The Engineering Society
For Advancing Mobility
Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE STANDARD

AS8015

REV. B

Issued 1976-09-01
Revised 1992-07-07

Submitted for recognition as an American National Standard

MINIMUM PERFORMANCE STANDARDS FOR PARACHUTE ASSEMBLIES AND COMPONENTS, PERSONNEL

1. SCOPE:

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

This document covers three types of personnel carrying parachute assemblies and the operating limitations for each:

1.1 Types:

1.1.1 Single harness reserve parachute assembly (and components thereof).

1.1.2 Emergency parachute assembly (and components thereof).

1.1.3 Dual harness reserve parachute assembly (and components thereof).

1.2 Maximum Operating Limits, General:

Parachute assemblies, or components, may be certificated for any operating weight limit equal to or greater than 220 lb (100 kg), and for any pack opening airspeed equal to or greater than 150 KEAS (277.8 km/h).

1.2.1 Dual Harness Reserve Parachute Assembly: The maximum operating weight need not be the same for each harness; however, the maximum operating limits must not be less than 400 lb (181.4 kg), 200 lb (90.7 kg) in each harness, and 175 KEAS (324.1 km/h).

2. REFERENCES:

2.1 Definitions:

2.1.1 GENERAL: For purposes of this document a parachute assembly normally, but not exclusively, consists of the following major components:

a. Deployment initiation device (pilot chute, drogue, or functional equivalent); bridle, if applicable

b. Deployment control device (sleeve, bag, diaper, or functional equivalent), if used

c. Canopy(s) (includes suspension lines, connector links if used, and reefing device, if used)

d. Riser(s), if used, when not integral with harness and/or canopy

e. Stowage container

f. Harness(es)

g. Primary actuation device (ripcord or functional equivalent, including reserve static line, if used)

2.1.2 SINGLE HARNESS RESERVE PARACHUTE ASSEMBLY: A certificated parachute assembly (including the reserve deployment initiation device, deployment control device, canopy, risers, stowage container, harness, and actuation device) that is worn in conjunction with a main parachute assembly used for premeditated jumps.

2.1.3 MAIN PARACHUTE ASSEMBLY: A noncertificated parachute assembly (excluding the reserve deployment initiation device, deployment control device, canopy, risers, stowage container, harness, and actuation device) that is worn in conjunction with a certificated reserve parachute assembly as the primary parachute (the one intended for use) for premeditated jumps.

2.1.4 EMERGENCY PARACHUTE ASSEMBLY: A certificated parachute assembly worn for emergency, unpremeditated use only.

2.1.5 DUAL HARNESS RESERVE PARACHUTE ASSEMBLY: A certificated parachute assembly that is used for a premeditated jump by two people: A parachutist in command and a passenger (each in own harness), utilizing one main parachute assembly and one reserve parachute assembly.

2.1.6 FAILURE OF A PARACHUTE ASSEMBLY OR COMPONENT: The term "failure" in this document shall mean any change in a component or assembly that adversely affects its airworthiness.

2.1.7 FUNCTIONALLY OPEN: Functionally open shall mean a parachute sufficiently deployed to provide a rate of descent equal to or less than the limit specified in 4.3.7.

2.1.8 RESERVE STATIC LINE: A device connected to the main canopy that is capable of actuating the reserve parachute assembly following a breakaway from the main canopy.

2.1.9 MAXIMUM OPERATING WEIGHT: The maximum operating weight is the total weight of all individuals or dummies and their equipment.

2.1.10 MAXIMUM OPERATING SPEED: The maximum operating speed equals the maximum pack open speed in KEAS.

3. MATERIALS AND WORKMANSHIP:

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 materials shall remain functional for storage and use from -40 to +200 °F (-40 to +93.3 °C), and from 0 to 100% relative humidity. All plated ferrous parts shall be treated to minimize hydrogen embrittlement.

