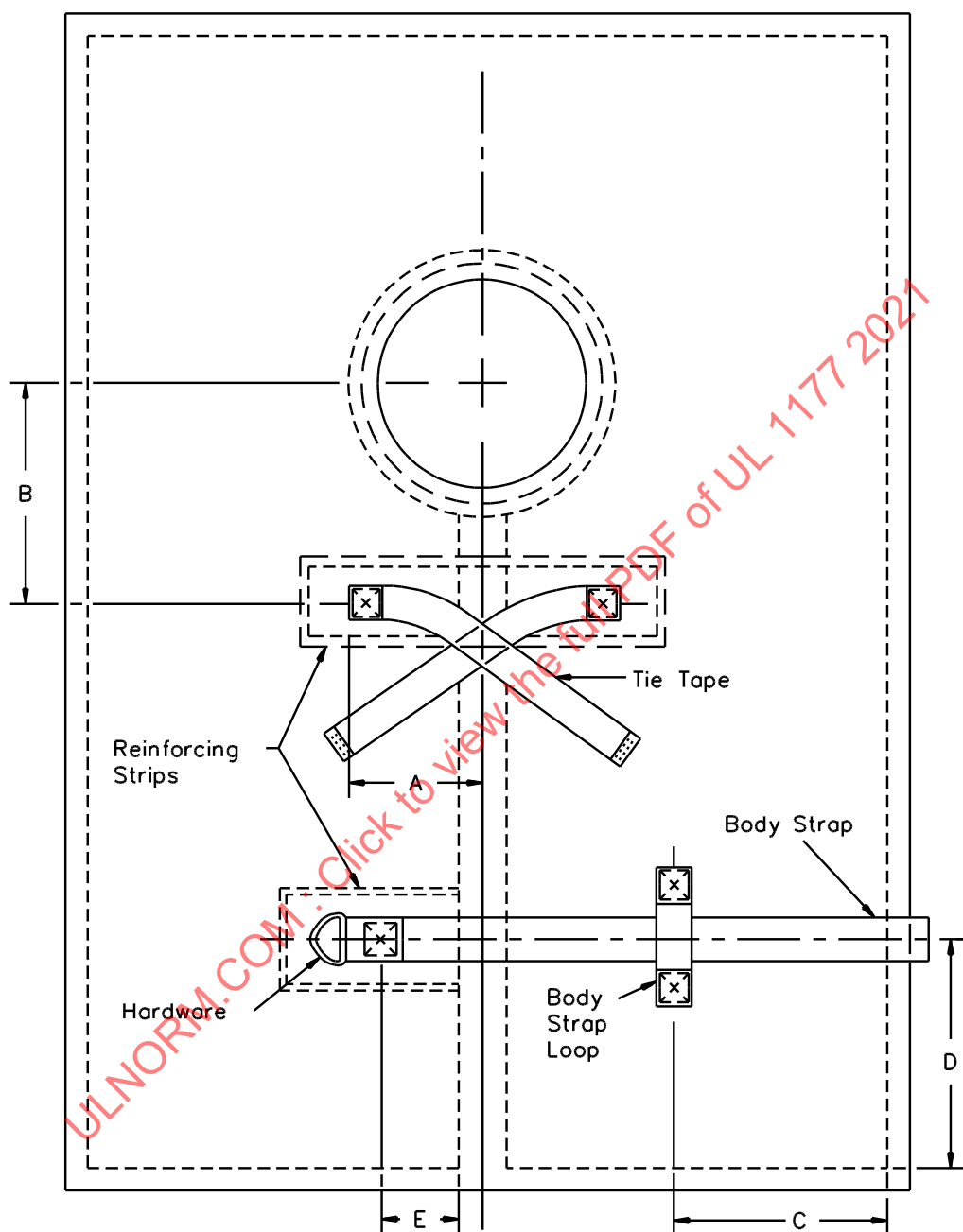
NOTE – Dimensions in inches (1 inch = 25.4 mm)

^a Dimensions plus 1/4 inch, minus 0 inch.

^b When 70 denier uncoated nylon fabric is used, cutting pattern shall be increased to permit a 3/8-inch (9.5-mm) seam width.

Figure 7.13

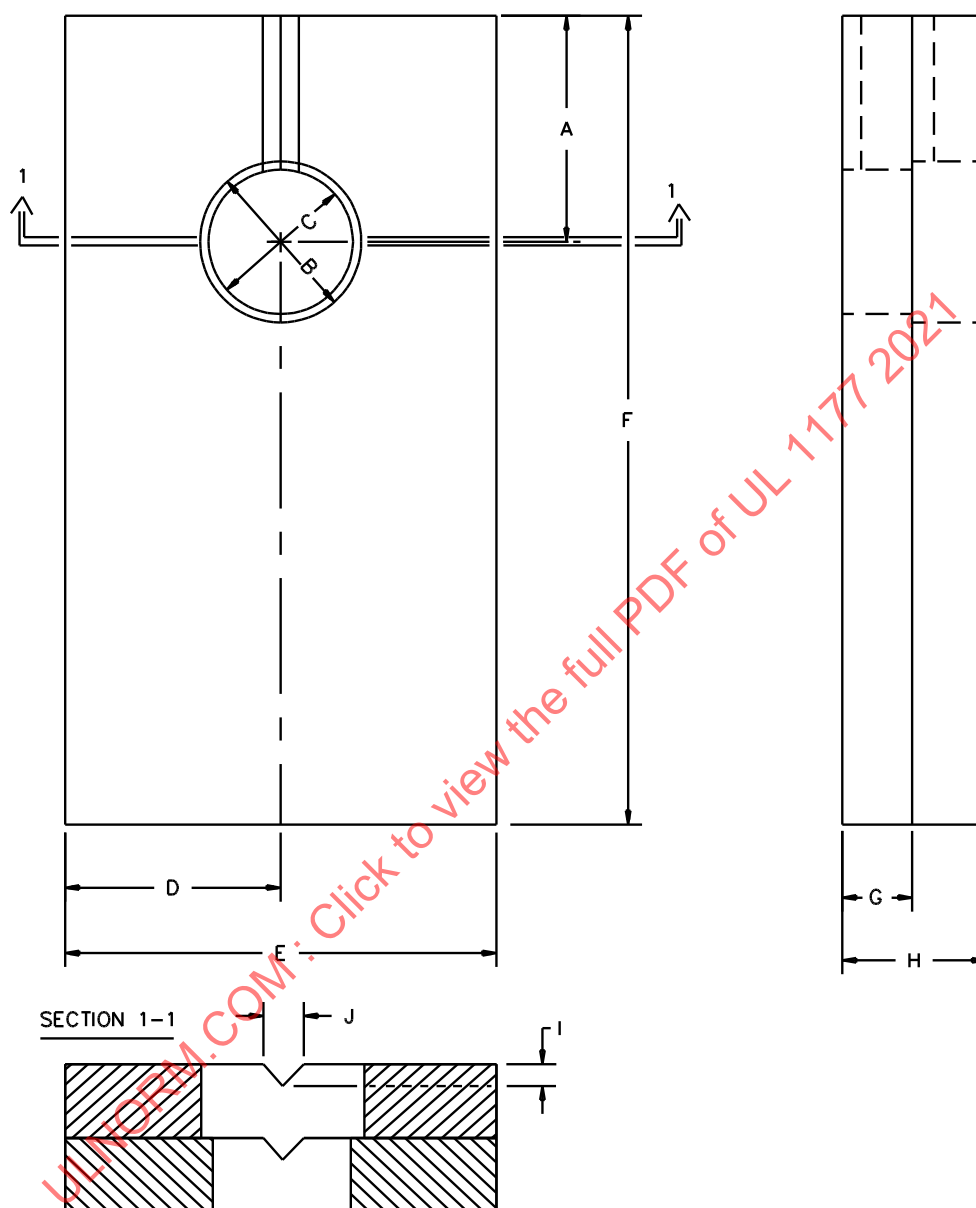
Foam vest locations for securing tie tapes, belt loops, and reinforcing strips to front cover



