

pressure valve or, if the lifejacket does not have an over-pressure valve, until its design pressure, as stated in the plans and specifications, is reached. After 12 hours the lifejacket must still be firm with an internal pressure of at least 14 kPa (2.0 psig). This test is then repeated as many times as necessary to test a different chamber until each chamber has been tested in this manner.

(u) *Seam strength test.* Samples of each type of structural sewn seam must be subjected to and pass the "Seam Strength (Sewability) Test" specified in Underwriters Laboratories Standard UL 1191 except that the breaking strength of each seam in the directions of both greater and lesser thread count must be at least 400 N (90 lb.).

(v) [Reserved]

(w) *Visual examination.* One complete lifejacket must be visually examined for compliance with the requirements of §§ 160.176-9 and 160.176-11 of this part

(x) [Reserved]

(y) *Inflation chamber properties.* The tests in this paragraph must be run after successful completion of all other approval tests. The results of these tests will be used to check the quality of incoming lifejacket components and the production process. Test samples must come from one or more lifejackets that were each used in all of the tests in paragraphs (e), (j), (p), (s), and (t) of this section.

(1) *Grab breaking strength.* The grab breaking strength of chamber materials must be determined according to Method No. 5100 of Federal Test Method Standard 191A or ASTM D 751 (incorporated by reference, see § 160.176-4).

(2) *Tear strength.* The tear strength of chamber materials must be determined according to Method No. 5132 or 5134 of Federal Test Method Standard 191A or ASTM D 751 (incorporated by reference, see § 160.176-4).

(3) *Permeability.* The permeability of chamber materials must be determined according to ASTM D 1434 (incorporated by reference, see § 160.176-4) using CO<sub>2</sub> as the test gas.

(4) *Seam strength.* The seam strength of the seams in each inflation chamber of at least one lifejacket must be determined according to ASTM D 751 (incor-

porated by reference, see § 160.176-4) except that 25 by 200 mm (1 by 8 in.) samples may be used where insufficient length of straight seam is available.

(z) *Additional tests.* The Commandant may prescribe additional tests, if necessary, to approve novel or unique designs.

[CGD 78-1746, 54 FR 50320, Dec. 5, 1989, as amended by CGD 78-174b, 56 FR 29441, June 27, 1991; USCG-2000-7790, 65 FR 58464, Sept. 29, 2000]

#### § 160.176-15 Production tests and inspections.

(a) *General.* (1) Production tests and inspections must be conducted in accordance with this section and subpart 159.007 of this chapter.

(2) The Commandant may prescribe additional production tests and inspections if needed to maintain quality control and check for compliance with the requirements in this subpart.

(b) *Test and inspection responsibilities.* In addition to responsibilities set out in part 159 of this chapter, each manufacturer of an inflatable lifejacket and each independent laboratory inspector must comply with the following, as applicable:

(1) *Manufacturer.* Each manufacturer must—

(i) Perform all required tests and examinations on each lifejacket lot before the independent laboratory inspector tests and inspects the lot;

(ii) Perform required testing of each incoming lot of inflation chamber material before using that lot in production;

(iii) Have procedures for maintaining quality control of the materials used, manufacturing operations, and the finished product;

(iv) Have a continuing program of employee training and a program for maintaining production and test equipment;

(v) Have an inspector from the independent laboratory observe the production methods used in producing the first lifejacket lot produced and observe any revisions made thereafter in production methods;

(vi) Admit the inspector and any Coast Guard representative to any place in the factory where work is done on lifejackets or component materials,

and where completed lifejackets are stored; and

(vii) Allow the inspector and any Coast Guard representative to take samples of completed lifejackets or of components materials for tests prescribed in this subpart.

(2) *Independent laboratory.* (i) An inspector may not perform or supervise any production test or inspection unless—

(A) The manufacturer has a current approval certificate; and

(B) The inspector has first observed the manufacturer's production methods and any revisions to those methods.

(ii) An inspector must perform or supervise all required tests and inspections of each lifejacket lot produced.

(iii) During each inspection, the inspector must check for noncompliance with the manufacturer's quality control procedures.

(iv) At least once each calendar quarter, the inspector must, as a check on manufacturer compliance with this section, examine the manufacturer's records required by §160.176-17 of this part and observe the manufacturer in performing each of the tests required by paragraph (h) of this section.

(c) *Lifejacket lots.* A lot number must be assigned to each group of lifejackets

produced. No lot may exceed 1000 lifejackets. A new lot must be started whenever any change in materials or a revision to a production method is made, and whenever any substantial discontinuity in the production process occurs. Changes in lots of component materials must be treated as changes in materials. Lots must be numbered serially. The lot number assigned, along with the approval number, must enable the lifejacket manufacturer, by referring to the records required by this subpart, to determine who produced the components used in the lifejacket.

