

**MIL-L-81542A(AS)**

29 March 1976

**SUPERSEDING****MIL-L-81542(AS)**

2 MAY 1968

**MILITARY SPECIFICATION****LIFE RAFT, INFLATABLE, ONE MAN, TYPE LR-1**

This specification is approved for use by the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

**1. SCOPE**

1.1 Scope. This specification covers requirements for one type of one-man inflatable life raft designated as Type LR-1.

**2. APPLICABLE DOCUMENTS**

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

**SPECIFICATIONS****FEDERAL**

|           |   |
|-----------|---|
| BB-C-101  | - Carbon Dioxide (CO <sub>2</sub> ), Technical and U. S. P.                     |
| UU-P-271  | - Paper, Wrapping, Waterproofed Kraft   |
| UU-T-81   | - Tags, Shipping and Stock  |
| PPP-B-636 | - Box, Fiberboard   |
| PPP-C-843 | - Cushioning Material, Cellulosic   |
| PPP-T-76  | - Tape, Pressure-Sensitive Adhesive Paper, Water Resistant (For Carton Sealing) |

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## SPECIFICATIONS (Continued)

## MILITARY

- MIL-P-116 - Preservation, Methods of
- MIL-I-6903 - Ink, Marking (for Parachutes and Other Textile Items)
- MIL-O-81375 - Oral Inflation Assemblies, Survival Equipment, Inflatable
- MIL-V-81722 - Valve, Inflation, One Man Life Raft

## STANDARDS

## FEDERAL

- FED-STD-751 - Stitches, Seams, and Stitching

## MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MS29599 - Valve Inlet
- MS26545 - Cylinders - Compressed Gas, Non-Shatterable

## DRAWINGS

## NAVAL AIR SYSTEMS COMMAND

- 67A318H2 - Life Raft Assembly, Inflatable, Type LR-1
- 67A318D3 - Pocket Assembly, Retaining Line - LR-1 Inflatable Life Raft
- 67A318C10 - Life Raft Assembly Index, Inflatable, Type LR-1
- 67A319C15 - Inspection Record Patch - Life Preservers and Rafts
- 67A319C17 - Patch, Directive Compliance - Inflatable Life Rafts

(When requesting any of the applicable documents, refer to both title and number. All requests should be made via the cognizant Government quality assurance representative. Copies of this specification and other unclassified specifications, standards, and drawings required by contractors in connection with specific procurement functions should be obtained upon application to the Commanding Officer, Naval Publications and Forms Center (Code 1051), 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120. All other documents should be obtained from the procuring activity or as directed by the contracting officer.)

### 3. REQUIREMENTS

3.1 Qualification. The Type LR-1 inflatable life raft furnished under this specification shall be a product which is qualified for listing on the applicable qualified products list at the time set for opening of bids (see 4.3, 4.3.1, 4.3.1.1 and 6.3). In addition, the retention of the qualification for the LR-1 inflatable life raft on the applicable qualified products list shall be dependent on periodic verification of continued compliance with the requirements of this specification (see 4.3 and 4.3.2).

3.2 First article. Unless otherwise specified, the Type LR-1 inflatable life rafts furnished under this specification shall be a product which has been inspected and has passed the first article inspection specified in 4.4 through 4.4.3.

3.3 Materials and components. The materials and components shall conform to the applicable specifications, standards, and drawings as listed or required herein. Unless otherwise specified, the materials and components, except for the metallic parts, used in the construction of the life raft shall have been manufactured not more than 12 months prior to the date of delivery of the life rafts (see 6.2(i)).

3.4 Design and construction. The design and construction of the life raft and the components shall be in accordance with this specification and the drawings listed on Dwg 67A318C10. All knots shall be tightly drawn.

3.4.1 Cut edges. All the cut edges of the uncoated nylon fibrous materials, except for the base cloths which are to be coated, shall be seared prior to the fabrication of the life raft to prevent fraying. No sharp edges shall be formed.

3.4.2 Use of adhesive. In all the cementing operations, the surface, to which the adhesive is to be applied, shall be thoroughly cleaned with a suitable solvent so that the dusting materials (zinc stearate or talc) and any other surface contaminant are removed. The surface shall be clean prior to cementing. Care shall be exercised to assure that the coating and the base undercloth are not damaged and the adhesion between both is not impaired in any way by prolonged exposure to the solvent. The solvent used shall evaporate completely, prior to the application of the adhesive, and shall leave no residue. The cemented areas shall not contain any trapped air, channels,

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or wrinkles. The adhesive shall be controlled to insure that old adhesive or adhesive which has partly or completely polymerized is not used. A fresh batch of the adhesive shall be used at least every eight hours during the course of manufacture. The containers, for the adhesive, shall be free from congealed adhesive before being refilled.

#### 3.4.3 Cementing of the seams, seam tapes, patches, and attachments.

The construction of the seams and the cementing of the seam tapes, patches, and attachments shall be undertaken utilizing the technique and precautions outlined in 3.4.2 so that, prior to the inspection of the assembled life raft, the adhesive shall have developed its optimum bonding properties and the adherence of all such seams, seam tapes, patches, and attachments shall comply with the requirements of this specification. All the seams, seam tapes, patches, and attachments shall be secured by the adhesive specified in the applicable drawings. The tube radial joining seams shall be covered, on the inner and outer sides, with the seam tape as specified in 67A318H2. The tube longitudinal seam shall be covered on the inner side, with the seam tape and, on the outer side, by the attachment of the floor as specified in 67A318H2. All the seam tapes shall be applied to the seams without tension, and wrinkles, and shall be applied in accordance with the applicable drawing requirements. The floor, patches, and attachments shall also be cemented to the life raft without tension or wrinkles. The internal diametral opening in the base patch, reinforcing the attachment of the oral inflation tube, shall coincide with the opening in the oral inflation tube. The adhesive shall be applied in a straight line parallel to the edges of the seam tapes, seams, patches, and attachments and shall extend from just being visible to a maximum of one inch beyond the edges of the seam tape, seam, patch, and attachment. The seam tapes, which seal circumferential seams, or where one end of the seam tape comes in contact with the other end of the same seam tape or another seam tape, shall overlap on itself, at the ends,  $3/4$ , plus  $1/2$ , minus 0, inch. The adhesive, when dry or cured, shall present a neat and uniform appearance. The adhesive shall not be allowed to remain in clots, and upon drying or curing shall not cause the cloth, seam tapes, and attachments to shrink or pucker at any point on the life raft. The life raft shall be free from congealed masses of the adhesive and spots or stains resulting from excessive adhesive.