S2047

Model	A	B	C	D	E
AP and AY	2	4-3/4	1-3/4	6-1/2	2
CPM and CYM	2	4	1-1/2	4-1/2	2
CPS and CYS	2	3-5/8	1-1/8	3-5/8	2
NOTES –					
1. Dimensions in inches (1 inch = 25.4 mm)					
2. Dimensions $\pm 3/8$ inch (9.5 mm)					

Figure 7.14
Foam buoyant material



S2048

Model	A	B	C	D	E ^a	F ^a	G	H	I	J
AP	7-3/4	7	5-1/2	5-1/2	11	25-3/4	1	2	3/4	3/4
CPM	6	5-1/2	4	5	10	20-1/4	1	2	3/4	3/4
CPS	5-1/4	4-3/4	3-1/4	4	8	16-1/2	1	2	3/4	3/4
AY	6-3/4	7	5-1/2	5-1/2	11	25-3/4	1-1/8	2-1/4	3/4	3/4
CYM	5-1/2	5-1/2	4	5	10	20-1/4	1-1/8	2-1/4	3/4	3/4
CYS	4-1/2	4-3/4	3-1/4	4	8	16-1/2	1-1/8	2-1/4	3/4	3/4

NOTE – Dimensions in inches (1 inch = 25.4 mm)

^a Plus 3/8 inch (9.5 mm), minus 0. All other dimensions approximate.

8 Kapok or Fibrous Glass Devices

8.1 The buoyant pad inserts for Models AK-1, CKM-1, and CKS-1 shall be filled with kapok distributed as specified in [Table 8.1](#).

Table 8.1
Distribution of kapok in buoyant pad inserts

	Model AK-1 (minimum)		Model CKM-1 (minimum)		Model CKS-1 (minimum)	
	Oz	(kg)	Oz	(kg)	Oz	(kg)
Front pad (2 each)	5.75	(0.16)	3.75	(0.11)	2.5	(0.07)
Back pad	4.0	(0.11)	2.5	(0.07)	2.0	(0.06)
Total	15.5	(0.44)	10.0	(0.28)	7.0	(0.20)

8.2 Buoyant pad inserts for Models AF, CFM, and CFS buoyant vests shall be filled with fibrous glass and distributed as specified in [Table 8.2](#).

Table 8.2
Distribution of fibrous glass in buoyant pad inserts

	Model AF-1 (minimum)		Model CFM-1 (minimum)		Model CFS-1 (minimum)	
	Oz	(kg)	Oz	(kg)	Oz	(kg)
Front pad (2 each)	10.25	(0.29)	6.75	(0.19)	4.5	(0.13)
Collar pad	7.25	(0.21)	4.5	(0.13)	3.5	(0.10)
Total	27.75	(0.79)	18.0	(0.51)	12.5	(0.35)

8.3 The envelope for a kapok or fibrous glass filled device shall be cut and sewn in accordance with pattern illustrated in [Figure 7.1](#). Three compartments shall be formed to hold the buoyant pad inserts: two front compartments and one back compartment. As an alternative construction, the front or back cover panels, or both, may be made of two pieces, if the two pieces are joined by a double stitched seam from the top center of the neck hole to the top of the vest as illustrated in Section 4-4 of [Figure 7.1](#).

8.4 Each buoyant insert pad covering:

- Shall be formed from two pieces of plastic film cut to the patterns illustrated in [Figure 7.3](#) and heat-sealed; or
- May be formed from extruded tubular film.

9 Foam Devices

9.1 For Models AP, CPM, and CPS, the buoyancy shall be provided by inserts of unicellular expanded polyvinyl chloride-acetate copolymer or synthetic rubber modified polyvinyl chloride, polymer, or copolymer plastic foam. For Models AY, CYM, and CYS, the buoyancy shall be provided by inserts of unicellular polyethylene foam. The inserts shall be all new material. Buoyancy shall not be dependent on loose or granulated material.

9.2 The fabric envelope shall be made of three pieces. Two pieces of fabric shall be cut and sewn with seams as illustrated in [Figure 7.12](#). These two pieces shall be joined together with a third piece that forms:

- a) A 2 inch (51 mm) finished gusset strip on the periphery of the device for Models AP, CPM, and CPS; or
- b) A 2-1/4 inch (57 mm) finished gusset strip on the periphery of the device for Models AY, CYM, and CYS.

Reinforcing strips measuring 2 by 4 inches (51 by 102 mm) and of the same material as the envelope shall be stitched to the inside of the front piece of the envelope as illustrated in [Figure 7.4](#).

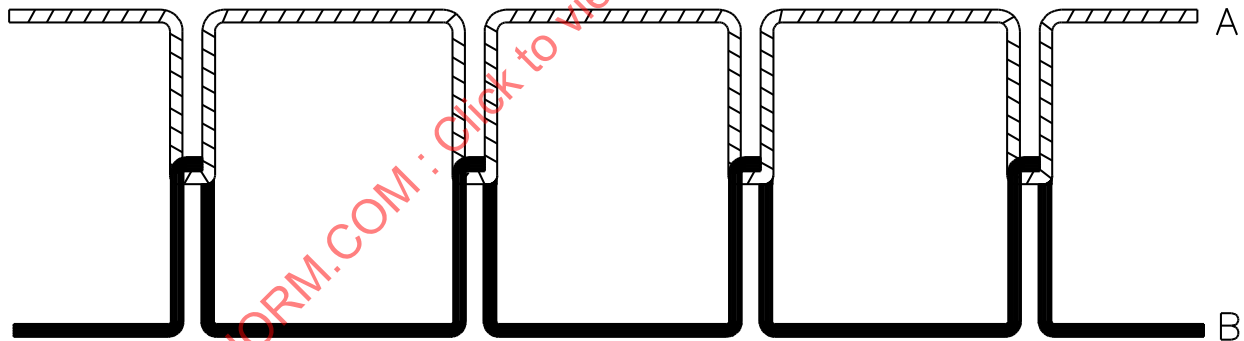
9.3 Where a vinyl coating is used:

- a) Its minimum thickness shall be 10 mils (0.25 mm);
- b) It shall comply with the requirements specified in Coatings, Section [32](#); and
- c) It shall comply with the Standard for Components for Personal Flotation Devices, UL 1191.

10 Stitching – All Devices

10.1 All stitching shall be by short lock stitch, Type 301, as defined in Federal Standard 751, and illustrated in [Figure 10.1](#). There shall be not less than 7 nor more than 9 stitches to the inch (25 mm). Both ends of the stitching forming the shoulder hinge seams and the top and bottom closing seams of the envelope shall be backstitched at least 1/2 inch (13 mm).