4. DETAIL REQUIREMENTS:

4.1 Design and Construction:

4.1.1 Materials: All materials shall be designed to support the proof loads specified in the applicable specification, drawing, or standard, without yielding. In the absence of an applicable specification, drawing, or standard for a particular material, successful completion of the 4.3 tests shall be considered adequate evidence of suitability.

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

4.1.3 Main Parachute Assembly: The main parachute assembly when installed but not deployed shall not interfere with the proper function of the reserve parachute assembly.

4.1.4 Primary Actuation Device/Ripcord/Reserve Static Line: The primary actuation device/ripcord/reserve static line, including all joints, shall withstand the test loads of 4.3.1 without failure and shall meet the functional requirements of 4.3.2.

4.1.5 Harness Release: The harness shall be so constructed that the parachutist can separate himself from the reserve canopy and/or harness assembly unaided.

On a dual harness reserve parachute assembly: The parachutist in command must be able to separate himself and the passenger from the reserve canopy and/or harness assemblies unaided.

4.1.6 Main Parachute Release: A device capable of releasing the main parachute assembly from the harness of a reserve parachute assembly is optional. If used, the main parachute assembly release shall meet the applicable functional requirements of 4.3.2.

4.1.7 Dual Harness Reserve Parachute Assembly, Reserve Static Line: A reserve static line, or functionally equivalent device, is required on dual harness reserve parachute assemblies.

4.1.8 Dual Harness Parachute Assembly, Drogue Release: On dual harness parachute assemblies the use of a drogue is optional. If a drogue is used, it shall meet the functional requirements of 4.3.2.

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:

a. Part number, including dash numbers
b. Manufacturer's name and address
c. Date of manufacture (month and year) and serial number
d. FAA TSO-C23 ( )
e. Maximum operating limits (see 1.2 and 4.3.4)

NOTE: These items need not be marked at the same location on the component as long as all of the pertinent information is permanently marked and readily available.

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), and a space provided to mark the information from 4.2.3 and 4.2.4. The lowest maximum operating weight of any component in the assembly (canopy, harness, etc.) and the lowest maximum operating speed of any component (canopy, harness, etc.) shall be marked on the outside of the stowage container (pack) in such a location as to be readily visible to the user during donning of the parachute assembly and subject to a minimum of obliteration during use. Such markings shall be in a block type face, in a minimum size of 3/8 in (9.5 mm) tall (27 point type). The other information required by 4.2, 4.2.3, and/or 4.2.4 may be marked in another location, if desired. In addition, the stowage container shall be provided with a parachute data card pocket constructed such that the card will not be easily lost but will be readily accessible.

4.2.2 Primary Actuation Device/Ripcord: The following information shall be marked on the primary actuation device/ripcord:

a. Part number, including dash number
b. Manufacturer's identification
c. TSO-C23( )
d. Batch, serial number, or date of manufacture (month and year)

4.2.3 Canopy: In addition to 4.2 the following shall be marked on the canopy.

a. Average peak force measured during 4.3.4 tests.

b. "Approved for use with emergency parachute assemblies and single harness reserve parachute assemblies without main parachute release only", for canopies that have not passed the test specified in 4.3.6.2.

c. "Approved for use with single harness reserve parachute assemblies equipped with or without a main parachute release", for canopies which have passed the test specified in 4.3.6.2.

d. "Approved for use with dual harness reserve parachute assemblies equipped with a main parachute release", for canopies which have passed the test specified in 4.3.6.2.

4.2.4 Harness: In addition to 4.2 marking, the following data shall be marked on the harness:

a. Average peak force measured during 4.3.4 tests

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. In case of a failure, the cause must be found, corrected, and all affected tests repeated. The packing method must be specified and the same packing method must be used for all tests.