#### 3.4.4 Seams and stitching.

No stitching shall be used in any of the life raft seams, through the cloth of any air retaining chamber, or through the life raft floor. Sewing shall only be used in the construction of the accessory parts but not in their final attachment to the life raft. All the machine stitching in the accessory parts shall be accomplished as specified in the applicable drawings. All the sewing, except for the bartacks (see 3.4.4.1), shall be accomplished with Stitch Type 301 conforming to FED-STD-751 and shall contain 6 to 10 stitches per inch. Each row of stitching shall be straight and parallel to the seam edge. The straightness of the stitching, in any row, shall be maintained within a tolerance of plus or minus  $1/32$  inch. The ends of the stitching shall be backstitched, by overlapping on itself, a minimum of  $1/2$  inch. Thread breaks, skips, and run-offs shall be overstitched not less than one inch. The thread tension shall be maintained so that there shall not be

any loose or tight stitching and the lock shall be embedded in the materials sewn together. No seam shall be twisted, puckered, or pleated and no portion of the accessory parts shall be caught in an unrelated operation or seam. All the thread ends shall be trimmed to a length of 1/4 to 3/8 inch. The seam edges shall be properly forced out and shall not contain any folds. Non-lubricated thread shall be used for all stitching operations to prevent stains.

3.4.4.1 Bartacking. The number of stitches per bartack shall be based proportionally on 1/4 inch long bartack containing a minimum of 14 stitches. The length and location of each bartack shall be as specified in the applicable drawings.

3.4.5 Inflatable tube. The cloth sections used in the raft flotation tube shall be incorporated in such a manner that the warp threads of the straight cloth run in a circumferential direction around the tube and the warp threads of the bias cloth run in the opposite direction in the adjoining sections. The floor shall be attached to the flotation tube without tension and with sufficient slack to prevent distortion of the tube, when the raft is inflated. The floor shall be of such size that the attached portion shall extend 2 inches past the centerline of the inflatable tube as specified in 67A318H2.

3.5 Dimensions. The dimensions shall conform to the applicable drawings listed on Index Sheet No. 67A318C10. The dimensions of the finished life raft shall apply, when the raft is inflated to a pressure of one pound per square inch gage (psig).

3.6 Color. The color of the life raft and components shall be as specified in the applicable drawings.

3.7 Marking. Unless otherwise specified, the markings shall be legible and durable yellow letters and numerals, which shall be thoroughly dry prior to packaging. Stenciling shall not be used for letters and numerals 1/4 inch or less in height. The marking ink shall conform to MIL-I-6903 and the markings shall be as specified in 3.7.1 through 3.7.5.

3.7.1 Raft identification. The height of the raft identification markings shall be 1/2 inch. The outboard side of the flotation tube, adjacent to the sea anchor patch, shall be marked as follows:

LIFE RAFT, INFLATABLE, ONE MAN  
TYPE LR-1  
MIL-L-81542A(AS)  
Name of manufacturer  
Contract No.  
Date of manufacture (month and year)  
Serial No.

3.7.2 Serial numbers. The results of the operation (carbon dioxide) (4.7.2), pressure (4.7.3), and leakage (4.7.4) inspections shall be identifiable by the assigned serial number (see 6.2e).

3.7.3 Oral inflation assembly. The inboard side of the flotation tube, adjacent to the oral inflation assembly conforming to MIL-O-81375 shall be marked as follows:

TO INCREASE PRESSURE, UNSCREW KNURLED RING, PUSH VALVE MOUTHPIECE DOWN AND IMMEDIATELY BLOW THROUGH INLET

The height of the markings shall be 3/16 inch.

3.7.4 Retaining line pocket and inspection record and directive compliance patches. The retaining line pocket and the inspection record and directive compliance patches shall contain the markings specified in 67A318D3, 67A319C15, and 67A319C17, as applicable.

3.7.5 Warning tag. A warning tag conforming to UU-T-81, Type B, not smaller than Size 4, and strung with twine, shall be securely tied to the handle of the raft, nearest the inlet valve conforming to MS29599. The tag shall protrude from the folded raft and shall contain the following information:

WARNING

THIS LIFE RAFT SHALL NOT BE USED UNTIL  
SUBJECTED TO THE CALENDAR INSPECTION  
REQUIREMENTS OF NAVAIR 13-1-6.1, AVIATION  
CREW SYSTEMS MANUAL.

3.8 Performance inspections.

3.8.1 Operation (carbon dioxide). Each life raft, when inspected for operation as specified in 4.7.2, shall inflate to its design shape, as shown in 67A318H2, in not more than 30 seconds without any evidence of impediment or blockage to the flow of the carbon dioxide gas or by restriction by any component. The carbon dioxide shall enter the raft flotation tube, through the inlet valve, without any evidence of leakage. After 40 plus or minus 25 minutes, the corrected pressure in the raft flotation tube shall be not less than 0.25 pounds per square inch gage (psig) nor more than 2.0 psig. All the seams, seam tapes, patches, and cemented attachments shall remain perfectly intact and shall show no indication of separation. There shall be no evidence of constructional or material failure in any respect. The floor or flotation tube shall not be twisted or distorted. The oral inflation valve shall operate without difficulty and shall shut off the flow of the carbon dioxide gas completely. The attachment of the flange end of the oral inflation tube to the raft flotation

tube and the attachment of the oral inflation tube to the valve shall remain perfectly intact. There shall be no evidence that the carbon dioxide gas being exhausted from the raft flotation tube is impeded or blocked by the misplacement of the oral inflation tube base reinforcing patch, by damage to the oral inflation valve due to the clamping together of the oral inflation tube and valve, or by the oral inflation assembly (tube and valve) being blocked by any excess adhesive, talc, zinc stearate, or other foreign matter.