Figure 10.1
Lock stitches



Lock Stitch Type 301

S2049

This type of stitch shall be formed with two threads: one needle thread, A, and one bobbin thread, B. A loop of thread A shall be passed through the material and interlaced with thread B. Thread A shall be pulled back so that the interlacing shall be midway between surfaces of the material or materials being sewn.

10.2 The tie tapes at the neck shall have a finished length of not less than 12 inches (305 mm) for both adult- and child-size vests. They shall be arranged and attached to the envelope as illustrated in [Figure](#)

7.2 and Figure 7.13. Free ends shall be doubled over and stitched as illustrated in Figure 7.5. The fixed ends shall be folded double thickness for a minimum 7/8 inch (22 mm) length and stitched to the front cover and reinforcing strip using a minimum 3/8 by 1/2 inch (10 by 13 mm) box-x stitch.

10.3 The tie tapes, body strap, body strap loop, hardware, and reinforcing strips shall be arranged as illustrated in Figure 7.2 and Figure 7.13, and attached to the envelope with the seams and stitching indicated. Body strap lengths shall be as specified in Table 10.1.

Table 10.1
Finished length of extended body strap assembly

Model	Assembly length ^a	
	Inches	(m)
Adult	56-1/2	(1.44)
Child, medium	39	(1.0)
Child, small	33	(0.84)
^a Plus 1 inch (25.4 mm), minus 0 inch (0 mm).		

MATERIALS

11 General

11.1 Buoyant materials

11.1.1 Kapok shall be all new material complying with the requirements of 46 CFR 164.003. The kapok shall be processed by the "Air Blow" method so as to separate the fiber from coarser masses. There shall be not more than 5 percent by weight of sticks, seeds, or other foreign matter remaining. Processing shall not break down fiber or cause powdering or pulverizing of the kapok.

11.1.2 Fibrous glass buoyant material shall comply with the requirements of Batt, Fibrous Glass, Lifesaving Equipment, MIL-B-2766.

11.1.3 Foam material used as buoyant material shall comply with the requirements for foam in the Standard for Components for Personal Flotation Devices, UL 1191.

11.1.4 Foam used as buoyant material shall have a V factor of 85 or more as determined in accordance with the Standard for Components for Personal Flotation Devices, UL 1191. Also, see 39.2.

Exception: This requirement does not apply to foam that is not relied upon for compliance with the requirement in 39.2, if the device complies with the requirements in the Flotation Stability Test, Section 36, both with and without the foam in place.

11.1.5 The V factor as determined in accordance with the Standard for Components for Personal Flotation Devices, UL 1191, of foam forward of the body axis shall be greater than or equal to the V factor of foam aft of the body axis.

Exception: A device that complies with the requirement in 38.2.1 need not comply with this requirement.

11.1.6 A device shall be constructed to acceptably reduce the likelihood of shifting or bunching of internal materials.

11.2 Covering materials (for kapok or fibrous glass only)

11.2.1 The pad covering for the buoyant pad inserts containing kapok or fibrous glass shall be flexible vinyl film 0.006 ± 0.0006 inch (0.15 ± 0.015 mm) in thickness, and shall comply with the Standard for Components for Personal Flotation Devices, UL 1191, of Federal Specification L-P-375C for Type I or II, Class 1 film.

11.3 Envelope materials

11.3.1 The buoyant vest envelope, or cover, shall be made from:

- a) Materials complying with the Standard for Components for Personal Flotation Devices, UL 1191; or
- b) 39-inch (982-mm) 2.85 cotton jeans cloth with a thread count of approximately 96 by 6.4.

The finished goods shall weigh not less than 4.2 ounces per square yard (139 g/m^2), have a thread count of not less than 94 by 60, and have a minimum breaking strength of 85 pounds-force (378 N) in the direction of greater thread count and 50 pounds-force (222 N) in the direction of lesser thread count.

11.3.2 There are no restrictions as to the color of the envelope material but the fastness of the color to laundering, water, crocking, and light shall be rated good when tested in accordance with Federal Test Method Standard, No. 191, Methods 5610, 5680, 5650, and 5660.

11.4 Tie tape, belt loops, and reinforcing tape

11.4.1 Tie tape and belt loops shall be made from:

- a) Materials complying with the Standard for Components for Personal Flotation Devices, UL 1191; or
- b) 3/4-inch (19-mm) cotton webbing complying with Military Specification MIL-T-43566 (Class I) for Type I webbing.

11.4.2 Reinforcing tape shall be:

- a) Made from materials complying with the Standard for Components for Personal Flotation Devices, UL 1191; or
- b) 3/4-inch (19-mm) cotton tape weighing 0.18 ounce or more per linear yard (5.9 g/m) and having a minimum breaking strength of 120 pounds-force (534 N).

11.5 Body straps

11.5.1 Body straps shall be made from:

- a) Materials complying with the Standard for Components for Personal Flotation Devices, UL 1191; or
- b) 1-inch (25-mm) wide webbing for adult size and 3/4-inch (19-mm) wide webbing for child sizes, complying with Military Specification MIL-W-530 for Type IIa webbing.

11.5.2 Thread shall be made from:

- a) Materials complying with the Standard for Components for Personal Flotation Devices, UL 1191; or

- b) Materials complying with the requirements of one of the Federal Specifications in [Table 11.1](#).

Cotton thread shall be used only with cotton materials and be mildew inhibited. Only one kind of thread shall be used in each seam.

Table 11.1
Federal specifications for thread

Material type	Class, ticket number, or letter size	Federal specification
Cotton, Type 1B	Ticket no. 16	V-T-276H
Polyester, Type I or II	Class 1, Size E	V-T-285D
Nylon, Type I or II	Class A, Size E	V-T-295D

11.6 "D" rings and snap hooks

11.6.1 "D" rings and snap hooks shall:

- a) Comply with the Standard for Components for Personal Flotation Devices, UL 1191; or
- b) Be constructed of inherently corrosion resistant material, such as brass, bronze, or stainless steel. See also Tensile Test, Section [43](#).

11.6.2 The snap hook spring shall:

- a) Comply with the Standard for Components for Personal Flotation Devices, UL 1191; or
- b) Comply with Subpart 160.047-3a of Chapter I, Title 46 CFR.

11.6.3 The width of the webbing passage shall not exceed the width of the webbing by more than 1/8 inch (3 mm) as measured at the line of contact.

11.6.4 "D" ring ends shall:

- a) Be welded to form a continuous ring; or
- b) Be a one-piece casting.

The webbing opening of the snap hook shall be a continuous ring. Decorative platings in any thickness are permitted.

11.7 Other means of closure

11.7.1 Means of closure other than "D" rings and snap hooks shall comply with the Standard for Components for Personal Flotation Devices, UL 1191, and the Tensile Test, Section [43](#).

12 Survivor Locating Means

12.1 Survivor locating lights

12.1.1 A survivor locating light provided by the PFD manufacturer shall comply with the requirements specified in the USCG, Subpart 161.012, Chapter I, Title 46 CFR. The attachment means shall not impair the intended performance of the device.

12.2 Retroreflective tapes

12.2.1 Retroreflective tape provided on a device and intended by the manufacturer to be an aid for use in search and rescue efforts shall comply with the requirements specified in the applicable USCG regulations. The attachment means shall not impair the intended performance of the device.