(d) *Samples.* (1) Samples used in testing and inspections must be selected at random. Sampling must be done only when all lifejackets or materials in the lot are available for selection.

(2) Each sample lifejacket selected must be complete, unless otherwise specified in paragraph (h) of this section.

(3) The inspector may not select the same samples tested by the manufacturer.

(4) The number of samples selected per lot must be at least the applicable number listed in Table 160.176-15A or Table 160.176-15B.

TABLE 160.176-15A—MANUFACTURER'S SAMPLING PLAN

|  | Number of Samples Per Lot |         |         |         |         |          |
|--|---------------------------|---------|---------|---------|---------|----------|
|  | Lot Size                  |         |         |         |         |          |
|  | 1-100                     | 101-200 | 201-300 | 301-500 | 501-750 | 751-1000 |
| <b>Tests:</b>                              |                           |         |         |         |         |          |
| Inflation Chamber Materials.               |                           |         |         |         |         |          |
|  | SEE NOTE (1)              |         |         |         |         |          |
| Seam Strength .....                        | 1                         | 1       | 2       | 2       | 3       | 4        |
| Over-pressure <sup>2,3</sup> .....         | 1                         | 2       | 3       | 4       | 6       | 8        |
| Air Retention.                             |                           |         |         |         |         |          |
|  | EVERY DEVICE IN THE LOT   |         |         |         |         |          |
| Buoyancy & Inflation Media Retention ..... | 1                         | 2       | 3       | 4       | 6       | 8        |
| Tensile Strength <sup>4</sup> .....        | 1                         | 1       | 1       | 1       | 1       | 1        |
| Detailed Product Examination .....         | 2                         | 2       | 3       | 4       | 6       | 8        |
| Retest Sample Size <sup>2</sup> .....      | —                         | —       | 13      | 13      | 20      | 20       |
| Final Lot Inspection:.                     |                           |         |         |         |         |          |
|  | EVERY DEVICE IN THE LOT   |         |         |         |         |          |

<sup>1</sup> Samples must be selected from each lot of incoming material. The tests referenced in §§ 160.176-13(y)(1) through 160.176-13(y)(4) of this part prescribe the number of samples to select.

<sup>2</sup> Samples selected for this test may not be the same samples selected for other tests.

<sup>3</sup> If any sample fails the over-pressure test, the number of samples to be tested in the next lot produced must be at least 2% of the total number of lifejackets in the lot or 10 lifejackets, whichever is greater.

<sup>4</sup> This test is required only when a new lot of materials is used and when a revised production process is used. However, the test must be run at least once every calendar quarter regardless of whether a new lot of materials or a revised process is started in that quarter.

TABLE 160.176-15B—INSPECTOR'S SAMPLING PLAN

|  | Number of samples per lot |         |         |         |         |          |
|--|---------------------------|---------|---------|---------|---------|----------|
|  | Lot size                  |         |         |         |         |          |
|  | 1-100                     | 101-200 | 201-300 | 301-500 | 501-750 | 751-1000 |
| Tests:                                     |                           |         |         |         |         |          |
| Over-pressure <sup>1</sup> .....           | 1                         | 2       | 3       | 4       | 6       | 8        |
| Air Retention .....                        | 1                         | 2       | 3       | 4       | 6       | 8        |
| Buoyancy & Inflation Media Retention ..... | 1                         | 2       | 3       | 4       | 6       | 8        |
| Tensile Strength <sup>2</sup> .....        | 1                         | 1       | 1       | 1       | 1       | 1        |
| Waterproof marking.                        |                           |         |         |         |         |          |
|  | SEE NOTE (3) FOR SAMPLING |         |         |         |         |          |
| Detailed Product Examination .....         | 2                         | 2       | 2       | 3       | 3       | 3        |
| Retest Sample Size <sup>1</sup> .....      | 10                        | 10      | 13      | 13      | 20      | 20       |
| Final Lot Inspection: .....                | 20                        | 32      | 50      | 60      | 70      | 80       |

<sup>1</sup> Samples selected for this test may not be the same lifejackets selected for other tests.  
<sup>2</sup> This test may be omitted if the manufacturer has previously conducted it on the lot and the inspector has conducted the test on a previous lot during the same calendar quarter.  
<sup>3</sup> One sample of each means of marking on each type of fabric or finish used in lifejacket construction must be tested. This test is only required when a new lot of materials is used. However, the test must be run at least once every calendar quarter regardless of whether a new lot of materials is started in that quarter.

(e) *Accept/reject criteria: manufacturer testing.* (1) A lifejacket lot passes production testing if each sample passes each test.