3.8.2 Pressure. The pressure in the raft flotation tube shall be not less than 4.75 psig, when inspected as specified in 4.7.3. All the seams, seam tapes, patches, and cemented attachments shall remain perfectly intact and shall show no indication of separation. There shall be no evidence of constructional or material failure in any respect. The floor or flotation tube shall not be twisted or distorted.

3.8.3 Leakage. The pressure in the raft inflatable tube shall be not less than 1.60 psig, when inspected as specified in 4.7.4.

3.8.4 Weight of the raft. When weighed as specified in 4.7.5, the raft shall weigh not more than 5.25 pounds.

3.8.5 Strength of attachment of the inlet valve to the flotation tube. The attachment of the inlet valve to the flotation tube shall withstand a torque of 15 foot pounds without tearing, separating, or resulting in raft leakage, when inspected as specified in 4.7.6. The life raft shall then be inspected and conform to the requirements for leakage, 3.8.3.

3.8.6 Strength of attachment of the sea anchor patch to the flotation tube. The attachment of each sea anchor patch to the flotation tube shall withstand a pull of 150 pounds without separating or tearing, when inspected as specified in 4.7.7.

3.8.7 Strength of attachment of the handles to the flotation tube. The attachment of each handle to the flotation tube shall withstand a pull of 150 pounds without tearing or separating, when inspected as specified in 4.7.7.

3.8.8 Strength of attachment of the ballast bags to the floor. The attachment of each ballast bag to the floor shall withstand a pull of 75 pounds without tearing or separating, when inspected as specified in 4.7.7.

3.8.9 Extreme temperatures. When inspected as specified in 4.7.8.1 and 4.7.8.2, as applicable, the raft shall inflate to its design shape, as shown in 67A318H2, within the time limit specified in 4.7.8.1 and 4.7.8.2 as applicable, without any evidence of impediment or blockage to the flow of the carbon dioxide or restriction by any component. All the seams, seam tapes, patches, and cemented attachments shall remain perfectly intact and shall show no indication of separation. There shall be no evidence of constructional or material failure in any respect. The floor or flotation tube shall not be twisted or distorted. The raft flotation tube shall

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be completely deflated and the life raft shall then be inspected and conform to the requirements for leakage, 3.8.3.

3.9 Preparation and folding. The sea anchor shall be folded as specified in 67A318H2 and then placed in the sea anchor pocket. The retaining and sea anchor pockets shall be closed by mating the fastener tapes. The weather shield shall be neatly rolled and held in the rolled position, by mating the fastener tapes on the ends of the weather shield securing straps. The oral inflation valve conforming to MIL-O-81375 shall be locked in the closed position, by the knurled ring, and shall be placed in the oral inflation pocket. The protruding portion of the inlet valve conforming to MS29599 shall be completely capped with non-corrosive plastic material. All the applicable areas, of each raft, shall be covered with a sufficient quantity of zinc stearate or talc to prevent adhering of the adjacent cloth surfaces during normal storage and transportation conditions. The capped inlet valve and the oral inflation valve and clamp shall be individually covered with the cellulosic cushioning material conforming to PPF -C-843, Type I or II, Class A or B, to prevent damage to themselves, to the components of the life raft, and to the raft by puncture or abrading. The raft flotation tube shall be completely evacuated of air. The raft shall be folded and rolled, in accordance with the standard commercial practice, in a manner that shall not permanently crease or damage the raft or the components. The warning tag (see 3.7.5) shall protrude from the folded and rolled raft. In addition, care shall be exercised so that the oral inflation tube is not folded, bent, creased, or distorted. The folds and rolls, of the raft, shall not contain any trapped air.

3.10 Workmanship. After completion of the final assembly, the life rafts shall be thoroughly cleaned and all loose thread, lint, and foreign matter shall be removed. The metal components shall not be misaligned nor contain any sharp edge, crack, dent, nick, burr, or sliver. The life rafts shall not contain any spot, stain, non-specified hole, abraded area, tear, cut, mend, or needle chew. Because of the emergency and life support use of this equipment, the importance of providing a product of uniform excellent quality cannot be overemphasized. The life rafts shall be uniform in quality and shall be free from irregularities or defects which could adversely affect performance, reliability, or durability. The life rafts shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the acceptance criteria established herein.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.



4.2 Classification of inspection. The examination and testing of the Type LR-1 life rafts shall be classified as follows:

- a. Qualification inspection. Qualification inspection consists of examinations and tests performed on samples submitted for approval as qualified products (see 3.1, 4.3, 4.3.1, 4.3.1.1, and 6.3).
  - (1) Retention of qualification. Retention of qualification consists of periodic verification to determine compliance of the qualified product with the requirements of this specification (see 3.1, 4.3, and 4.3.2).
- b. First article inspection. First article inspection consists of examinations and tests performed on samples which are representative of the production item after award of a contract to determine that the production item conforms to the requirements of this specification (see 3.2 and 4.4 through 4.4.3).
- c. Quality conformance inspection. Quality conformance inspection consists of examinations and tests performed on individual products or lots to determine conformance of the products or lots with the requirements set forth in this specification (see 4.5 through 4.5.1.3).

