



Standard Specification for Airframe Emergency Parachute¹

This standard is included under the designation F2316; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of latest revision or editorial change since the last revision or approval.

1. Scope

1.1 This specification covers minimum requirements for the design, manufacture, and installation of parachutes for airframe airframe emergency parachute added in this specification effective parachutes, as designed, manufactured, and installed on aircraft, helicopters, and balloons. This specification is not applicable to deep-pull parachutes, pin-cord parachutes, dog-eared parachutes, or other airframe emergency aerodynamic deceleration parachutes intended for aerial work. The specification is applicable to the use of parachutes if the use is an integral part of an airframe emergency parachute, as designed on aircraft, helicopters, and balloons, as applicable.

1.2 The units used in SI units are to be regarded as standard. The metric system is the preferred system of units. Values in parentheses are provided for information only and are not considered standard.

1.2.1 Note that this specification is in accordance with International Civil Aviation Organization (ICAO) agreements. While the units used in SI units are regarded as standard, certain units which are used in known and allied industries are also accepted as standard.

1.3 Airframe emergency parachute recovery systems have become an acceptable means of greatly reducing the likelihood of serious injury or death in an in-flight emergency. Even though they have saved hundreds of lives in many different types of conditions, inherent danger of failure, even if properly designed, manufactured and installed, remains due to the countless permutations of random variables (attitude, altitude, accelerations, airspeed, weight, geographic location, etc.) that may exist at time of usage. The combination of these variables may negatively influence the life saving function of these airframe emergency parachute systems. They are designed to

be a supplemental safety device and to be used at the discretion of the pilot when deemed to provide the best chance of survivability.

1.4 This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory requirements prior to use.

1.5 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 The following are the referenced documents in this specification.

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 ballistic device, *n*—manually deployed parachute, mortar, or projectile, ping, or other deployed device.

3.1.2 completely opened parachute, *n*—the parachute has reached its maximum deployment dimension for its use.

3.1.3 parachute deployment, *n*—process of parachute activation and inflation.

4. Materials and Manufacture

4.1 Materials—Material used for parachute and assembly, the failure of which could adversely affect performance, the following conditions:

4.1.1 Material shall be suitable and durable for its intended use.

4.1.2 Design shall be chosen so that no critical part is under stress of material failure of load concentration, or both.

4.1.3 The effect of environmental conditions, such as temperature and humidity, expected in service, shall be taken into account.

5. Reserved

5.1 This section is being held as a placeholder for future use.

¹ This specification is under the jurisdiction of ASTM Committee F37 on Light Sport Aircraft and is the direct responsibility of Subcommittee F37.70 on Cognition.

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6. Parachute System Design Requirements

6.1 Strength Requirements:

6.1.1 Strength requirements are specified in terms of limit load (the maximum load to be expected in service) and ultimate load (limit load multiplied by a prescribed factor).

6.1.1.1 Unless otherwise provided, prescribed load is a limit load.

6.1.1.2 Unless otherwise provided, an ultimate load factor of 1.5 may be used.

6.1.2 Strength analysis may be an accepted computational method has been established.

6.1.3 Strength analysis by engineering methods is permitted in certain cases, provided that the analysis is based on applicable engineering and material properties, and the design is approved.

6.2 System Design—The following minimum performance standards for the basic parachute system shall be met.

6.2.1 Parachute Strength Test—A minimum of free fall drop test of the parachute assembly shall be conducted under ultimate load conditions to demonstrate the parachute strength. The maximum parachute opening force measured in the test will be the ultimate parachute opening load. The parachute assembly must be tested for each configuration. The weight of the parachute assembly included in the test weight. Data acquisition shall be performed for each test and shall include recording of in-air load as a function of time.

6.2.1.1 Failure free fall drop test of the parachute system shall be able to provide the ultimate load demonstrated during the drop test. No detrimental permanent deformation or damage may occur to the parachute system during the drop test. The parachute shall:

(1) Maintain a descent rate a certain percentage of descent for a given weight and altitude.

(2) Have completely opened within the designed parachute opening time.

6.2.1.2 An ultimate load factor of 1.5 is achieved by conducting the parachute strength test as follows:

(1) Parachute Strength Test with Aircraft in Flight. If the parachute is strength tested while attached to an aircraft in flight, the following parachute test shall be applied:

Min. Test Weight = 1.25 Aircraft Maximum Gross Takeoff Weight

Min. Test Speed = 1.1 Aircraft Maximum Intended Parachute Deployment Speed

NOTE 1. In this section, the factor of safety is considered applicable to the weight of the aircraft. However, it is not permissible to calculate the weight by including an engine or other aircraft components.