4.3.1 Primary Actuation Device/Ripcord Test: The ripcord, including all joints, shall not fail under a straight tension test load of 300 lbf (1337.7 N) applied for not less than 3 s. The reserve static line, if used, must not fail under a straight tension test load of 600 lbf (2667.3 N) for not less than 3 s. If the ripcord is to be static line operated, the test shall be 600 lbf (2667.3 N) for not less than 3 s. The pins, if used, shall not yield under a 8 lbf (35.6 N) load applied to the cable (or equivalent) perpendicular to the axis of the pin, for not less than 3 s. The pin shall be supported for 0.5 in (12.7 mm) maximum at the end farthest from the cable attachment. The pin(s) shall be deemed to have passed this test if the primary actuation device/ripcord which it (they) is (are) a part of then passes the tests specified in 4.3.2.4.

4.3.2 Human Factors and Actuation Force Tests: An anthropometrically diverse group of individuals from the intended user group shall be employed for all human factors tests in 4.3.2.

4.3.2.1 Primary Actuation Device/Ripcord, Human Factors Tests: The primary actuation device/ripcord shall be ground tested by a representative user group of no less than 6 male and 6 female subjects. They shall be able to operate the actuation device without difficulty. The ripcord, or equivalent, shall be sealed in accordance with FAR 65.133 for these tests.

4.3.2.1.1 Single harness reserve parachute assemblies shall be tested with the main compartment(s) both full and empty. The tests shall be conducted by the user in a suspended harness[1] (3 male/3 female), and while standing upright (3 male/3 female); (24 tests total).

4.3.2.1.2 Emergency parachute assemblies shall be tested while standing upright only (6 male/6 female); (12 tests total).

4.3.2.1.3 Dual harness reserve parachute assemblies shall be tested with the passenger attached as follows: Main compartment(s) both full and empty; with the user in a suspended harness[1] (3 male/3 female), with the user suspended by the drogue bridle (3 male/3 female) and while standing upright (3 male/3 female). These tests shall be repeated without the passenger attached; (72 tests total)[2].

4.3.2.2 Main Canopy Release, Human Factors Tests: The main canopy release, if used, shall be ground tested in a suspended harness[1] by a representative group of no less than 6 male and 6 female subjects; (12 tests total). They shall be able to operate the release device without any undue difficulty.

Dual harness reserve parachute assemblies shall be tested while in a suspended harness[1] and while suspended by the drogue bridle with and witout a passenger attached by a representative group of no less than 6 male and 6 female subjects; (48 tests total). They shall be able to operate the release device without any undue difficulty.[2]

4.3.2.3 Drogue Release, Human Factors Tests: The drogue release (if used) shall be ground tested by a representative group of no less than 6 male and 6 female subjects. They shall be able to operate the release device without any undue difficulty. The drogue release shall be tested with the test subject(s) suspended by the drogue bridle (6 male/6 female), and with an additional test subject, if used, in the passenger harness (6 male/6 female); (24 tests total)[2].

[1] "In a suspended harness" shall mean suspended by the risers of the main canopy.

[2] Dual harness reserve parachute assemblies while being tested with an attached passenger are required to be tested/operated by the parachutist in command. If passenger operated devices are used, all 4.3.2.2 and 4.3.2.3 tests with a test subject in the passenger harness must be repeated with the passenger operating the device.

4.3.2.4 Primary Actuation Device/Ripcord, Actuation Force Tests: A load at the ripcord handle, or equivalent, of not less than 5 lbf (22.2 N), applied in the direction giving the lowest pull force, nor more than 22 lbf (97.9 N), applied in the direction giving the highest pull force under normal design operations, shall result in a positive and quick deployment initiation on all tests. A minimum of 10 pull tests is required. For chest type parachute assemblies, the maximum pull force shall be 15 lbf (66.7 N).

4.3.2.5 Main Canopy Release, Actuation Force Tests: While in a suspended harness (with additional ballast as required to equal twice the maximum operating weight), a force at the main canopy release handle, or equivalent (if used), of not less than 5 lbf (22.2 N) (applied in the direction requiring the least force), nor more than 22 lbf (97.9 N) (applied in the direction requiring the greatest force under normal design operations), shall result in a positive and quick release of the main canopy on all tests. A minimum of 12 pull tests is required.