PERFORMANCE

13 Buoyancy Test for Buoyant Pad Inserts

13.1 The finished individual heat-sealed kapok or fibrous glass buoyant pad inserts shall provide the buoyancy specified in [Table 13.1](#) when tested in accordance with the Buoyancy Test, Section [39](#), except that the pad covers are not to be slit open, and the period of submergence is to be that necessary for the buoyant material to attain the temperature of the water, and to determine the displacement of the pads. The values are specified for a water temperature of 68°F (20°C) and a barometric pressure of 29.92 inches (101 kPa) of mercury.

Table 13.1
Buoyancy of buoyant pad inserts

	Models AK-1 and AF-1		Models CKM-1 and CFM-1		Models CKS-1 and CFS-1	
	Pounds-force	(N)	Pounds-force	(N)	Pounds-force	(N)
Front pads (each)	6-1/4	(27.8)	4-1/4	(18.9)	2-3/4	(12.2)
Back pad	4-1/4	(18.9)	3-1/4	(14.5)	2-1/2	(11.1)
NOTE – Tolerance $\pm 1/4$ pound-force (± 1.1 N)						

14 Buoyant Pad Insert Seam Test

14.1 The heat-sealed seams of kapok or fibrous glass buoyant pad inserts shall have an adhesion of not less than 8 pounds-force (3.5 N) when 1 inch (25 mm) strips cut across (perpendicularly) to the seams are subjected to the tensile force described in [14.2](#).

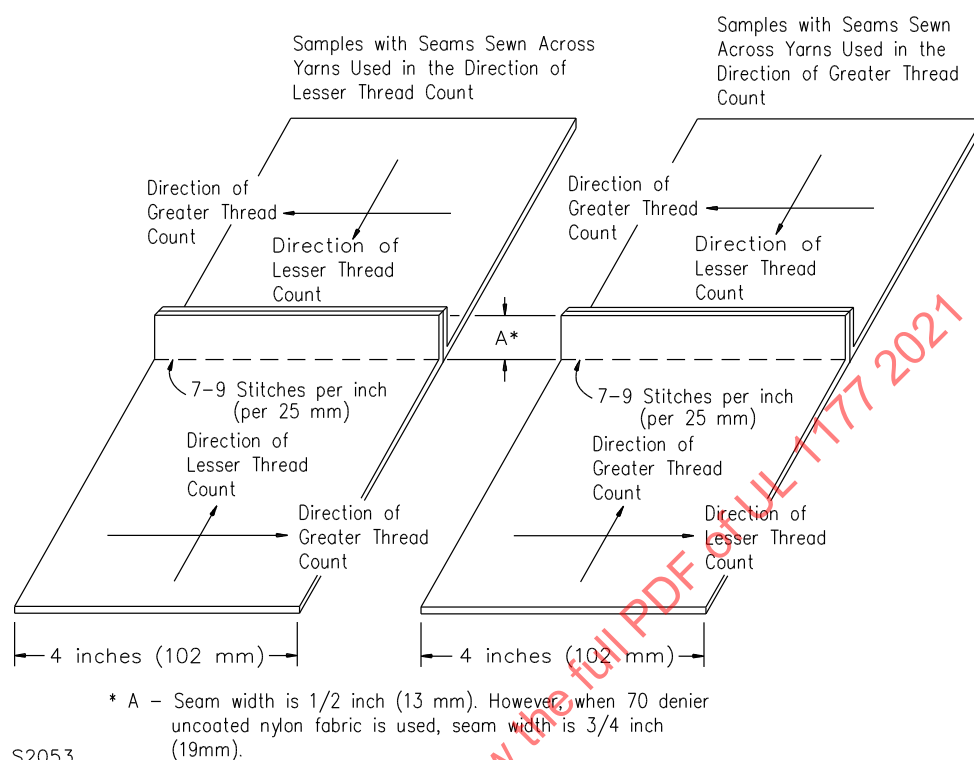
14.2 Each sample, in turn, is to be placed in the jaws of a CRT type tensile tester, as defined in Specification for Tensile Testing Machines for Textile Materials, ASTM D76, and adjusted to a jaw separation rate of 12 inches (305 mm) per minute.

15 Seam Strength Test

15.1 The strength of a fabric sewn seam that contributes to the functional integrity of the vest shall not be less than 60 pounds-force (267 N) in both the directions of greater thread count and lesser thread count.

15.2 Six samples with seams sewn across in each of the yarns used in the directions of greater thread count and lesser thread count, a total of 12 samples, are to be prepared. Each sample is to consist of two 4 by 5 inch (100 by 125 mm) pieces of cloth, as used for the vest, stitched together along the 4-inch (100-mm) dimension in a seam (see [Figure 15.1](#)). Each sample is to be placed in the jaws of a tensile tester adjusted to a jaw separation rate of 12 inches per minute (305 mm/minute). Initial jaw separation is to be 3 inches (76 mm).

Figure 15.1
Details of seam samples



16 Reinforcing Tape Strength Test

16.1 Reinforcing tape shall have a minimum breaking strength of 120 pounds-force (534 N) when tested as specified in [16.2](#).

16.2 A 6-inch (152-mm) length of the reinforcing tape is to be placed in the jaws of a tensile tester adjusted to a jaw separation rate of 12 inches per minute (305 mm/minute). The machine is to be operated until the tape breaks or the 120 pounds-force (534 N) value is reached, whichever comes first.

17 Closure Strength Test

17.1 A closure assembly, including the body strap, shall withstand for 10 minutes a hanging weight of 300 pounds (136 kg) for adult-size buoyant vests or 230 pounds (104 kg) for child-size vests without evidence of deformation, cracking, breaking, or any deterioration that would impair its intended operation.

18 Marking Permanency Test

18.1 A marking shall be permanently secured to the device after being subjected to the conditions specified in [18.2](#) and [18.3](#). A pressure-sensitive label, a label secured by cement, adhesive, or sewing, or applied directly to the surface of the device by silk screening, ink stamping, or stenciling is considered to be of a permanent nature if:

- a) The sample demonstrates good adhesion and edges are not curled.
- b) The printing remains legible.

18.2 The sample is to be completely submerged in fresh water for a minimum of 72 hours.

18.3 Immediately after removal from the water, the sample is to be placed on a hard surface and rubbed vigorously with the fingers for not less than 30 seconds.

MARKINGS

19 General

19.1 Each standard device shall be permanently and legibly marked with the following items with lettering size that can be read at a distance of 2 feet (0.61 m) and shall comply with the requirements specified in the Marking Permanency Test, Section [18](#).

- a) "Type II Personal Flotation Device."
- b) "Dry Out Thoroughly When Wet."
- c) "Inspected and tested in accordance with U. S. Coast Guard Regulations."
- d) "Approved for use on all recreational boats and on uninspected commercial vessels less than 40 feet in length not carrying passengers for hire by persons weighing (more than 90 pounds) (50 to 90 pounds) (less than 50 pounds)."
- e) Lot (number).
- f) Model (number or designation).
- g) Manufacturer's or private labeler's name and address.
- h) Year and Quarter^a (1, 2, 3, or 4 Qtr.) of manufacture.
- i) The following or equivalent wording: "There is a potential for buoyancy loss depending on how this device is used and cared for. The in-water performance of this device should be tested at the beginning of each season to determine that it provides adequate personal flotation."