#### 4.3 Qualification.

4.3.1 Qualification samples. The qualification inspection samples shall consist of three life rafts. The qualification samples shall be forwarded to the COMMANDER, Naval Air Development Center, Warminster, Pennsylvania 18974, Attention: CODE 4044. The qualification samples shall be forwarded to the test facility set forth in the letter of authorization to submit samples (see 6.3).

Samples for qualification inspection

LIFE RAFT, INFLATABLE, ONE MAN, TYPE LR-1

Manufacturer's designation or number

Name of manufacturer

Submitted by (name) (date) for qualification inspection in accordance with the requirements of MIL-L-81542A(AS) under authorization (reference authorizing letter and number) (see 6.3).

4.3.1.1 Qualification inspection. The qualification inspection of the Type LR-1 one man inflatable life rafts shall consist of examinations and tests for all of the requirements of this specification.

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4.3.2 Retention. The retention of qualification shall consist of periodic verification to determine compliance of the qualified LR-1 one man inflatable life rafts with the requirements of this specification. Periodic verification shall be by certification unless otherwise specified by the activity responsible for the Qualified Products List and shall be at intervals of not more than two years.

4.4 First article.

4.4.1 First article samples. Unless otherwise specified as soon as practicable after award of the contract or order, the manufacturer shall submit three life rafts. The samples shall be representative of the construction, workmanship, components, and materials to be used during production. When a manufacturer is in continuous production of these life rafts from contract to contract, submission of further first article inspection samples on the new contract may be waived at the discretion of the procuring activity (see 6.2(c)). Approval of the first article inspection samples or the waiving of the first article inspection does not preclude the requirements for performing the quality conformance inspection. The first article inspection samples shall be furnished to the Government as directed by the contracting officer (see 6.2(d)).

4.4.2 First article inspection. The first article inspection of the Type LR-1 one man inflatable life rafts shall consist of the examinations and tests specified in Table I. The examinations and tests shall be performed in the sequence listed.

TABLE I. First article examinations and tests.

| Inspection                 | Paragraph   |                 |
|----------------------------|---|-----------------|
|                            | Requirement   | Method          |
| Weight of the raft         | 3.8.4   | 4.7.5           |
| Operation (carbon dioxide) | 3.8.1   | 4.7.2           |
| Pressure                   | 3.8.2   | 4.7.3           |
| Leakage                    | 3.8.3   | 4.7.4           |
| Strength of attachments    | 3.8.5 through 3.8.8   | 4.7.6 and 4.7.7 |
| Visual examination         | 3.4 through 3.4.5, 3.6 through 3.7.4, 3.9 and applicable drawings | 4.7.1.1         |
| Dimensional check          | 3.5 and applicable drawings                                       | 4.7.1.1         |

4.4.3 First article approval. Upon completion of the first article inspection, all the applicable inspection reports and when applicable, recommendations and comments pertinent for use in monitoring production shall be forwarded to the cognizant Government activity. One of the approved first article inspection sample life rafts will be returned to the manufacturer for use in monitoring production. One life raft will be consumed or destroyed in the first article inspection and shall not be considered as part of the quantity to be delivered under the contract. The other life raft will be retained by the inspection laboratory for reference and will be returned to the manufacturer with the samples from the final lot as required by 4.5.1.3.

4.5 Quality conformance inspection. The sampling and inspection levels shall conform to MIL-STD-105. The quality conformance inspection shall consist of the following:

Visual examination of the life rafts  
 Dimensional check of the life rafts  
 Operation (carbon dioxide)  
 Pressure  
 Leakage  
 Weight of the raft  
 Tests and examinations at a laboratory  
 Preparation for delivery

4.5.1 Sampling.

4.5.1.1 Inspection lot.

4.5.1.1.1 Life rafts. An inspection lot size shall be expressed in units of one life raft made essentially under the same conditions and from the same materials and components. The sample unit shall be one life raft.

4.5.1.1.2 Preparation for delivery. An inspection lot size shall be expressed in units of one fully prepared shipping container, containing life rafts, fully prepared for delivery from essentially the same materials and components. The sample unit shall be one shipping container, containing life rafts, fully prepared for delivery with the exception that it need not be sealed.

4.5.1.2 Sampling for tests and examinations of the components and the life rafts. The sample size, acceptance criteria, tests, and examinations required for the components and the life rafts shall be as specified in Table II and 4.5.1.3.

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TABLE II. Sample size, acceptance criteria, tests, and examinations of the components and the life rafts.

| Inspection                             | Paragraph   |         | Sample size   | Acceptance criteria  |
|--|---|---------|---|--|
|  | Requirement   | Method  |   |  |
| Visual examination                     | 3.4 through 3.4.4.1, 3.6 through 3.7.4, 3.9, 3.10 and applicable drawings | 4.7.1.1 | Every life raft for critical defects. Inspection Level II for minor defects <u>1/</u> | Reject all units with any critical defect and an acceptable quality level of 15.0 defects per 100 units for minor defects. |
| Dimensional check                      | 3.5 and applicable drawings   | 4.7.1.1 | Inspection Level S-3 <u>1/</u>  | An acceptable quality level of 100 defects per 100 units.  |
| Operation (Carbon Dioxide) <u>2/4/</u> | 3.8.1   | 4.7.2   | Every life raft   | Reject all defective units.  |
| Pressure <u>3/4/</u>                   | 3.8.2   | 4.7.3   | Every life raft   | Reject all defective units.  |
| Leakage <u>2/4/</u>                    | 3.8.3   | 4.7.4   | Every life raft   | Reject all defective units.  |
| Weight of the raft                     | 3.8.4   | 4.7.5   | Inspection Level S-3 <u>1/</u>  | An acceptable quality level of 1.5 defects per 100 units.  |
| Preparation for delivery               | Section 5   | 4.7.1.2 | Inspection Level S-2 <u>1/</u>  | An acceptable quality level of 2.5 defects per 100 units.  |

- 1/ The sample size shall be based upon the applicable sample size code letter corresponding to the specified level of MIL-STD-105.
- 2/ These inspections shall be performed in sequence. The operation (carbon dioxide) inspection shall be performed first and then the leakage inspection.
- 3/ Pressure tests may be performed prior to final assembly of the life raft, or as a final assembly. In the event the pressure test is performed as a final assembly, the test shall be performed in sequence with Operations and Leakage Test (i.e., Operations first, Pressure second and Leakage last.)
- 4/ The results of the Operation, Pressure and Leakage inspections shall be identifiable by the assigned serial numbers (see 6.2e), which shall be marked on the life raft, as specified in 3.7, 3.7.1 and 3.7.2.