4.3.2.6 Drogue Release, Actuation Force Tests: A force at the drogue release handle (if used), or equivalent, of not less than 5 lbf (22.2 N) (applied in the direction requiring the least force), nor more than 22 lbf (97.9 N) (applied in the direction requiring the greatest force under normal design operations), while suspending the maximum operating weight, shall result in a positive and quick release of the drogue on all tests. A minimum of 12 tests is required.

4.3.3 Compressed Pack and Environmental Tests: Three drops shall be made to the lowest applicable direct drop speed in 4.3.6 except that prior to the test the parachute assembly shall be subjected to the following preconditioning: (These tests may be combined with other tests.)

4.3.3.1 Precondition for 16 h at not less than +200 °F (93.3 °C), stabilize to ambient and test drop.

4.3.3.2 Precondition for 16 h at not greater than -40 °F (-40 °C), stabilize to ambient and test drop.

4.3.3.3 Precondition for not less than 400 continuous hours with a 200 lbf (889.6 N) or greater load applied to compress the pack in a manner similar to that most likely to be encountered in actual use. Test drop within 1 h after removing the load.

4.3.4 Strength Test: No material(s) or device(s) that attenuates shock loads and is not an integral part of the parachute assembly or component being certificated may be used. Tests may be conducted for either a complete parachute assembly or separate components. There shall be no evidence of material, stitch, or functional failure that will affect airworthiness. The same canopy, harness, component, and/or riser(s) shall be used for all 4.3.4 tests. Opening forces shall be measured on all 4.3.4 tests. The parachute must be functionally open within the number of seconds calculated for 4.3.6 tests. Parachute assemblies shall be tested in accordance with the following schedule:

4.3.4 (Continued):

a. Test weight = Maximum operating weight limit x 1.2
b. Test speed = Maximim operating speed limit x 1.2

However, test weight must be not less than 264 lb (119.7 kg) and the test speed must be not less than 180 KEAS (333.4 km/h) for reserve and emergency parachute assemblies; for dual harness parachute assemblies for test weight must not be less than 480 lb (217.7 kg) and the test speed must not be less than 210 KEAS (388.9 km/h).

4.3.4.1 Emergency Parachute Assembly: Three drops shall be made with weight and speed in accordance with 4.3.4. Where easily detachable hardware (such as snap and ring) is used to attach the canopy or riser(s) to the harness, a cross connector must be used and one of the above drops shall be with only one attachment engaged to test the cross connector and hardware.

4.3.4.2 Canopy to be Used With a Single or a Dual Harness Reserve Parachute Assembly (Alternate Test for 4.3.4.1): Three drops shall be made with a suspended weight and speed in accordance with 4.3.4. A test vehicle (e.g., a bomb) may be used. The canopy, deployment device (if used), a 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 it is intended to attach to the harness. Where easily detachable hardware (such as snap and ring) is intended to attach the canopy or riser(s) to the harness, one of the above drops shall be made with only one attachment engaged to test the cross connector and hardware.

4.3.5 Functional Test (Twisted Lines): A minimum of 5 drops shall be made with a weight not more than the maximum operating weight dummy or person[3] in each harness. The airspeed at the time of pack opening shall be 60 KEAS (111.1 km/h). Three twists in the same direction (360° each) shall be purposely packed in the suspension lines adjacent to the lowest attachment point to the canopy. The parachute must be functionally open within the time calculated for 4.3.6 tests +1 s from the time of pack release.

4.3.6 Functional Test (Normal Pack All Types): For all 4.3.6 tests the maximum allowable opening time for parachute canopies with a maximum operating weight of 250 lb (113.4 kg) or less, is 3 s from the moment of pack opening. For parachutes with a maximum operating weight of greater than 250 lb (113.4 kg) the maximum allowable opening time shall be increased by 0.01 s for every pound of maximum operating weight in excess of 250 lb (113.4 kg).

[3] A person's or individual's body weight may be increased to equal the maximum operating weight by using a weight belt or similar device.