



AEROSPACE STANDARD

AS1354™

Issued 2016-02
Reaffirmed 2024-11

Individual Inflatable Life Preserver

RATIONALE

ARP1354A has been revised as AS1354 at the request of the FAA. This Aerospace Standard was developed to update design and performance requirements for individual life preservers.

AS1354 has been reaffirmed to comply with the SAE Five-Year Review policy.

TABLE OF CONTENTS

1.	SCOPE.....	4
2.	REFERENCES.....	4
2.1	Applicable Documents	4
2.1.1	SAE Publications.....	4
2.1.2	ASTM Publications.....	4
2.1.3	RTCA Publications.....	4
2.1.4	Code of Federal Regulations (CFR)	4
2.1.5	FAA Publications.....	4
2.1.6	U.S. Government Publications.....	5
2.1.7	U.S. Department of Health & Human Services Publications	5
2.1.8	U.S. Army Publications	5
2.1.9	NTIS Publications.....	5
2.1.10	Parachute Industry Association Publications	5
2.2	Related Publications	5
2.2.1	FAA Publications	5
2.3	Definitions	6
2.4	Mandating and Recommending Words.....	7
3.	DESIGN AND PERFORMANCE REQUIREMENTS	7
3.1	Reversibility	7
3.2	Compartmentalization	7
3.3	Chafing and Abrasion.....	7
3.4	Buoyancy	8
3.5	Inflation.....	8
3.5.1	Oral Inflation Means	8
3.5.2	Manual Inflation Means	8
3.6	Overpressure	9
3.7	Temperature.....	9
3.7.1	Operational Temperature Range	9
3.7.2	Extreme Temperature Exposure	9
3.8	Deflation	10
3.9	Donning	10
3.10	Retention	10

SAE Executive Standards Committee Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

SAE reviews each technical report at least every five years at which time it may be revised, reaffirmed, stabilized, or cancelled. SAE invites your written comments and suggestions.

Copyright © 2024 SAE International

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, or used for text and data mining, AI training, or similar technologies, without the prior written permission of SAE.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
http://www.sae.org

SAE WEB ADDRESS:

Full document details: SAE AS1354

For more information on this standard, visit
<https://www.sae.org/standards/content/AS1354/>

Documents

Standard, visit Sharing Hub

3.11	Flotation Attitude	11
3.11.1	Adult, Adult-Child, or Child	11
3.11.2	Infant-Small Child	11
3.12	Comfort, Fit, and Adaptability	11
3.13	Tether, Infant-Small Child Category	11
3.14	Survivor Locator Light	11
3.15	Retroreflective Material	12
3.16	Color	12
3.17	Packaging	12
3.17.1	Package Markings	12
3.17.2	Package Opening	12
3.18	Marking	12
3.18.1	Instructions	12
3.18.2	Date of manufacture of the device (month and year)	12
3.18.3	Part Number (P/N)	12
3.18.4	Lot or Serial Number (S/N)	12
3.18.5	Size Category	12
4.	MATERIAL AND CONSTRUCTION REQUIREMENTS	13
4.1	Physical properties	13
4.2	Flotation Chamber Material	13
4.2.1	Permeability	13
4.2.2	Strength	13
4.2.3	Seam Strength	13
4.2.4	Coat Adhesion	14
4.3	Other than Flotation Chamber Material	14
4.4	Metallic Parts	14
5.	COMPLIANCE TEST METHODS	15
5.1	Inflation Tests	15
5.1.1	Submersion Test	15
5.1.2	Overpressure	15
5.1.3	Leakage Resistance	15
5.2	Temperature Tests	15
5.2.1	Operational Temperature Range	15
5.2.2	Extreme Temperature Exposure	15
5.3	Donning Tests	15
5.3.1	Test Subjects	15
5.3.2	Infant-Small Child Test Dummy	16
5.3.3	Arrangement	16
5.3.4	Procedure	16
5.4	Retention Test	16
5.4.1	Adult, Adult-Child, or Child Life Preserver	16
5.5	Flotation Attitude Test	17
5.5.1	Adult, Adult-Child, or Child Life Preserver	17
5.5.2	Infant-Small Child Life Preserver	17
5.6	Material Tests	17
5.6.1	Fungus Resistance	17
5.6.2	Flammability	17
5.6.3	Permeability	17
5.6.4	Strength	17
5.6.5	Coat Adhesion	18
5.6.6	Seam Strength	18
5.6.7	Salt Spray	18
5.7	Package Opening	18
5.7.1	Pull Force	18
5.7.2	Operation of the Opening Mechanism	18
5.8	Comprehensibility	18