4.5.1.3 Sampling for tests and examinations of the life rafts at an inspection facility. Upon completion of the tests and examinations specified in Table II, a random sample size shall be selected from each lot (see 6.2j) in accordance with MIL-STD-105, Inspection Level S-3. The sample size shall be based only on the applicable size code letter corresponding to the Level S-3. The selected samples shall be forwarded to the quality conformance inspection facility specified in the contract or order (see 6.2f) for the following tests and examinations:

#### TESTS AND EXAMINATIONS

|                            |                   |
|----------------------------|-------------------|
| Weight                     | (3.8.4 and 4.7.5) |
| Operation (Carbon Dioxide) | (3.8.1 and 4.7.2) |
| Leakage                    | (3.8.3 and 4.7.4) |
| Visual Examination         | (4.7.1.1)         |
| Dimensional Check          | (4.7.1.1)         |

The Government activity responsible for conducting the inspection program shall be specified in the contract or order (see 6.2(f)).

The tests and examinations shall be conducted in the order listed. The acceptable quality level shall be 1.5 defects per hundred units for each test and examination, except that the acceptable quality level for the minor defects (visual examination) shall not exceed 15.0 defects per hundred units, and the dimensional check shall not exceed 100 defects per hundred units.

The lot, from which the samples were selected, shall not be shipped until the samples have been approved by the cognizant Government activity and the lot accepted by the cognizant Government Quality Assurance Representative. The Government activity responsible for conducting the inspection program (see 6.2f) shall report the results of the tests and examinations to the cognizant Government activity. Final acceptance of the lot, from which the samples were selected, shall be based upon satisfactory completion of the inspection plan by the cognizant Quality Assurance Representative/Specialist. The costs of tests and examinations on samples initially submitted from a lot, shall be borne by the Government. The costs of the tests and examinations on samples resubmitted from a reworked lot or from a new lot, which is necessitated by the rejection of a previous lot, shall be borne by the manufacturer. The inspection samples shall be identified by their serial numbers (see 6.2(e)). The serial numbers of the units in the lot, represented by the inspection samples, shall be furnished to the inspection facility. Upon completion of the tests and examinations, the inspection facility shall return the samples to the manufacturer, at the manufacturer's expense.

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#### 4.6 Inspection conditions.

4.6.1 Atmospheric conditions. Unless otherwise specified, all the inspections required by this specification shall be conducted at an atmospheric pressure of 28 to 32 inches of mercury and at a temperature of  $77 \pm 18$  degrees Fahrenheit ( $25 \pm 10$  degrees Centigrade). If the final values of the ambient temperature or barometric pressure, at the end of the 4 hour waiting period of the leakage inspection, 4.7.4, are different from the initial values recorded at the start of the inspection, the following corrections shall be made to the final pressure readings in psig.

4.6.1.1 Temperature correction. For each degree Fahrenheit rise in temperature, 0.031 psig shall be subtracted from the final pressure reading. For each degree Fahrenheit drop in temperature, 0.031 psig shall be added to the final pressure reading. The corresponding correction per degree Centigrade is 0.056 psig.

4.6.1.2 Barometric pressure correction. For each 0.1 inch of mercury rise in barometric pressure, 0.049 psig shall be added to the final temperature-corrected pressure reading. For each 0.1 inch of mercury drop in barometric pressure, 0.049 psig shall be subtracted from the final temperature-corrected pressure reading.

4.6.2 Pressure measurement. The pressure shall be measured by means of a mercury manometer or gauge calibrated in tenths psig or tenths inches of mercury. Inches of mercury can be converted to psig by multiplying the inches of mercury by 0.49.

4.6.3 Inspection area and equipment. The area, in which the rafts are inspected, shall be adequately protected to preclude damage to the units. The area and inspection equipment shall be free of sharp or rough edges, burrs, protrusions and anything else which will cut, tear, or damage the life raft or the components.

4.6.4 Air. When use of air is specified in an inspection, the air used shall not contain any oil or liquid water.

#### 4.7 Inspection methods.

##### 4.7.1 Visual examination.

4.7.1.1 Life rafts. Every life raft shall be examined visually for critical defects to determine conformance to this specification. Each life raft, selected as a sample unit from the lot, shall be thoroughly checked dimensionally and examined visually for minor defects to determine conformance to this specification. The classification and list of defects, Tables III and IV, as applicable, shall be used to classify and enumerate the defects found.