^a May be in code.

19.2 In addition to complying with the requirements specified in [19.1](#), a device using kapok or fibrous glass buoyant material shall be marked:

- a) ("Kapok" or "fibrous glass") "buoyant material provides a minimum buoyant force of" ("16 lb.", "11 lb.", or "7-1/4 lb.").^a
- b) "Do not snag or puncture inner plastic cover."
- c) "If pads become waterlogged, replace device."
- d) "U. S. Coast Guard Approval No. 160.047/xxx/x."

^a When the minimum buoyancy is the minimum actual production buoyancy, the following marking may be added: "at time of manufacture."

19.3 In addition to complying with the requirements specified in [19.1](#), a device using unicellular plastic or polyethylene foam buoyant material shall also be marked:

- a) "WARNING – DO NOT DRY CLEAN."

b) "(Name of buoyant material) foam buoyant material provides a minimum buoyant force of" ("15-1/2 lb.", "11 lb.", or "7 lb.").

c) "U. S. Coast Guard Approval No. _____^a/xxx/x."

^a 160.052 for unicellular plastic foam vest. 160.060 for unicellular polyethylene foam vest.

19.4 In addition to complying with the requirements specified in [19.1](#) and applicable requirements specified in [19.2](#) and [19.3](#), a device incorporating a hiking harness shall also be marked.

"This device is designed to function as a Type II PFD both with and without the lower (harness) position secured to the body. In an emergency, the upper (vest) portion only may be donned and secured to the body as a normal vest – the device will still perform as a Type II PFD."

19.5 Markings of [19.1](#) (a) – (d), [19.2](#) (a) – (d), and [19.3](#)(a) shall be prominent with respect to [19.1](#) (e) – (g), and [19.3](#) (a) and (b), that is, printed in contrasting size, color, style, lettering, or appropriate spacing.

19.6 A device for persons weighing 50 to 90 pounds (22.7 to 40.5 kg) shall not be marked "small."

19.7 When a manufacturer:

a) Produces a device incorporating dee rings, tabs, or other construction features that are not intended to secure the device to the boat; and

b) Does not wish to have such construction features rendered inoperative when subjected to the Pull Test, Section [50](#);

the statement "This device is not to be fastened to the boat," shall be permanently and clearly marked on the device. This statement shall be prominent, that is, printed in contrasting style, size, or color or lettering or appropriate spacing, with respect to [19.1](#) (e), (f), and (h) and [19.3](#)(a). The product shall also comply with the requirements specified in [22.1](#).

19.8 Deleted

19.9 Deleted

SUPPLEMENTARY INFORMATION

20 General

20.1 Each device shall be accompanied by two informational items that comply with the requirements specified in [20.2](#) – [20.5](#), [21.1](#), and [21.3](#), and incorporate the texts specified in [21.2](#) and [21.4](#).

20.2 The text specified in [21.2](#) shall be provided so that it can be read prior to purchase of the device. The text in [21.4](#) is intended to be read after purchase.

20.3 When the device package is not transparent, the text specified in [21.2](#) may be printed directly on the outside of the package or may be printed on a separate card, so that it is legible to the purchaser and the text specified in [21.4](#) shall be printed in a pamphlet enclosed in each package.

20.4 When the device package is transparent, the text specified in [21.2](#) may be printed in a pamphlet enclosed in each package so that the text can be read through the package. The text specified in [21.4](#) shall be printed on the remaining pages of the pamphlet or on a separate pamphlet.

20.5 When the device is not provided in a package, the texts specified in [21.2](#) and [21.4](#) shall be printed in a pamphlet attached to the device.

21 Required Texts

21.1 The text specified in [21.2](#) shall be verbatim and shall conform with the location requirements specified in [20.2](#) – [20.5](#). The illustrations provided by the manufacturer may be photographs or drawings of his own products or, where this is not possible, may be illustrations of other USCG approved PFDs. The text shall be printed in the sequence specified in [21.2](#). Additional information, instructions, or illustrations shall not be included. Minimum type size shall be 8 point.

21.2 The following text, to be readable prior to purchase, shall be provided:

"FEDERAL REGULATIONS REQUIRE PERSONAL FLOTATION DEVICES"

"Coast Guard regulations in Part 175 of Title 33, Code of Federal Regulations require personal flotation devices in the following three situations:

a) No person may use a recreational boat less than 16 feet in length or a canoe or kayak unless at least one personal flotation device (PFD) of the following types is on board for each person:

Type I PFD

Type II PFD

Type III PFD

Type IV PFD

b) No person may use a recreational boat 16 feet or more in length, except a canoe or kayak, unless at least one personal flotation device of the following types is on board for each person:

Type I PFD

Type II PFD

Type III PFD

c) No person may use a recreational boat 16 feet or more in length, except a canoe or kayak, unless at least one Type IV PFD is on board in addition to the PFD's required in paragraph (b)."

"THERE ARE FIVE TYPES OF PERSONAL FLOTATION DEVICES. This is a Type II PFD.

NOTE: The following types of PFD's are to perform as described in calm water and when the wearer is not wearing any other flotation material (such as a wetsuit). Type I – A Type I PFD has the greatest required buoyancy and is designed to turn most unconscious persons in the water from a face down position to a vertical or slightly backward position and to maintain the person in the vertical and slightly backward position, and therefore, greatly increase his or her chances of survival. The Type I PFD is suitable for all waters, especially for cruising on waters where there is a probability of delayed rescue, such as large bodies of water where it is not likely that a significant number of boats will be in close proximity. This type PFD is the most effective of all types in rough water. The Type I PFD is easiest to don in any emergency

because it is reversible and available in only two sizes – adult (90 lb. or more) and child (less than 90 lb.) which are universal sizes (designed to fit all persons in the appropriate category).

(Illustration of Type I PFD)

Type II – A Type II PFD is designed to turn the wearer to a vertical and slightly backward position in the water. The turning action is not as pronounced as with a Type I and the device will not turn as many persons under the same conditions as the Type I. The Type II PFD is usually more comfortable to wear than the Type I. This type PFD is normally sized for ease of emergency donning and is available in the following sizes: Adult (more than 90 lbs.) – Medium Child (50 to 90 lb.), and two categories of Small Child (less than 50 Lb. or less than 30 lb.). Additionally, some models are sized by chest sizes. You may prefer to use the Type II where there is a probability of quick rescue such as areas where it is common for other persons to be engaged in boating, fishing, and other water activities.

(Illustration of Type II PFD)

Type III – The Type III PFD is designed so that the wearer can place himself or herself in a vertical and slightly backward position, and the device will maintain the wearer in that position and have no tendency to turn the wearer face down. A Type III can be the most comfortable, comes in a variety of styles which should be matched to the individual use, and is usually the best choice for water sports, such as skiing, hunting, fishing, canoeing, and kayaking. This type PFD normally comes in many chest sizes and weight ranges; however, some universal sizes are available. You may also prefer to use the Type III where there is a probability of quick rescue such as areas where it is common for other persons to be engaged in boating, fishing, and other water activities.

(Illustration of Type III PFD)

Type IV – A Type IV PFD is designed to be grasped and held by the user until rescued as well as to be thrown to a person who has fallen overboard. While the Type IV is acceptable in place of a wearable device in certain instances, this type is suitable only where there is a probability of quick rescue such as areas where it is common for other persons to be engaged in boating, fishing, and other water activities. It is not recommended for nonswimmers and children.