(2) Parachute Strength Test with "Dead Weight" Payload. If the parachute is strength tested while attached to a dead-weight (demonstrator and metal chain, etc., and limited to weight), the following parachute test shall be applied:

Min. Test Weight = Aircraft Maximum Gross Takeoff Weight

Min. Test Speed = Aircraft Maximum Intended Parachute Deployment Speed

NOTE 2. This method is based on the concept of a dead weight.

do not, however, an pitching or oscillation tendency has a bobbing tendency in the parachute opening height, a certain aircraft altitude. The effective weight limit and speed limit in the load.

6.2.2 Rate of Descent—Rate of descent data shall be recorded for all tests in 6.2.1. This data may be recorded for the aircraft in the vehicle weight or determine the rate of descent. The weight of the parachute assembly. The descent rate data from parachute canopy shall be recorded to 1500 m (5000 ft) density altitude and standard temperature. Aircraft manufacturer and parachute manufacturer shall coordinate the joint project to obtain similar landing performance.

6.2.3 Staged Deployment—The parachute assembly shall be designed to reduce the deployment sequence in an order of magnitude to reduce the chance of entanglement or similar malfunction.

6.2.4 Environmental Conditions—The system shall be evaluated for operation in temperature conditions of 40°C to 48.9°C (104°F to 120°F).

6.3 Installation Design—A specific Parachute Installation Manual (PIM) for the installation of a particular parachute system in each aircraft model must be created. The PIM must provide sufficient information on the correct installation of the parachute system on the aircraft.

6.3.1 Coordination—Aircraft and parachute manufacturer must coordinate and jointly approve the PIM for correctness. Design configuration changes have impact on the parachute installation, performance, operability, reliability, etc. Aircraft and parachute manufacturer shall coordinate the anticipated change before implementation. The change shall be documented in a revised PIM.

6.3.2 Weight and Balance—The installation of the parachute system shall be accounted for in the design data of weight and balance limit of the aircraft.

6.3.3 System Mounting—The hardware used on all the parachute system shall not become loosened or detached at any time of normal use and wear.

6.3.4 Extraction Performance—Aircraft and parachute manufacturer must coordinate and hold the extraction device will cleanly penetrate and connect to the parachute system, if any, and the parachute assembly will penetrate the penetration line (line has connected to the parachute canopy or the harness) without inhibiting or damaging the parachute deployment. While in the recognized harness configuration, it is not predictable in an emergency situation (for example, broken parachute opening device), all deployment shall be taken to provide a path of least resistance to the parachute deployment.

6.3.5 Parachute Attachment to the Airframe—The parachute assembly must be attached to the primary structure of the aircraft with an attachment mechanism that has a mass composed of a single harness section or a series of harness sections. The aircraft and parachute manufacturer must coordinate and agree on the parachute attachment mechanism of the aircraft compliance with the following condition:

6.3.5.1 Parachute deployment incidence, the load distribution on the aircraft, the geometric location of the harness attachment point. The aircraft attachment point and

airframe attachment has been for each individual aircraft model
method completed with the limit load opening load mea-
sured in the attachment height described in 6.2.1. This load
allowance contains the increased safety factor of 1.5.

6.3.5.2 The attachment and attachment point must be
constructed in a manner that prevents the aircraft from decelerating
and landing attitude maintenance the ability of the airframe
to absorb the anticipated landing load and minimize
the probability of injury to the occupant.

6.3.5.3 The airframe attachment must be loaded
from the installed attachment of the airframe attachment point
and loaded in a manner that will prevent impact
normal operation. It must also be shown that the
structure will be sufficient to support the attachment of the
attachment element and the functioning of the element.

6.3.5.4 The airframe attachment design must
minimize the potential for collision with the propeller. If collision
with the propeller is unavoidable in all loading conditions
operation in which a change in engine, the
airframe attachment must be manufactured from
material that has a reasonable likelihood of surviving a collision
with the propeller.

6.3.6 *Activating Housing Routing*—The attachment element

from 276 76 76 76e76e76 76 ig76 76 the probability element.

11.2.1 *Installation and Size of Placard or Label*—The placard or label shall be permanently in all hazardous areas and shall be installed in accordance with the PIM.