(2) In lots of 200 or fewer lifejackets, the lot must be rejected if any sample fails one or more tests.

(3) In lots of more than 200 lifejackets, the lot must be rejected if—

- (i) One sample fails more than one test;
- (ii) More than one sample fails any test or combination of tests; or
- (iii) One sample fails one test and in redoing that test with the number of samples specified for retesting in Table 160.176-15A, one or more samples fail the test.

(4) A rejected lifejacket lot may be retested only if allowed under paragraph (k) of this section.

(5) In testing inflation chamber materials, a lot is accepted only if the average of the results of testing the minimum number of samples prescribed in the reference tests in §160.176-13(y) of this part is within the tolerances specified in §160.176-8(c)(1) of this part. A rejected lot may not be used in production.

(f) *Accept/reject criteria: independent laboratory testing.* (1) A lot passes production testing if each sample passes each test.

- (2) A lot must be rejected if—
  - (i) One sample fails more than one test;
  - (ii) More than one sample fails any test or combination of tests; or

(iii) One sample fails one test and in redoing that test with the number of samples specified for retesting in Table 160.176-15B, one or more samples fail the test.

(3) A rejected lot may be retested only if allowed under paragraph (k) of this section.

(g) *Facilities and equipment*—(1) *General.* The manufacturer must provide the test equipment and facilities described in this section for performing production tests, examinations, and inspections.

(2) *Calibration.* The manufacturer must have the calibration of all test equipment checked at least every six months by a weights and measures agency or the equipment manufacturer, distributor, or dealer.

(3) *Equipment.* The following equipment is required:

(i) *A sample basket* for buoyancy tests. It must be made of wire mesh and be of sufficient size and durability to securely hold a completely inflated lifejacket under water without compressing it. The basket must be heavy enough or be sufficiently weighted to submerge when holding an inflated test sample.

(ii) *A tank filled with fresh water* for buoyancy tests. The height of the tank must be sufficient to allow a water depth of 5 cm (2 inches) minimum between the top of the basket and water surface when the basket is not touching the bottom. The length and width

of the tank must be sufficient to prevent each submerged basket from contacting another basket or the tank sides and bottom. Means for locking or sealing the tank must be provided to prevent disturbance of any samples or a change in water level during testing.

(iii) *A scale* that has sufficient capacity to weigh a submerged basket for buoyancy tests. The scale must be sensitive to 14 g (0.5 oz.) and must not have an error exceeding  $\pm 14$  g (0.5 oz.).

(iv) *Tensile test equipment* that is suitable for applying pulling force in conducting body strap assembly strength subtests. The equipment assembly may be (A) a known weight and winch, (B) a scale, winch, and fixed anchor, or (C) a tensile test machine that is capable of holding a given tension. The assembly must provide accuracy to maintain a pulling force within  $\pm 2$  percent of specified force. Additionally, if the closed loop test method in §160.176-13(h)(1) of this Part is used, two cylinders of the type described in that method must be provided.

(v) *A thermometer* that is sensitive to 0.5 °C (1 °F) and does not have an error exceeding  $\pm 0.25$  °C (0.5 °F).

(vi) *A barometer* that is capable of reading mm (inches) of mercury with a sensitivity of 1 mm (0.05 in.) Hg and an error not exceeding  $\pm 5$  mm (0.02 in.) Hg.

(vii) *A regulated air supply* that is capable of supplying the air necessary to conduct the tests specified in paragraphs (h)(4) and (h)(5) of this section.

(viii) *A pressure gauge* that is capable of measuring air pressure with a sensitivity of 1 kPa (0.1 psig) and an error not exceeding  $\pm 0.5$  kPa (0.05 psig).

(ix) *A torque wrench* if any screw fasteners are used. The wrench must be sensitive to, and have an error of less than, one half the specified tolerance for the torque values of the fasteners.

(4) *Facilities*: The manufacturer must provide a suitable place and the necessary apparatus for the inspector to use in conducting or supervising tests. For the final lot inspection, the manufacturer must provide a suitable working environment and a smooth-top table for the inspector's use.

(h) *Production tests and examinations—*  
(1) *General*. (i) Samples used in testing must be selected according to paragraph (d) of this section.

(ii) On each sample selected—

(A) The manufacturer must conduct the tests in paragraphs (h)(2) through (h)(8) of this section; and

(B) The independent laboratory inspector must conduct or supervise the tests in paragraphs (h)(4) through (h)(9) of this section.

(iii) Each individual test result must, in addition to meeting the requirements in this paragraph, meet the requirements, if any, set out in the approved plans and specifications required by §160.176-5(a)(2) of this part.