(Illustration of Type IV PFD)

Type V – A Type V PFD is a PFD approved for restricted use. No Type V PFD is currently approved for use on recreational boats to meet the mandatory carriage requirements listed in paragraph (a), (b), or (c) above.

21.3 The text in [21.4](#) shall be verbatim and shall conform with the location requirements of [20.2](#) – [20.5](#). The text shall be printed in the sequence shown in [21.4](#). Additional information, instructions, or illustrations may be included at the end of or between quoted phrases, provided there is no contradiction to the text in [21.2](#) and [21.4](#).

21.4 The following text, to be readable after purchase, shall be provided:

A. "YOUR PERSONAL FLOTATION DEVICE

You are required by Federal Regulations to have at least one Coast Guard approved personal flotation device (PFD) for each person in your recreational boat. You may not use your recreational boat unless all your PFD's are in serviceable condition, are readily accessible, are legibly marked with the Coast Guard approval number, and are of an appropriate size (within the weight range and chest sizes marked on the PFD) for each person on board."

B. "WHY DO YOU NEED A PFD?

Your PFD provides buoyancy to help keep your head above the water and to help you remain in a satisfactory position in the water. The average weight of an adult is only 10 to 12 pounds in the water and the buoyancy provided by the PFD will support that weight in water. Unfortunately, your body weight does not determine how much you will weigh in water. In fact, your weight in water changes slightly throughout the day. There is no simple method of determining your weight in water. You should try the device in the water to make sure it supports your mouth out of the water. Remember, all straps, zippers, and tie tapes must be used and of course the PFD must be the proper size (size limitations are on the label)."

C. "THINGS TO CONSIDER ABOUT PFD's

- (1) USCG approval of a PFD does not imply that it is ideal for all uses. For instance, there are a number of PFD's which are better suited for water skiing and others for white water canoeing and kayaking. These and other PFD's are labeled accordingly.
- (2) Some PFD's are more rugged and durable than others but usually cost more. You should evaluate the trade-offs of cost, your intended use, and how often the PFD will have to be replaced.
- (3) The use of most Type IV throwable PFD's usually requires you to grasp the device until rescued, which is difficult when there is an extended delay or when you are overcome by hypothermia (loss of body heat to the water). Also it implies that when you find yourself in the water there will be someone available to throw it to you."

D. "EACH OF THESE DEVICES IS INTENDED TO HELP YOU SAVE YOUR OWN LIFE

For your PFD to function properly, follow these suggestions to insure that it fits, floats, and remains in good condition:

- (1) Try your wearable PFD on and adjust it until it fits comfortably in and out of the water.
- (2) Try your PFD out in the water. This will show you how it works and will give you confidence when you use it. You should be aware that your PFD may perform differently under different conditions such as in swift water, with bulky clothing, etc.
- (3) Mark your PFD with your name if you are the only wearer.
- (4) Do not alter your PFD. If it doesn't fit properly, get one that does. An altered device is no longer Coast Guard approved.
- (5) Your PFD is not intended for use as a fender or kneeling pad.
- (6) Inspect your PFD periodically to make sure that it is free of rips, tears, or holes, that the flotation pads have no leaks, and that all seams and joints are securely sewn.
- (7) Keep your PFD away from sharp objects which may rip the fabric or puncture the flotation pads.
- (8) If your PFD contains kapok, the kapok fibers may become waterlogged and lose their buoyancy after the vinyl inserts are split or punched. When the kapok becomes hard or if the kapok is soaked with water, the PFD is no longer serviceable. It may not work when you need it and must be replaced.
- (9) When your PFD contains foam buoyant material, the foam may lose buoyancy from compression, water absorption, and other effects of use, to the degree that it is no longer serviceable. The in-water performance of the device should therefore be

checked at the beginning of each season (more often if you subject it to frequent or very hard use) to determine that it supplies enough flotation for your needs.

(10) When your PFD is wet, allow it to dry thoroughly before storing it. Store it in a well ventilated area.

(11) Do not dry your PFD in front of a radiator or other source of direct heat.

(12) When you must swim while wearing your PFD use a back or side stroke."

E. "PFD's AND CHILDREN

A child is difficult to float in a safe position because of the distribution of body weight and because a child tends to panic when suddenly in an unfamiliar environment. The violent movement of the arms and legs in an attempt to "climb out" of the water tends to nullify the stability of the PFD. An approved device will keep a child afloat, but not always in a face up position. A child should be taught how to put on the device and should be allowed to try it out in the water. It is important that the child feels comfortable and knows what the PFD is for and how it functions. Parents should note, however, that PFD's are not a substitute for adult supervision."

F. "WEAR YOUR PFD

Your personal flotation device won't help you if you don't have it on. When you don't choose to wear it at all times, you should keep it handy and put it on when heavy weather threatens, or when danger is imminent. Don't wait until it is too late; nonswimmers and children especially should wear their PFD's at all times when on or near the water."

G. "HYPOTHERMIA

Hypothermia, the loss of body heat to the water, is a major cause of deaths in boating accidents. Often the cause of death is listed as drowning; but, most often the primary cause is hypothermia and the secondary cause is drowning. After an individual has succumbed to hypothermia, he will lose consciousness and then drown. The following chart shows the effects of hypothermia:

Water temperature (degrees F)	Exhaustion or unconsciousness	Expected time of survival
32.5	Under 15 min.	Under 15 to 45 min.
32.5 to 40	15 to 30 min.	30 to 90 min.
40 to 50	30 to 60 min.	1 to 3 hrs.
50 to 60	1 to 2 hrs.	1 to 6 hrs.
60 to 70	2 to 7 hrs.	2 to 40 hrs.
70 to 80	3 to 12 hrs.	3 hrs. to indefinite
Over 80	Indefinite	Indefinite

PFD's can increase survival time because of the insulation they provide. Naturally, the warmer the water, the less insulation one will require. When operating in cold water (below 40 F), consideration should be given to using a coat or jacket style PFD as they cover more of the body than the vest style PFD's.

Some points to remember about hypothermia protection:

(1) While afloat in the water, do not attempt to swim unless it is to reach a nearby craft, fellow survivor, or a floating object on which you can lean or climb. Unnecessary swimming increases the rate of body heat loss. In cold water drown-proofing methods that require putting your head in the water are not recommended.

Keep your head out of the water. This will greatly lessen heat loss and increase your survival time.

(2) Keep a positive attitude about your survival and rescue. This will improve your chances of extending your survival time until rescue. Your will-to-live does make a difference!

(3) When there is more than one person in the water, huddling is recommended while waiting to be rescued. This action tends to reduce the rate of heat loss and thus increase the survival time.

(4) Always wear your PFD. It won't help you fight off the effects of hypothermia if you don't have it on when you go into the water.

H. "REMEMBER – SAFE BOATING IS NO ACCIDENT

When you need more information about PFD's and safe recreational boating, contact your state boating authority, U. S. Coast Guard Auxiliary, U. S. Power Squadron, Red Cross, or your nearest unit of the U. S. Coast Guard.