11.2.2 *Label Size and Color*—All placard or label shall follow the coloration method described below. The height of placard or label shall add the different location for installation.

11.2.2.1 *Danger Placard*—Danger placard or label shall be printed in a bold face type with the following characteristics:

(1) *Danger Placard for Interior Parachute Installation*—A 7.62 cm (3 in.) minimum diameter placard or label with the word Danger (see sample placard Fig. X1.1 of Appendix X1) shall be placed adjacent to the parachute egress point for enclosed aircraft. The placard shall be visible from the exterior.

(2) *Danger Placard for Exterior Parachute Installation*—A 5.08 cm (2 in.) minimum diameter placard or label (see sample label Fig. X1.1

S3.1.1 The emergency parachute manufacturer shall be able to identify and describe each article produced conforming to the original engineering specification, as detailed below:

S3.1.1.1 In preparation for a material, purchased item, and part and assembly produced by a supplier, including methods used, the acceptable quality of part and assembly shall be established in preparation for conformity and quality control of the parachute manufacturer's facility.

S3.1.1.2 Production in preparation of individual parts and complete assemblies, including the identification of an individual manufacturer's process in order, the manufacturer's control

the process, and the final inspection in preparation of the completed emergency parachute item.

S3.1.1.3 A nonconforming material item shall include documentation of part disposition decision and a removal or disposal of rejected parts.

S3.1.1.4 A manufacturer's information company in preparation of a change in engineering drawing, specification, and quality control procedure.

APPENDIX

(Nonmandatory Information)

X1. SAMPLE OF LABELS (PLACARDS)

X1.1 The sample label shown in Fig. X1.1 meets the requirements provided in 11.2.2.1.

X1.2 The sample label shown in Fig. X1.2 meets the requirements provided in 11.2.2.2.

X1.3 The sample label shown in Fig. X1.3 meets the requirements provided in 11.2.2.3.