6.	NOTES	19
6.1	Revision Indicator	19
APPENDIX A	ANTHROPOMETRIC DUMMY DIMENSIONS	20
APPENDIX B	FTMS 191, METHOD 5136	22
APPENDIX C	TESTS INVOLVING SUBJECTS	24
TABLE 1	MINIMUM BUOYANT FORCE	8

1. SCOPE

This SAE Aerospace Standard (AS) provides the minimum design and performance requirements for individual, inflatable life preservers, divided into six categories: "Adult," "Adult-Child," "Child," "Infant-Small Child," "Adult-Child-Infant-Small Child," and "Demonstration."

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AS6011 Cylinders, Carbon Dioxide Filled, Technical

2.1.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM D1434-82 Procedure V, July 30, 1982

2.1.3 RTCA Publications

Available from RTCA, Inc., 1150 18th Street, NW, Suite 910, Washington, DC 20036, Tel: 202-833-9339, www.rtca.org.

RTCA DO-160 Environmental Conditions and Test Procedures for Airborne Equipment

2.1.4 Code of Federal Regulations (CFR)

Available from the United States Government Printing Office, 732 North Capitol Street, NW, Washington, DC 20401, Tel: 202-512-1800, www.gpo.gov.

14 CFR 25 Airworthiness Standards: Transport Category Airplanes

2.1.5 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

Federal Aviation Administration Technical Standard Order TSO-C85, Survivor Locator Lights

Federal Aviation Administration Technical Standard Order TSO-C13f, Life Preserver

2.1.6 U.S. Government Publications

Copies of these documents are available online at <http://quicksearch.dla.mil>.

Federal Test Method Standard (FTMS) 191, dated Dec. 31, 1968

Federal Test Method Standard (FTMS) 191A, dated July 20, 1978

A-A-59826 Thread, Nylon, dated March 3, 2009 (Supersedes V-T-295)

2.1.7 U.S. Department of Health & Human Services Publications

Available from The U.S. Department of Health and Human Services, 200 Independence Avenue, SW, Washington, DC 20201, Tel: 1-877-696-6775, www.hhs.gov.

Anthropometric Reference Data for Children and Adults: United States, 2003–2006, DHHS Publication No. (PHS) 2009–1250, CS121840, T32709 (10/2008)

2.1.8 U.S. Army Publications

Available from U.S. Army Natick Soldier Research, Development and Engineering Center, ATTN RDNS-WSH-E (S. Paquette), Kansas Street, Natick, MA 01760-5020.

NATICK/TR-09/014 Anthropometric Survey (ANSUR) II Pilot Study: Methods and Summary Statistics

2.1.9 NTIS Publications

Available from National Technical Information Service, 5301 Shawnee Road, Alexandria, VA 22312, Tel: 1-888-584-8332 or 703-605-6050, www.ntis.gov.

NTIS ADA406674 CAESAR: Summary Statistics for the Adult Population (Ages 18-65) of the United States of America Interim rept. Dec 1997-Jun 2002

2.1.10 Parachute Industry Association Publications

Available from Parachute Industry Association, 3839 W. Oakton Street, Skokie, IL, 60076, Tel: 847-674-9742, www.pia.com.

PIA-C-5040 Cord, Fibrous and Nylon

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Aerospace Standard.

2.2.1 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

Corbett, CL, Weed, DB, Ruppel, DJ, Larcher, K, and McLean GA (2014). Inflatable Emergency Equipment I: Evaluation of individual inflatable life preserver donning tests (DOT/FAA/AM-14/14).

2.3 Definitions

APPROVED: Certified or accepted by the relevant national or international civil aviation authority for use aboard civil transport aircraft.