22 Optional Texts

22.1 When a manufacturer produces a device incorporating dee rings, tabs, or other construction features which are not intended to secure the device to the boat and does not wish to have such construction features rendered inoperative when subjected to the Pull Test, Section 50, the text specified in 22.3 shall be used and shall be located as specified in 22.2. The product shall also comply with the requirements specified in 19.7.

22.2 When the text specified in 22.3 is to be used as specified in 22.1, it shall:

- a) Be included as information or instructions in addition to those specified in 21.3; or
- b) Appear on a separate sheet of paper to be provided with each device along with the text specified in 21.4.

22.3 When required by 22.1, the following text, to be readable after purchase, shall be provided:

"PFD's ATTACHED TO BOAT – NO!

Each PFD has straps, hooks, buckles or other means for securing the device in place on the wearer. Some PFD's also incorporate decorative dee rings or tabs. Such items are not to be used to attach the device to the boat. Attaching the device to the boat will not permit it to perform as intended."

PART II – NONSTANDARD BUOYANT VESTS

CONSTRUCTION

23 General

23.1 A nonstandard buoyant vest shall:

- a) Be as comfortable, nonrestrictive of motion and vision, and as nonbulky for the wearer as practicable, consistent with intended use.

b) Be constructed so that the intended method of donning the device is obvious to an untrained person.

c) Incorporate strapping or other means of attachment that will enable the wearer to don the device and adjust it to a snug fit (as tight as possible without causing discomfort) within 1 minute. See Donning Test for Devices for Persons Weighing 50 – 90 Pounds, or 90 Pounds or More, Section [48](#).

d) Provide chin and head support for the wearer.

e) Incorporate means for removing the wearer from the water without the necessity of grasping the wearer, in the case of devices intended to be worn by persons weighing less than 50 pounds (22.7 kg).

f) When vinyl coated, have a minimum coating thickness of 10 mils (0.25 mm). The vinyl coating shall comply with the Standard for Components for Personal Flotation Devices, UL 1191.

g) Not incorporate instructions or provide means obviously intended for fastening or securing the vest to a boat.

Exception: Certain devices that have dee rings, tabs, or other constructional features intended for uses other than to secure the device to the boat need not comply with this requirement. Construction shall be such that these features shall be rendered inoperative when subjected to a dead weight pull of 50 pounds-force (222 N). See Pull Test, Section [50](#).

23.2 A device shall have provision for drainage of entrapped water.

23.3 A nonstandard buoyant vest shall be of appropriate size to accommodate persons weighing less than 50 pounds (22.7 kg), 50 to 90 pounds (22.7 to 40.8 kg), or more than 90 pounds. Devices for persons weighing less than 50 pounds shall be acceptable for use by a group of persons representing the 5th to 95th percentile. Devices for persons weighing 50 to 90 pounds, or more than 90 pounds, may be sized by chest size.

23.4 Maximum chest size for child medium devices shall be 29 inches (737 mm).

23.5 Uncoated 70 denier fabrics shall:

- a) Have 3/4 inch (19 mm) seams; or
- b) Incorporate two rows of lockstitch, or the equivalent.

23.6 A device shall not incorporate means obviously intended for fastening or securing the device to a boat nor shall instructions accompanying the device indicate such intent.

Exception: Devices incorporating dee rings, tabs, or other construction features which are not intended to secure the device to the boat need not comply with this requirement, When:

- a) Such constructions are rendered inoperative when subjected to the Pull Test, Section [50](#); or*
- b) The marking label information complies with the requirements of [19.7](#) and the Optional Texts, Section [22](#).*

23.7 A device intended to be worn by a person weighing less than 30 pounds (13.6 kg) shall:

- a) Have means of closure that reduces the risk of the wearer's undoing the closure; and

b) Incorporate means for removing the wearer from the water without the necessity of grasping the wearer.

23.8 When chest size marking is required, the chest size shall be expressed as a range and each range shall include minimum increments of 2 inches (50.8 mm), for example, 30 – 32 inches (762 – 813 mm).

MATERIALS

24 General

24.1 The material to be used in the manufacture of a device shall be new.

24.2 A fibrous buoyant material shall be completely encased in flexible, sealed, airtight film.

24.3 Only inherently buoyant materials shall be used as the prime buoyant means in a device.

24.4 Buoyant materials, envelope materials, tie tapes, belt loops, reinforcing tape, body straps, and thread shall comply with the requirements specified in [11.1.1](#) – [11.5.2](#).

25 Hardware

25.1 Hardware shall comply with the requirements of [11.6.1](#) – [11.6.4](#) or [25.2](#) – [25.5](#).

25.2 Hardware shall be attached to the device so that it will be retained in its intended position yet will not be so tight that the operation of the hardware is restricted.

25.3 A metallic component shall be resistant to the corrosive effects of repeated immersion in salt water and exposure to salt atmospheres and shall comply with the Standard for Components for Personal Flotation Devices, UL 1191.

25.4 Material having corrosion resistance at least equivalent to stainless steel No. 302, 304, 410, or 430 as described in the American Iron and Steel Institute Steel Products Manual for Stainless and Heat Resisting Steels, is considered to comply with the corrosion resistance requirements specified in [25.3](#).

25.5 Hardware used to secure the device shall have a quick and positive lock mechanism, such as a snap hook and dee ring assembly.

26 Body Straps

26.1 Body straps shall comply with the requirements for webbing in the Standard for Components for Personal Flotation Devices, UL 1191. The free end of a body strap shall be provided with means, such as a t-tab, to prevent the strap from disengaging from the hardware. See Body Strap/Hardware Secureness Test, Section [51](#).

26.2 A t-tab shall be turned under 1-1/2 inches (40 mm) twice and secured with box-x stitching, bar tack, rivets, or other equivalent means. Other constructions will be subjected to an investigation to determine acceptability which will include the Body Strap/Hardware Secureness Test, Section [51](#).

26.3 Body straps shall be prevented from becoming disengaged from the device either by means of belt loop constructions intended for that purpose or by an equivalent means that will attach at least one end of the body strap to the device.

27 Belt Loops

27.1 Belt loops shall comply with the requirements for webbing or fabrics, as applicable, in the Standard for Components for Personal Flotation Devices, UL 1191. All cut ends shall be prevented from ravelling by turn-under and stitching, or the equivalent. Synthetic materials used as webbing may be heat-sealed in lieu of turn-under.

27.2 Belt loops used to prevent the body strap from becoming disengaged from the device shall be constructed to prevent the primary closure from passing through the loop.

28 Tie Tapes

28.1 Tie tapes shall comply with the requirements for tie tapes in the Standard for Components for Personal Flotation Devices, UL 1191.

28.2 All cut ends shall be prevented from ravelling by turn-under and stitching, or the equivalent. Synthetic materials may be heat-sealed in lieu of turn-under.

29 Thread

29.1 Thread used for structural seams shall comply with the requirements for thread in the Standard for Components for Personal Flotation Devices, UL 1191. See also [11.5.2](#).

29.2 Monofilament thread shall not be used for structural seams.

29.3 Thread and fabric combinations shall be compatible. Cotton threads shall be used only with cotton fabrics; synthetic threads may be used with all fabrics.

30 Zippers

30.1 Zippers shall comply with the applicable requirements for zippers in the Standard for Components for Personal Flotation Devices, UL 1191.