(2) *Inflation chamber materials*. Each sample must be tested according to §§160.176-13(y)(1) through 160.176-13(y)(3) of this part. The average and individual results of testing the minimum number of samples prescribed by §160.176-13(y) of this part must comply with the requirements in §160.176-8(c)(1) of this part.

(3) *Seam strength*. The seams in each inflation chamber of each sample must be tested according to §160.176-13(y)(4) of this part. The results for each inflation chamber must be at least 90% of the results obtained in approval testing.

(4) *Over-pressure*. Each sample must be tested according to and meet §160.176-13(t)(1) of this part.

(5) *Air retention*. Each sample must be tested according to and meet §160.176-13(t)(2) of this part.

(6) *Buoyancy and inflation medium retention*. Each sample must be tested according to and meet §160.176-13(j) of this part. Each buoyancy value must fall within the tolerances specified in the approved plans and specifications.

(7) *Tensile strength*. Each sample must be tested according to and meet §160.176-13(n) of this part.

(8) *Detailed product examination*. Each sample lifejacket must be disassembled to the extent necessary to determine compliance with the following:

(i) All dimensions and seam allowances must be within tolerances prescribed in the approved plans and specifications required by §160.176-5(a)(2) of this part.

(ii) The torque of each screw type mechanical fastener must be within its tolerance as prescribed in the approved plans and specifications.

(iii) The arrangement, markings, and workmanship must be as specified in the approved plans and specifications and this subpart.

(iv) The lifejacket must not otherwise be defective.

(9) *Waterproof marking test.* Each sample is completely submerged in fresh water for a minimum of 30 minutes, and then removed and immediately placed on a hard surface. The markings are vigorously rubbed with the fingers for 15 seconds. If the printing becomes illegible, the sample is rejected.

(i) [Reserved]

(j) *Final lot examination and inspection*—(1) *General.* On each lifejacket lot that passes production testing, the manufacturer must perform a final lot examination and an independent laboratory inspector must perform a final lot inspection. Samples must be selected according to paragraph (d) of this section. Each final lot examination and inspection must show—

(i) First quality workmanship;

(ii) That the general arrangement and attachment of all components such as body straps, closures, inflation mechanisms, tie tapes, drawstrings, etc. are as specified in the approved plans and specifications; and

(iii) Compliance with the marking requirements in §160.176-23 of this Part.

(2) *Accept/reject criteria.* Each nonconforming lifejacket must be rejected. If three or more nonconforming lifejackets are rejected for the same kind of defect, lot examination or inspection must be discontinued and the lot rejected.

(3) *Manufacturer examination.* This examination must be done by a manufacturer's representative who is familiar with the approved plans and specifications required by §160.176-5(a)(2) of this part, the functioning of the lifejacket and its components, and the production testing procedures. This person must not be responsible for meeting production schedules or be supervised by someone who is. This person must prepare and sign the record required by §159.007-13(a) of this chapter and §160.176-17(b) of this part.

(4) *Independent laboratory inspection.*

(i) The inspector must discontinue lot inspection and reject the lot if observation of the records for the lot or of in-

dividual lifejackets shows noncompliance with this section or the manufacturer's quality control procedures.

(ii) An inspector may not perform a final lot inspection unless the manufacturer has a current approval certificate.

(iii) If the inspector rejects a lot, the Commandant must be advised immediately.

(iv) The inspector must prepare and sign the inspection record required by §159.007-13(a) of this chapter and §160.176-17(b) of this part. If the lot passes, the record must also include the inspector's certification to that effect and a certification that no evidence of noncompliance with this section was observed.

(v) If the lot passes, each lifejacket in the lot must be plainly marked with the words, "Inspected and Passed, (Date), (Inspection Laboratory ID)." This marking must be done in the presence of the inspector. The marking must be permanent and waterproof. The stamp which contains the marking must be kept in the independent laboratory's custody at all times.

(k) *Disposition of rejected lifejacket lot or lifejacket.* (1) A rejected lifejacket lot may be resubmitted for testing, examination or inspection if the manufacturer first removes and destroys each defective lifejacket or, if authorized by the Commandant, reworks the lot to correct the defect.

(2) Any lifejacket rejected in a final lot examination or inspection may be resubmitted for examination or inspection if all defects have been corrected and reexamination or reinspection is authorized by the Commandant.

(3) A rejected lot or rejected lifejacket may not be sold or offered for sale under representation that it meets this subpart or that it is Coast Guard approved.

[CGD 78-1746, 54 FR 50320, Dec. 5, 1989, as amended by CGD 78-174b, 56 FR 29442, June 27, 1991]

#### § 160.176-17 Manufacturer records.

(a) Each manufacturer of inflatable lifejackets must keep the records required by §159.007-13 of this chapter except that they must be retained for at least 120 months after the month in