BUOYANT FORCE: Equal to the weight of the fresh water displaced by the totally-submerged life preserver.

CHILLED HANDS TEST METHOD: A technique to simulate the reduced dexterity of chilled, wet hands that may occur during an emergency in a cold and wet environment. A naïve test subject simultaneously submerges left and right forearms and hands in 50 °F (10 °C) water for 2 minutes and immediately upon removal attempts to open/operate designated packaging/equipment. The test subject should be healthy and wear a loose-fitting, sleeveless upper garment that will not inhibit blood-flow to the arms and hands. (Alternate: GLOVED HANDS TEST METHOD)

COMPREHENSIBLE: Readily understood – as evidenced by correct interpretation of information and/or description of a procedure or function.

FLOTATION CHAMBER: Air-holding cell.

GLOVED HANDS TEST METHOD: A technique to simulate the reduced dexterity of chilled hands that may occur during an emergency in a cold and wet environment. A naïve test subject wears appropriately sized, 0.2 inch (5 mm) or thicker smooth-surfaced neoprene gloves to open/operate designated packaging/equipment. (Alternate: CHILLED HANDS TEST METHOD)

LIFE PRESERVER: A flotation device, which when properly worn by a person, will provide adequate buoyant force to support the body in a safe and stable position in water and provide a self-righting force to maintain the face above the water.

ADULT LIFE PRESERVER: Designed for an adult weighing more than 90 pounds (40.82 kg).

ADULT-CHILD LIFE PRESERVER: Designed for an adult or child weighing more than 35 pounds (15.88 kg).

CHILD LIFE PRESERVER: Designed for a child weighing 35 to 90 pounds (15.88 to 40.91 kg).

INFANT-SMALL CHILD LIFE PRESERVER: Designed for an infant or small child weighing less than 35 pounds (15.88 kg).

ADULT/CHILD/INFANT LIFE PRESERVER: Designed for an adult or child weighing more than 35 pounds (15.88 kg) or an infant-small child weighing less than 35 pounds (15.88 kg), e.g., Universal.

CONSTANT WEAR LIFE PRESERVER: Life preservers that are intended to be worn during all phases of flight (i.e., taxi, takeoff, cruise, and landing). There are two classifications of constant wear life preservers:

Fully Donned: The life preserver is completely donned and, in the event of an emergency, no supplemental donning actions are required.

Partially Donned: The life preserver is only partially donned and, in the event of an emergency, supplemental actions are required to complete the donning process.

R-VALUE: A measure of the thermal conductivity of a material, related to both the material and thickness of the material.

TEST SUBJECTS: Individuals who participate in life preserver tests (e.g., donning, retention, flotation). All such personnel shall be naïve; i.e., they shall have had no experience using a life preserver or specific equipment to be tested, and they shall not have viewed or talked with other persons performing the same or similar activities.

TEST SUBJECT CHARACTERISTICS: Refers only to weight and height, except as otherwise indicated. The values for each characteristic are a composite of those reported in the latest studies referenced in 2.1.7, 2.1.8, and 2.1.9. Test Subjects are nominally defined as follows:

A 5th percentile female is no more than 60 inches (1.5 m) tall and weighs no more than 113.2 pounds (51.4 kg) with a head circumference not greater than 20.67 inches (52.5 cm).

A 5th percentile male is no more than 65 inches (1.7 m) tall and weighs no more than 140.9 pounds (63.9 kg).

A 50th percentile female is 63 to 64 inches (1.6 m) tall and weighs 142 to 155.8 pounds (64.4 to 70.7 kg).

A 50th percentile male is 69 to 70 inches (1.8 m) tall and weighs 175 to 188.8 pounds (79.4 to 85.6 kg).

A 95th percentile female is at least 68 inches (1.7 m) tall and weighs at least 205 pounds (93.0 kg).

A 95th percentile male is at least 73.7 inches (1.9 m) tall and weighs at least 243.9 pounds (110.7 kg) with a head circumference of at least 23.79 inches (60.4 cm).

TORSO: The human body, excluding head, neck, and limbs.

2.4 Mandating and Recommending Words

SHALL indicates a mandatory criterion.