31 Seams

31.1 A lock-type stitch, such as Type 301, Federal Standard 751, shall be used for joining structural seams.

32 Coatings

32.1 Dip coatings shall comply with the requirements of [23.1\(f\)](#), shall be applied smoothly and evenly, and shall be free of visible blemishes. This shall not preclude the stressed areas from having a greater thickness than unstressed areas.

32.2 One slash is to be made at each of the following or equivalent locations, and a pocket comparator with a minimum magnifying power of 6X is to be used to determine the thickness of the dipped coating at the slashes:

- a) On the left side of the neck opening;
- b) On the right side of the neck opening;
- c) On the left front panel near the lower center front; and

- d) On the right front panel near the lower center front.

Three thickness readings are to be taken at each location and the average of the three readings is to be considered the minimum thickness for that location.

33 Drawstrings

33.1 Drawstrings shall:

- a) Have a minimum width of 1 inch (25 mm);
- b) Have a closing mechanism with readily recognizable open and closed positions; or
- c) When tied into a square knot,

be able to be untied within 1 minute by the number of test subjects specified in [Table 36.1](#).

33.2 Primary closure drawstrings shall comply with the applicable requirements for webbing in the Standard for Components for Personal Flotation Devices, UL 1191. Secondary closure drawstrings shall comply with the applicable requirements for tie tapes specified in UL 1191.

34 Survivor Locating Means

34.1 A survivor locating means shall comply with the requirements specified in Survivor Locating Means, Section [12](#).

PERFORMANCE

35 General

35.1 Except as otherwise indicated, a fully representative sample of a device shall be subjected to the applicable tests specified in Sections [36](#) – [52](#).

35.2 When human test subjects are employed in the testing of a device, safety precautions shall be provided at all times.

35.3 Nonstandard buoyant vests shall provide a level of performance in the water equal to or greater than that provided by a reference vest.

35.4 Devices having optional features shall be tested both during use and nonuse of the optional features (see [6.12](#)).

36 Flotation Stability Test

36.1 A device shall comply with the requirements specified in [36.4](#) – [36.12](#). Test subjects selected as specified in [Table 36.1](#) are to be male, female, or both, and are to be of such varying heights and weights as to represent endomorphic, mesomorphic, and ectomorphic anatomic builds. For child devices, subjects are to be selected to represent the weight range involved (in lieu of chest size specified in [Table 36.1](#)) and the range of anatomic builds.

Table 36.1
Test subjects

	Chest size range		
	6 inches (152 mm) or less	7 – 12 inches (178 – 305 mm)	More than 12 inches (305 mm) (universal)
Number of subjects	6	12	18

36.2 For the purpose of this test, the device is to be donned over bathing attire.

36.3 All tests are to be conducted with the test subject wearing the reference vest and then repeated with the subject wearing the candidate device.

36.4 A device intended for use by persons weighing 50 to 90 pounds (22.7 to 40.8 kg) or by persons weighing more than 90 pounds (40.8 kg) shall turn the wearer from a face-down position to a position where the wearer's respiration is not impeded within a time comparable to that of the reference vest. Comparison of righting action times for the candidate device and the reference vest is to be based on the average time for each unit to perform the function. A candidate device shall perform as follows:

- a) The average righting time for the candidate device on the test subjects shall not exceed by more than 2 seconds the average time for the reference device; and
- b) The total number of turns obtained by the candidate test device and the reference vest during all of the trials required in [36.6](#) are to be recorded. The total number of turns obtained by the candidate device shall not be less than the number of turns obtained by the reference vest.
- c) Tie tapes shall remain in the original tied position during this test.

36.5 A device intended for persons weighing less than 50 pounds (22.7 kg) shall turn the wearer from a face-down position to a position where the wearer's respiration is not impeded in 7 seconds or less.

36.6 To determine compliance with the requirements specified in [36.4](#) or [36.5](#), the wearer is to don the device, enter the water^a in any manner, and swim for approximately 1 minute. Compliance with the requirement specified in [23.1\(a\)](#) is to be established during this period. The wearer then is to take at least three strokes in a face-down position and, while still face-down in the water, relax completely while exhaling slowly. The wearer is to remain limp in this position long enough to determine if the device will stabilize him in an attitude of static balance. For determining the amount of time required for a candidate device to turn a wearer from a face-down position to a position where the wearer's respiration is not impeded (versus the time required for a reference vest to perform this same function, see [36.4](#)) the average times of a minimum of three tests per device are to be recorded.

^a When the construction of a device indicates that it may have a tendency to permit movement of the buoyant material from the position it was in when the device was donned to a position toward the sides or back of a wearer, at least one test subject shall enter the water first by jumping (feet first) and then by diving in a manner so that he strikes the water in a face-down prone position.

36.7 The average freeboard (see [6.9](#)) of the candidate device shall be equal to or greater than the average freeboard of the reference vest while the wearer is at an attitude of static balance, and respiration is not impeded. The freeboard of the candidate device (and of the reference vest) is to be determined by the average freeboard of the test subjects. The subjects are to be instructed to "relax and breathe normally" during freeboard measurements.

36.8 The head and chin support of a device shall:

- a) Be not less than that of the applicable reference vest (AK-1, CKM-1, or CKS-2), as specified in [36.9](#) – [36.12](#); and
- b) Comply with the requirements specified in [36.11](#)(b).

36.9 Following the test specified in [36.4](#) – [36.7](#), each subject is to position himself in the water 20 feet (6.1 m) away from, and in line with, a vertical scale marked with 3-inch (75-mm) increments and mounted on the side of the pool.

36.10 The following observations of head support are to be made for comparison between the reference vest and the candidate device while the subject is in the position specified in [36.9](#):

- a) The distance from the ears to the surface of the water.
- b) The distance that the outside edge of the collar extends up along the back of the head.

36.11 When the subject is in the position specified in [36.9](#), the device shall:

- a) Provide visible chin support in a stable position at least equivalent to that of the reference vest; and
- b) Not permit the chin to touch the chest or allow the freeboard to be reduced to zero when the subject moves his chin toward his chest.

36.12 While in the position specified in [36.9](#), the subject is to be asked to view the vertical scale without moving while in a position of static balance. He is to read the lowest mark possible while wearing the reference vest and then while wearing the candidate device. The head support of the candidate device is considered equivalent to that of the reference vest when:

- a) While wearing the candidate device each subject can view the mark on the vertical scale that is the same or lower than the mark viewed when the subject is wearing the reference vest; and
- b) Each subject's ears are a distance out of the water, when the candidate device is being worn, that is not less than the distance when the reference vest is being worn.

37 Jump Test

37.1 This test is to be conducted from a height of 3 feet (0.9 m), according to the abandon ship written instructions provided by the manufacturer of the device, or when there are no such written instructions, in accordance with the method specified in [37.2](#). The device is to be donned and adjusted prior to water entry as specified in the Donning Test for Persons Weighing 50 – 90 Pounds, or 90 Pounds or More, Section [48](#).

37.2 A device shall maintain its intended position on the wearer after the test subject jumps feet first, with hands above head, into the water from a height of 3 feet (0.9 m). The test subjects are to be instructed that after they enter the water and surface, the device may be pulled down and tightened in order to see or breathe more easily.

37.3 Tie tapes shall remain in the original tied position during this test.

37.4 The device shall be considered to be in the intended use position when:

- a) The wearer's arms are not trapped in the overhead position;
- b) The device stays attached to the wearer; and
- c) The wearer's breathing is not impeded.