TABLE III Classification of defects for the visual examination of the life rafts

| Critical   | Minor   |
|--|---|
| 1. Any non-specified hole, cut, patch, or burn.  | 201. Stitching and sewed seam construction not as specified. <u>3/</u>  |
| 2. Any fabric damaged, bruised, abraded, contains imperfections, or is otherwise defective. <u>1/</u>          | 202. One or more spots or stains. <u>3/</u>   |
| 3. Attachment of the floor or canopy to the inflatable tube not reinforced or not attached, as specified.      | 203. Any cut edge of the uncoated nylon fibrous materials not seared or containing sharp edges.                               |
| 4. Inlet valve assembly not in accordance with requirements, clogged with adhesive, or defective.              | 204. Any pile or hook tape missing, mislocated, or otherwise defective. <u>3/</u>   |
| 5. Any seam separating in the inflatable section or point of attachment of floor to the inflatable section.    | 205. Oral inflation assembly or components not specified type; oral tube not locked in the closed position.                   |
| 6. Oral inflation assembly mislocated, bent, distorted, or inoperable. Oral tube clamp not securely installed. | 206. Any metal component not properly finished or containing nicks, burrs, dents, sharp edges or rough surfaces. <u>3/</u>    |
| 7. Any stitching in the inflatable section or floor.   | 207. Adhesive on the inlet valve threads.   |
| 8. Any inflatable section seam construction which does not meet the minimum requirements specified.            | 208. Color of any component not as specified.   |
| 9. Any seam tape not applied to seams, as specified. <u>2/</u>   | 209. Any required markings missing, illegible, incomplete, incorrect or improperly located.                                   |
| 10. Any wrinkles, channels or voids in any cementing operation.  | 210. Any inspection record patch or warning tag missing, illegible, incomplete, incorrect, or improperly attached or located. |
| 11. Any grommet missing, mislocated, or improperly clinched. <u>2/</u>   | 211. Any inflatable section seam construction which exceeds the maximum requirements.   |

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TABLE III. (Continued)

| Critical  | Minor   |
|---|---|
| 12. Any component, component part, or required operation omitted; or any operation improperly performed, not herein classified. <u>2/</u> | 212. Cement on the cloth surfaces around the patches, attachments, seams, or seam tapes not visible or in excess of requirements. <u>3/</u> |
| 13. Any component not as specified, or any defect of a component or assembly, not herein classified. <u>2/</u>                            | 213. Any clot or mass of adhesive.  |
|   | 214. Any seam tape, patch, or attachment separating. <u>3/</u>  |
|   | 215. Any line or cord missing or not securely attached as specified.  |

- 1/ The defect shall be classified Critical if it is in the inflatable section; otherwise, it is to be classified Minor.
- 2/ The defect shall be classified Critical when it seriously affects serviceability or function; otherwise, it is to be classified Minor.
- 3/ The defect shall be classified as Minor when it does not seriously affect serviceability or function; otherwise, it is to be classified Critical.

TABLE IV. List of defects for the finished dimensions of the life rafts.

| Examine  | Defect  |
|--|---|
| Measure the life raft and all the visible components, as applicable. | Any measurement deviating from the dimensions and tolerances as specified in 3.5 and the applicable drawings shall be enumerated as a dimensional defect. |

4.7.1.2 Preparation for delivery. Each of the fully prepared shipping containers, containing life rafts, selected as a sample unit from the lot, shall be visually examined to determine that the packaging, packing, and marking conform to this specification. The list of defects, Table V, shall be used to enumerate the defects found.

TABLE V. List of defects for preparation for delivery.

| Item.                          | Defect  |
|--------------------------------|---|
| Exterior and interior markings | Missing, incorrect, incomplete, illegible, of improper size, location, sequence, or method of application; markings not the same on the interior and exterior containers. |



TABLE V. (Continued)

| Item                                    | Defect   |
|---|--|
| Packaging and packaging materials       | Any non-conforming component; any component missing, damaged, or otherwise defective.  |
| Workmanship                             | Inadequate application of the components such as incomplete closure of the unit package, container flaps, loose strappings, etc.; bulging or distortion of the containers; unit container contains metal fastenings or stitches.   |
| Exterior and interior weight or content | Number per container is more or less than required; gross or net weight exceeds the requirement; warning tag not visible; manner of folding damages the raft or any component; oral inflation tube is folded, bent, distorted, or creased; any metal component not covered as specified. |

4.7.2 Operation (carbon dioxide). The raft shall be spread out and placed in a horizontal position on the floor or table of the inspection area. An inflation assembly conforming to MIL-V-81722, for the valve and MS2654B2C0020 or MS26545B4C0020 for the carbon dioxide cylinder, the cylinder being charged with  $0.50 \pm 0.01$  pounds of carbon dioxide conforming to BB-C-101, Grade B, Type I, shall be installed on the life raft. The raft shall be inflated by pulling the pull cable of the inflation valve, with an abrupt quick motion, actuating the inflation valve. The inflation system shall function properly and the carbon dioxide shall enter the flotation tube, through the inflation and inlet valves, without any evidence of leakage. The life raft shall inflate to its design shape, as shown in 67A318H2, within 30 seconds, the time being recorded from the instant the inflation valve is actuated. During the inflation, the raft shall be observed for impediment or blockage to the flow of the carbon dioxide gas or restriction by any component (see 3.8.1). Forty - plus or minus twenty-five minutes after the raft has been inflated, the pressure in the flotation tube shall be measured. The temperature and pressure readings shall be taken with the life raft in a horizontal position. Immediately after the pressure reading is taken, the temperature and barometric pressure of the inspection area, in the vicinity of the life raft, shall be recorded. The life raft flotation tube pressure reading shall be corrected to 70 degrees Fahrenheit (21.1 degrees Centigrade) and barometric pressure of 29.92 inches of mercury using the correction factors specified in 4.6.1.1 and 4.6.1.2. The corrected pressure in the raft flotation tube shall be not less than 0.25 psig nor more than 2.0 psig. While inflated, the raft shall be examined for material and construction failure, separating of the seams, seam tapes, patches, and attachments, twisting or distortion of the floor or flotation tube (see 3.8.1).