SHOULD indicates a criterion for which an alternative, including noncompliance, may be applied if it is documented and justified.

3. DESIGN AND PERFORMANCE REQUIREMENTS

Tests and measurements performed to demonstrate compliance with this standard shall be conducted with equipment calibrated according to the original equipment manufacturer (OEM) specifications, using standards and references traceable to a recognized national authority (e.g., National Institute of Standards and Technology, NIST). The description of test results shall include the accuracy and precision of the measurement(s), e.g., measured in 5 pound increments with accuracy of ± 0.10 pounds.

All tests requiring timing shall use time encoded video.

Demonstration life preservers that are only appearance-correct models used by a crew member to show passengers how to don and operate the life preserver, but are not intended to be functional, do not need to meet the performance or test requirements of this standard. Demonstration life preservers should be marked accordingly.

3.1 Reversibility

The life preserver shall perform its intended function when reversed (front versus back side of life preserver), unless its design precludes improper donning. Markings indicating reversibility and/or proper donning orientation shall be included on both sides of the life preserver, in accordance with marking requirements in 3.18.

3.2 Compartmentalization

The inflatable life preserver may have one or two separate gas tight flotation chambers. Each flotation chamber shall be shown to comply with the requirements in 3.5.

3.3 Chafing and Abrasion

The flotation chambers shall be protected such that component parts do not cause chafing or abrasion of the material in both the packed and inflated conditions.

3.4 Buoyancy

The life preserver shall be shown to provide a buoyant force not less than that required in Table 1. The buoyant force of the life preserver is equal to the weight of the volume of the fresh water displaced by the life preserver when totally submerged. Buoyancy shall be demonstrated using only the standard gas reservoirs required in 3.5.2.1 starting from a vacuum flat unit.

Table 1 - Minimum buoyant force

Category of Life Preserver	Weight of Wearer (lb/kg)	Minimum Buoyant Force in Fresh Water at 70 °F ± 5 °F (21.1 °C ± 2.8 °C) (lb/N)
Adult	Above 90/40.82	35/155.69
Adult-Child Combination	35/15.88 and above	35/155.69
Adult-Child-Infant (Universal)	Under 35/15.88 to above 90/40.82	35/155.69
Child	35/15.88 to 90/40.82	25/111.21
Infant-Small Child	Under 35/15.88	20/88.96

3.5 Inflation

3.5.1 Oral Inflation Means

With the exception of infant-small child life preservers, a means shall be provided by which the wearer can inflate each flotation chamber by blowing into a mouthpiece in accordance with the instructions provided on the life preserver. The mouthpiece for oral inflation shall be readily available to the wearer without interfering with the wearer's face or body. The oral inflation means shall be readily available to assisting persons.

3.5.1.1 Oral Inflation Valve

3.5.1.1.1 The opening pressure of the oral inflation valve, with no backpressure applied, shall not exceed 0.44 lb/in² gage (psig) (3.03 kPa).

3.5.1.1.2 The oral inflation valve shall not leak when back pressure is applied throughout the range from 0 to 10 psig (0 to 68.95 kPa).

3.5.1.2 Oral Inflation Means Attachment

3.5.1.2.1 The attachment of the oral inflation means to the flotation chamber shall be shown not to fail when a 100 pound (45.36 kg) tension load is applied to the inflation means outwardly from and perpendicular to the surface of the flotation chamber for at least 3 seconds.

3.5.1.2.2 An adapter having an inside diameter at least 0.75 inches (19.05 mm) larger than the outside diameter of the oral inflation means attachment shall be used to support the flotation chamber fabric during load application.

3.5.2 Manual Inflation Means

A means shall be provided by which the wearer, or the person assisting a child or infant-small child wearer, may manually activate the release of stored gas to inflate each flotation chamber of the life preserver.

3.5.2.1 Manual Inflation Gas Reservoir

A reservoir containing a non-flammable, compressed gas shall be provided for each flotation chamber of the life preserver. Carbon dioxide (CO₂) cylinders complying with AS6011 or equivalent are acceptable, as are cylinders having different sizes and fill weights that comply with all other requirements of AS6011.