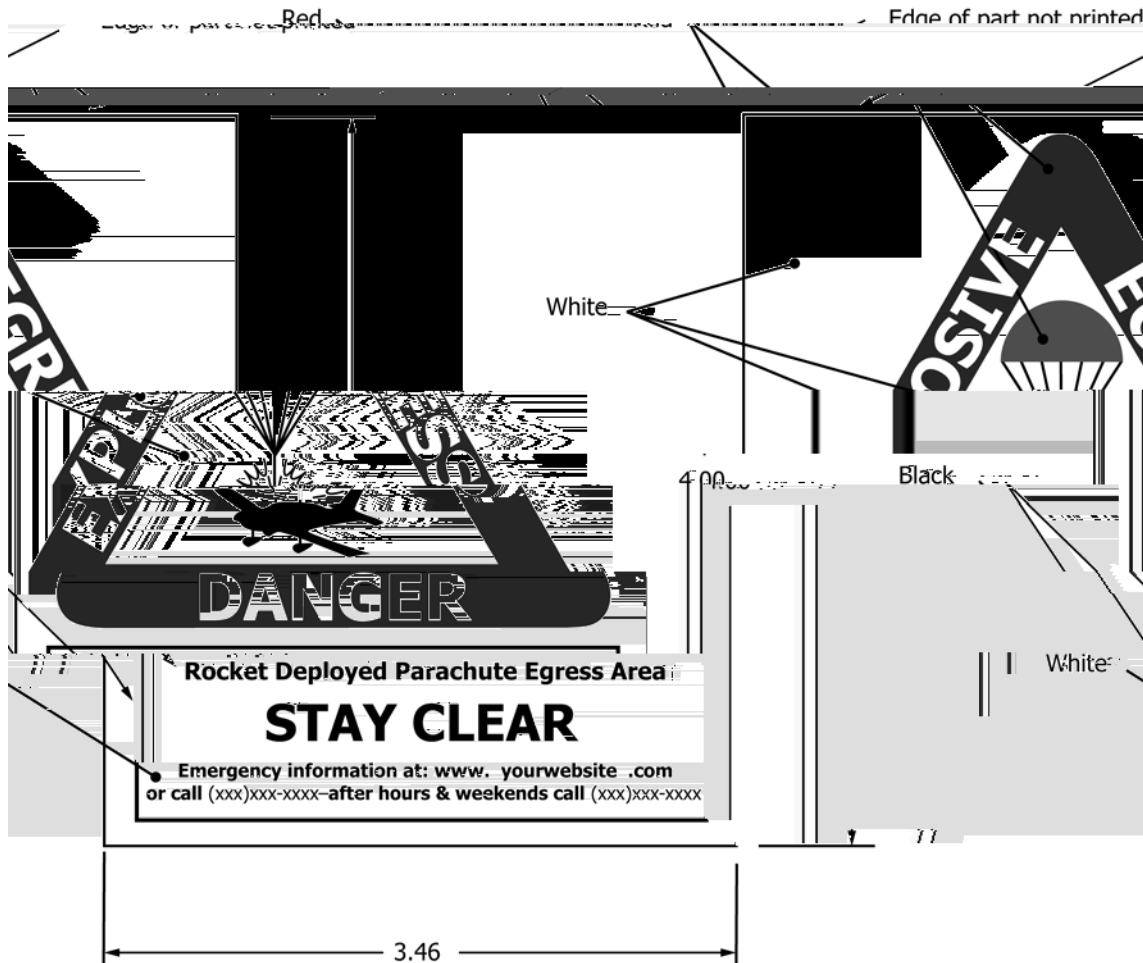


FIG. X1.1 Sample Danger Label

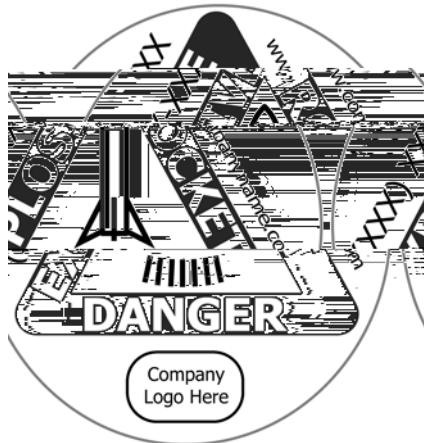


FIG. X1.2 Sample Identification Label

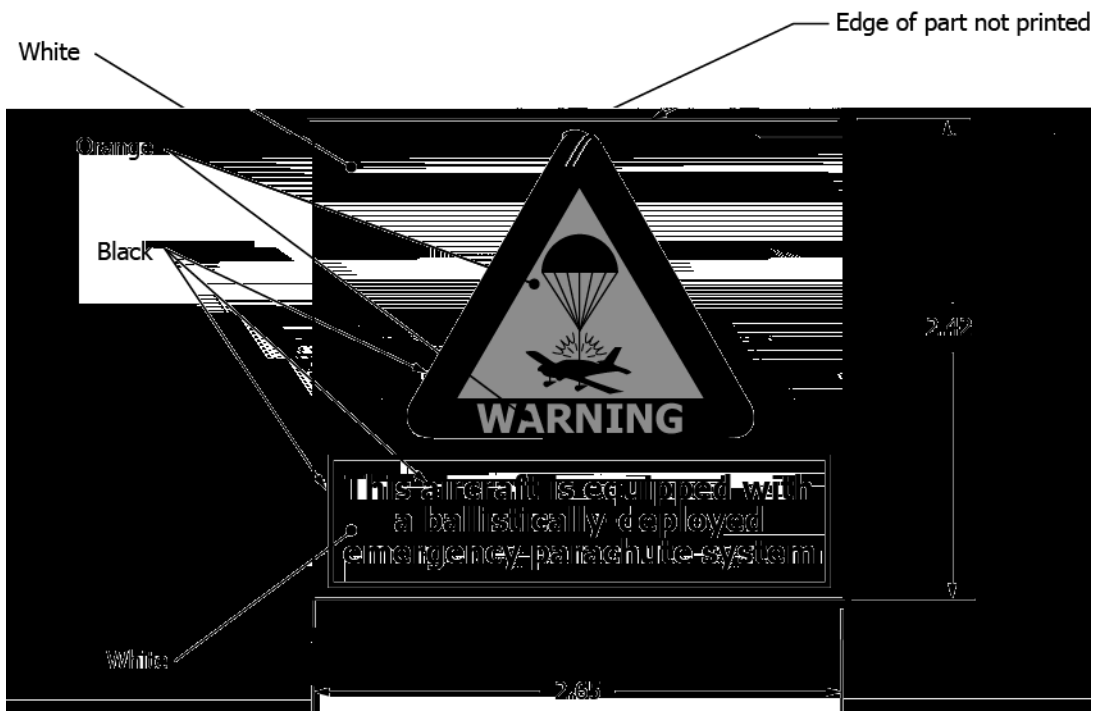


FIG. X1.3 Sample Label

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