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The flotation tube shall be completely deflated by unlocking the oral inflation valve and allowing the carbon dioxide gas to exhaust through the oral inflation assembly (tube and valve). The mouthpiece of the oral inflation valve shall be depressed to allow the carbon dioxide gas to flow through the valve to determine whether there is any difficulty in depressing the mouthpiece, whether the flow of the carbon dioxide gas is restricted by excess adhesive, talc, zinc stearate, other foreign matter, by damage due to the clamping of the oral inflation valve, or whether the flow of the carbon dioxide gas is impeded or blocked by the misplacement of the oral inflation tube base reinforcing patch (see 3.8.1). Upon completion of the examination for the flow of the carbon dioxide gas through the mouthpiece, the mouthpiece shall be released to its original position to determine whether the valve operates without difficulty and that the flow of the carbon dioxide gas is shut off completely (see 3.8.1). Upon completion of the testing and examination, the raft flotation tube shall be completely deflated and the raft shall then be subjected to the pressure inspection, 4.7.3.

4.7.3 Pressure. The completely deflated life raft shall be placed in a horizontal position on the floor or table of the inspection area. All the pressure readings shall be taken with the raft in this position. The flotation tube shall be inflated, with air (see 4.6.4), to a pressure of 5.0 psig. The air supply shall be securely shut off and after a minimum of 10 minutes, the pressure in the raft flotation tube shall be checked and readjusted, if necessary, to the original pressure of 5.0 psig. At the end of a minimum of 10 minutes after the readjustment period, the pressure in the tube shall be not less than 4.75 psig. While inflated, the raft shall be examined for material and construction failure, separating of the seams, seam tapes, patches, and attachments, twisting or distortion of the floor or flotation tube (see 3.8.2). Upon completion of the testing and examination, the raft flotation tube shall be completely deflated and the raft shall then be subjected to the leakage inspection, 4.7.4.

4.7.4 Leakage. The completely deflated raft shall be placed in a horizontal position on the floor or table of the inspection area. The temperature and pressure readings shall be taken with the raft in this position and in the vicinity of the raft. The inflatable tube shall be inflated, with air (see 4.6.4), to a pressure of 2.0 psig. The air supply shall be securely shut off and after a minimum of 15 minutes, the pressure in the tube shall be checked and readjusted, if necessary, to the original pressure of 2.0 psig. The temperature and barometric pressure shall be recorded at this time. At the end of a minimum of 4 hours, after the readjustment period, the pressure shall be measured and corrected for any change in the temperature or barometric pressure (see 4.6 through 4.6.1.2). The corrected pressure in the raft flotation tube shall be not less than 1.60 psig. The life rafts may be stacked one upon another during the 4 hour waiting period of the leakage inspection, provided the following shall be adhered to:

- a. The temperature shall be recorded at a level comparable to the height at which the raft being inspected was stowed during the 4 hour waiting period.

- b. At the end of a minimum of 4 hours, from the readjustment period, the raft to be checked for pressure shall be removed from the stacking and placed in a horizontal position on the floor or table of the inspection area. The barometric pressure of the inspection area shall be recorded. The pressure in the raft inflatable tube shall be measured and corrected for any change in the temperature or barometric pressure (see 4.6 through 4.6.1.2). In no event shall the pressure in a raft flotation tube be determined with another raft stacked upon it.

4.7.5 Weight of the raft. The weight of the raft shall be determined on a scale or balance capable of weighing at least to the nearest 0.01 pound. The weight of the raft shall include the configuration in accordance with 67A318H2 and shall conform to the requirements of 3.8.4.

4.7.6 Strength of attachment of the inlet valve to the flotation tube. The raft shall be spread out and placed in a horizontal position on the floor or table of the inspection area and shall be securely restrained. The coupling nut of the inflation valve, used in the inflation assembly specified in 4.7.2, shall be attached to the inlet valve with a torque of 15 foot pounds. No wrench shall be placed across the wrenching flats of the inlet valve nor shall the inlet valve be restrained in any manner, while the coupling nut is being attached. Upon completion of the attaching of the coupling nut, the inlet valve shall be examined for tearing and separation (see 3.8.5). Upon completion of the examination, the life raft shall be subjected to the leakage inspection, 4.7.4.

4.7.7 Strength of attachment of the sea anchor patch and handles to the flotation tube and the ballast bags to the floor. The strength of attachment of the sea anchor patch and the handles to the flotation tube and the ballast bags to the floor shall be determined by use of a suitable jig and inspection apparatus. The direction of the pull shall be perpendicular to the patch. The speed of the movable jaw of the inspection apparatus, under no load, shall be  $12 \pm 1/2$  inches per minute. The individual component being tested shall conform to the requirements of 3.8.6, 3.8.7, or 3.8.8 as applicable.

4.7.8 Extreme temperatures.

4.7.8.1 At zero degrees Fahrenheit. The deflated life raft, with the inflation assembly specified in 4.7.2 attached, shall be exposed, at  $0 \pm 2$  degrees Fahrenheit (minus  $18 \pm 1$  degrees Centigrade), for a minimum of 48 hours. The life raft shall then be removed to a room having a temperature of  $75 \pm 5$  degrees Fahrenheit ( $24 \pm 2$  degrees Centigrade) and the inflation valve shall be actuated immediately. The inflation system shall function properly and the carbon dioxide shall enter the raft flotation tube, through the inflation and inlet valves, without any evidence of leakage. The life raft shall inflate to its design shape, as shown in 67A318H2, within 20 minutes, the time being recorded from the instant the inflation valve is

actuated. During the inflation, the raft shall be observed for impediment or blockage to the flow of the carbon dioxide gas or restriction by any component (see 3.8.9). While inflated, the raft shall be examined for material and construction failure, separating of the seams, seam tapes, patches, and attachments, twisting or distortion of the floor or flotation tube (see 3.8.9). After  $1 \pm 1/4$  hour, the raft flotation tube shall be completely deflated and the raft shall then be subjected to the leakage inspection, 4.7.4. Upon completion of the leakage inspection, the raft flotation tube shall be completely deflated and the raft then subjected to the 160 degrees Fahrenheit inspection, 4.7.8.2.

