



AEROSPACE STANDARD

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MINIMUM PERFORMANCE STANDARD FOR PARACHUTE ASSEMBLIES, PERSONNEL

This specification defines the minimum performance standards for personnel parachute assemblies to be carried in aircraft or worn by parachutists for emergency use.

1. TYPES

This specification covers two types of personnel carrying parachute assemblies.

1. Reserve parachute assembly
2. Emergency parachute assembly

2. DEFINITIONS

- 2.1 Reserve Parachute Assembly: A reserve parachute assembly is one which is worn in conjunction with a main parachute assembly used for premeditated jumps.
- 2.2 Emergency Parachute Assembly: An emergency parachute assembly is one worn for emergency, unpremeditated use only.
- 2.3 Main Parachute Assembly: A parachute assembly, excluding the harness, that is used in conjunction with a reserve parachute assembly as the primary parachute assembly (the one intended for use) for a premeditated jump.
- 2.4 General: For purposes of this specification a parachute assembly normally consists of seven major components:
 1. Canopy (includes suspension lines)
 2. Deployment device (sleeve, bag, or equivalent) if used
 3. Pilot parachute, if used
 4. Riser(s), if used, when not integral with harness and/or canopy
 5. Stowage container (pack)
 6. Harness
 7. Primary actuation device (ripcord assembly or equivalent)

3. MATERIAL AND WORKMANSHIP

- 3.1 Materials and workmanship shall be of a quality which documented experience and/or tests have conclusively demonstrated to be suitable for the manufacture of parachutes. All nonmetallic material shall remain functional for storage and use from -40° to $+200^{\circ}$ F (-40° to $+93.3^{\circ}$ C).

3.1.1 Canopy Materials: The fabric used in the canopy construction shall be free from harmful gums, starches and other foreign material. It shall also be free from avoidable imperfections in manufacture and from defects or blemishes affecting its strength or durability. The canopy material shall have sufficient resilience to insure proper opening of the canopy under conditions outlined in 4.3.3 through 4.3.7.

3.1.2 Fitting Materials: Fittings shall be fabricated from carbon steel, alloy steel, or corrosion-resisting material. Fittings made from materials that are not corrosion-resisting shall be plated or otherwise protected, to resist corrosion during the normal life of the parachute assembly. The use of dissimilar metals, especially brass, copper, or steel in intimate metal-to-metal contact with aluminum or aluminum alloy, shall be avoided. All plated ferrous parts shall be treated to eliminate hydrogen embrittlement.

4. DETAIL REQUIREMENTS

4.1 Design and Construction:

4.1.1 Fittings: All fittings shall be designed to carry their full rated load without yielding.

4.1.2 Suspension Lines: All suspension lines of a parachute canopy shall be marked under controlled tension as specified by the manufacturer for that given model.

4.1.3 Stitching: Stitching shall be of a type that will not ravel when broken.

4.1.4 Primary Actuation Device/Ripcord: The primary actuation device/rip cord, including joints between the handle and the release, shall be designed to withstand the test loads of 4.3.1 without yielding and shall meet the functional requirements of 4.3.2. The actuation grip shall be located so as to be readily visible and accessible.

4.1.5 Harness Release: The harness shall be so constructed that the rider can separate himself from the canopy and/or harness assembly. A quick attachable or quick releasing device between the harness and the main canopy is mandatory on a reserve parachute assembly.

4.2 Marking: Except as noted below, the following information shall be legibly and permanently marked on each major component in a location subject to a minimum of obliteration.

- Part number, including dash numbers
- Manufacturer's name and address
- Date of manufacture
- FAA TSO-C23c

4.2.1 Stowage Container: The information in 4.2 shall be marked on or attached to the outside of the parachute stowage container (pack). In addition, the stowage container shall be provided with a parachute data card pocket constructed such that the card will not be lost.

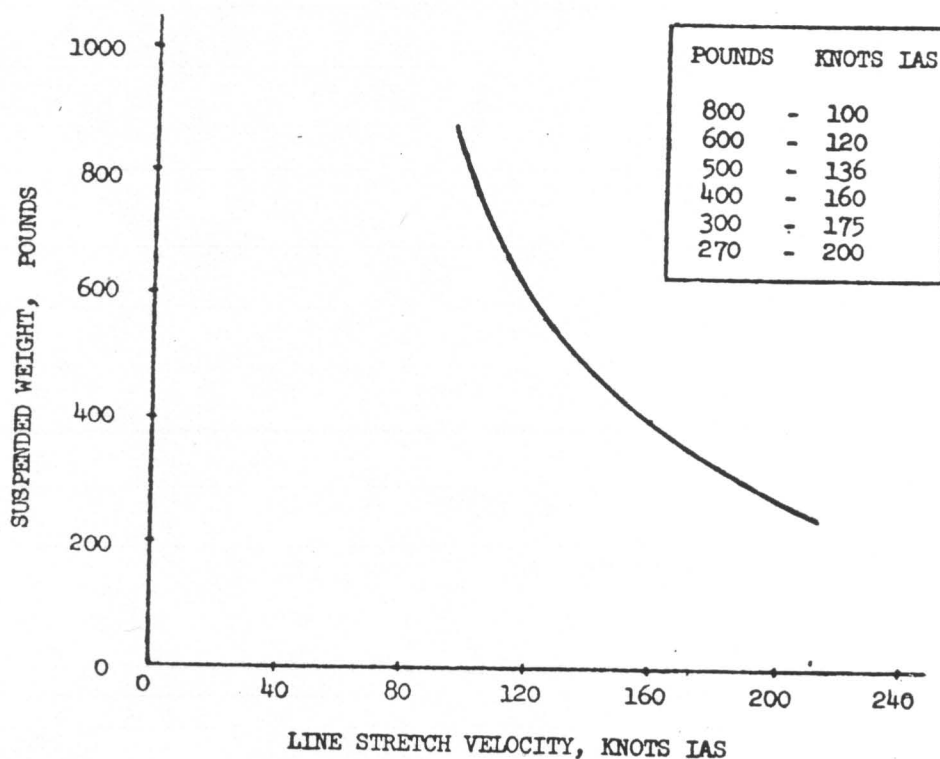
4.2.2 Canopy: In addition to the above information, the canopy marking shall include the canopy serial number.

4.2.3 Primary Actuation Device/Ripcord: The following information shall be marked on the Primary Actuation Device/Ripcord:

- Part number, including dash number
- Manufacturer's identification
- TSO-C23c

- 4.3 Qualification Tests: The following minimum performance standards shall be met. There shall be no failure to meet any of the requirements during the qualification tests of this section.
- 4.3.1 Ripcord Test: The ripcord, including all joints between the handle and the release, shall not fail under a straight tension test load of 300 pounds applied for not less than three seconds. If the ripcord is to be static line operated, the test shall be 600 pounds for not less than three seconds. The pins, if used, shall not yield under an eight pound load applied to the cable (or equivalent) perpendicular to the axis of the pin. The pin shall be supported for 1/2 inch (12.7 mm) maximum at the end furthest from the cable attachment.
- 4.3.2 Pull Test, Primary Actuation Device/Ripcord: The ripcord or equivalent shall be sealed for these tests. Tandem assemblies shall be tested both with the adjacent compartment(s) full and empty.
- 4.3.2.1 Human Factors: The primary actuation device shall be ground tested by use of a representative group of no less than five live subjects. They shall be able to function the actuation device without any undo difficulty.
- 4.3.2.2 Pull Test: A load of not less than 5 pounds (applied in the direction giving the lowest pull load) nor more than 27 pounds shall be required to cause a positive and quick functioning of the parachute assembly. For hand pull, chest-type parachute assemblies, the maximum pull shall be 15 pounds.
- 4.3.3 Compressed Pack Test: This test is required only when canopy or container materials other than pongee, cotton silk, or nylon are used (ref. 3.1.1) or when a coated or similarly treated fabric is used. Three drops shall be made with the conditions stated in 4.3.4 except that prior to the tests the parachute assemblies, completely packed, shall be subjected continuously to a 200 pound weight for 400 hours and then dropped without being repacked. This test may be combined with 4.3.4 when practical.
- 4.3.4 Strength Test: No material(s) or device(s) that attenuate shock loads and are not an integral part of the parachute assembly or component being certified may be used. Tests may be conducted for either a complete parachute assembly, a separate canopy, or a separate harness and/or riser(s). There shall be no evidence of material, stitch, or functional failure. The same canopy, harness, and/or riser(s) shall be used for all tests.
- 4.3.4.1 Parachute Assembly: Three drops shall be made with a 300 pound man-shaped dummy. The velocity of the dummy shall be 175 knots IAS at line stretch or equivalent (see table). Where easily detachable hardware (such as Snap and Ring) is used to attach the canopy or riser(s) to the harness, one test shall be made with only one attachment engaged to test the cross connector and hardware.
- 4.3.4.2 Static Harness and/or Riser(s) Test: The harness and/or riser(s) shall be subjected to a load of 5000 pounds applied and reacted against in a manner simulating loads applied by a parachute canopy and reacted against by a parachutist. The same harness and/or riser(s) shall be tested in this manner five times. Where easily detachable hardware (such as Snap and Ring) is used to attach the canopy or riser(s) to the harness, one test shall be made for each attachment with the full load applied to that attachment point to test the cross connector and/or hardware. While under load the harness shall not distort to a degree that would endanger the wearer (i.e., allow the wearer to fall out, or force the body past its normal range of motion).
- 4.3.4.3 Canopy: Three drops shall be made with a suspended weight of 300 pounds and a velocity at line stretch of 175 knots IAS or equivalent (see table). A test vehicle (e.g., a bomb) may be used. The canopy, deployment device (if used), pilot chute (if used), and riser(s) (if used) shall be tested as a unit. The riser(s) or equivalent shall be secured to the test vehicle in the same manner that they are intended to attach to the harness. Where easily detachable hardware (such as Snap and Ring) are intended to attach the canopy or riser(s) to the harness, one drop shall be made with only one attachment engaged to test the cross connector and hardware.

WEIGHT vs VELOCITY



- 4.3.5 Functional Test (Normal Pack): Twenty-four drops from an aircraft with a 170 pound dummy man. The indicated air speed at the time of pack release shall be as follows for eight drops each: 60, 85, and 110 knots IAS. In addition, Reserve Parachute Assemblies shall be dropped eight times by breaking away from an open and normally functioning main parachute canopy and releasing the Reserve pack within two seconds of the breakaway. The parachute canopy must be fully open within three seconds from time of pack release. These tests may be live jumps by a 170 pound (min.) individual except that at least two dummy drops shall be made at 60, 85, and 110 knots IAS. Tandem assemblies shall be tested both with the adjacent compartment(s) full and empty.
- 4.3.6 Rate of Descent Test: At least six drops from an aircraft with a 170 pound (min.) individual or dummy man. The average rate of descent shall not exceed 21 feet per second for the last 100 ft. corrected to standard sea level altitude conditions. A method shall be employed for direct and accurate measurement of rate of descent such as the use of a weighted cord or cable by which the descent may be timed for the last 100 ft. from the time of ground impact of the weight to ground impact of the dummy. The oscillation shall not exceed 15 degrees from the vertical. These tests may be combined with other tests in this section.
- 4.3.7 Live Drop Tests: Four live drop tests from an aircraft with a man weighing 170 pounds (min.) including the weight of a certificated reserve parachute assembly. Two drops shall include a free fall of not more than three seconds and two drops shall include a free fall of at least 15 seconds. These tests may be conducted in conjunction with functional and/or rate of descent tests when practical. The user must suffer no significant discomfort from the opening shock and must be able to disengage himself unaided from the harness after landing. For this test the standard harness may be altered to permit attachment of a certificated reserve parachute assembly (less harness) provided that such alteration does not interfere with the normal operation of the parachute assembly being tested. Tandem assemblies shall be tested both with the adjacent compartment(s) full and empty.

5. COMPONENT COMPATIBILITY

5.1 Parachutes may be qualified under this Technical Standard as complete assemblies or as components (e.g., just the harness/container assembly). The airworthiness of a parachute assembly including other separately approved, non-original components is the responsibility of the manufacturer who performs the certifying tests for the parachute assembly. The manufacturer shall publish and make available a list of interchangeable components which have passed the following tests in Section 4.3 when tested in conjunction with the assembly or component(s) being certified.

5.1.1 Canopy Including Suspension Lines: 4.3.2, 4.3.3, 4.3.4.1 (or 4.3.4.3), 4.3.5, 4.3.6, 4.3.7

5.1.2 Deployment Device: 4.3.2, 4.3.3, 4.3.4.1 (or 4.3.4.3), 4.3.5

5.1.3 Pilot Chute: 4.3.2, 4.3.3, 4.3.4.1 (or 4.3.4.3), 4.3.5

5.1.4 Stowage Container (Pack): 4.3.2, 4.3.3, 4.3.5

5.1.5 Harness: 4.3.4.1 (or 4.3.4.2), 4.3.7

5.1.6 Actuation Device (Ripcord): 4.3.1, 4.3.2, 4.3.5 (live jumps), 4.3.7

5.1.7 Riser(s): 4.3.4.1 (or 4.3.4.2), 4.3.5, 4.3.7

PREPARED BY
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