4.7.8.2 At 160 degrees Fahrenheit. The foregoing in 4.7.8.1 shall be repeated, except that the raft, with the carbon dioxide filled cylinder and valve attached, shall be exposed at  $160 \pm 2$  degrees Fahrenheit ( $71 \pm 1$  degrees Centigrade), instead of zero degrees Fahrenheit, for a minimum of 48 hours, and shall have rounded into design shape within 30 seconds, after the inflation valve is actuated.

## 5. PACKAGING

5.1 Packaging. Packaging shall be Level A or C, as specified (see 6.2).

5.1.1 Level A. Each life raft, prepared as specified in 3.9, shall be packaged in accordance with MIL-P-116, Method IC-4 except that the fiber container shall be as specified herein, in lieu of the fiber can. No contact preservative is required. Each life raft shall be completely wrapped in waterproof kraft paper, conforming to UU-P-271, and shall be packaged within a snug fitting fiberboard container conforming to PPP-B-636, Style CSSC, Type CF or SF, Weather Resistant Class, Variety SW, Grade W5c or W5s. The body joint and the top and bottom flaps shall be firmly glued together as specified in PPP-B-636. The fiberboard container shall not contain any metal fastenings or stitches. All the seams and joints shall be sealed with water resistant tape conforming to PPP-T-76, 2 inches wide minimum.

5.1.2 Level C. Each life raft, prepared for packaging as specified in 3.9, shall be individually packaged to afford the minimum degree of protection necessary to prevent deterioration or damage during shipment under normal environmental conditions and commercial modes of transportation.

5.2 Packing. Packing shall be Level A, B, or C, as specified (see 6.2g). Shipping containers, insofar as possible, shall be uniform in size and shape and of minimum cube and tare weight.

5.2.1 Level A. Four (4) life rafts, packaged as specified in 5.1.1, shall be packed as specified in 5.3.2, except that the fiberboard container shall be Weather Resistant Class, Variety SW, Grade V3c or V3s. In addition, each container shall be reinforced with flat steel strapping or tape banding in accordance with the appendix to PPP-B-636.

5.2.2 Level B. Four (4) life rafts, packaged as specified in 5.1.1, shall be packed within a snug fitting fiberboard container conforming to PPP-B-636, Type CF or SF, Domestic Class, Variety SW, Grade 275. Each container shall be constructed and closed in accordance with the appendix to PPP-B-636. The fiberboard container shall not contain any metal fastenings or stitches.

5.2.3 Level C. The packaged life rafts, which require packing for acceptance by the carrier, shall be packed within exterior type shipping containers in a manner that will insure safe transportation at the lowest rate to the point of delivery. The shipment shall conform to the minimum requirements of the rules and regulations applicable to the mode of transportation selected.

5.3 Marking. In addition to any special markings required by the contract or order (see 6.2h), the interior and exterior containers shall be marked in accordance with MIL-STD-129 and shall include the date of manufacture (month and year).

## 6. NOTES

6.1 Intended use. This raft is intended for use as emergency equipment by aircraft personnel forced down at sea.

6.2 Ordering data. Procurement documents shall specify the following:

- a. Title, number and date of this specification
- b. Quantity desired
- c. Whether first article inspection is waived (see 4.4.1)
- d. Name and address of the first article inspection laboratory (see 4.4.1)
- e. Issuance of a block of serial numbers to cover the individual serialization of the rafts for the quantity to be purchased (to be assigned by the procuring activity)
- f. Name and address of the quality conformance inspection facility including the Government activity responsible for conducting the inspection program (see 4.5.1.3)
- g. Selection of applicable levels of packaging and packing (see 5.1 and 5.2)
- h. Whether any special markings are required (see 5.3)

i. Certificate of compliance:

- (1) For material and components conforming to applicable specifications, standards, and drawings (see 3.3).
- (2) For the age of materials and components, except for the metallic parts (see 3.3).

## j. Selection of the samples to be performed by the cognizant Quality Assurance Representative/Specialist (see 4.5.1.3).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are at the time set for opening of bids, qualified for inclusion in the applicable Qualified Products List whether or not such products have actually been so listed by that date. The attention of the suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. The activity responsible for the Qualified Products List is the Commander, Naval Air Systems Command, Department of the Navy, Washington, DC 20360; however, authorization for qualification of products shall be obtained from the Commander, Naval Air Development Center, Warminster, Pennsylvania, 18974, Attention: CODE 4044. Prior to submission of the samples for qualification inspection, the manufacturer shall submit a letter to the Naval Air Development Center (CODE 4044) indicating a date on which the samples can be forwarded and requesting assignment of an authorization test number and the name and address of the Qualification Inspection Laboratory.

6.3.1 When requested, the manufacturer shall submit an inspection report in accordance with SD6, Provisions Governing Qualification.

6.4 Data. For the information of Contractors and Contracting Officers, any of the data specified in applicable documents listed in Section 2 of this specification, or referenced lower-tier documents need not be prepared for the Government and shall not be furnished to the Government unless specified in the contract or order. The data to be furnished shall be listed on DD Form 1423 (Contractor Data Requirements List), which shall be attached to and made a part of the contract or order. NavWeps Form 4200/25 (Drawings, Lists, and Specifications Required) shall be attached where applicable.

Preparing activity:  
Navy - AS  
(Project No. 4220-N219)

| STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL   |   | OMB Approval<br>No. 22-R255 |
|---|---|-----------------------------|
| <p><b>INSTRUCTIONS:</b> The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.</p> |   |                             |
| DOCUMENT IDENTIFIER AND TITLE<br>MIL-L-81542A(AS) LIFE RAFT, INFLATABLE, ONE MAN, TYPE LR-1   |   |                             |
| NAME OF ORGANIZATION AND ADDRESS  | CONTRACT NUMBER   |                             |
|   | MATERIAL PROCURED UNDER A .<br><input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT |                             |
| <p>1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?<br/>A. GIVE PARAGRAPH NUMBER AND WORDING.</p> <p>B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES</p>  |   |                             |
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REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED