



Designation: F2316 – 12 (Reapproved 2022)

Standard Specification for Airframe Emergency Parachute¹

This standard is intended to be used in conjunction with ASTM Specification F2316; the number immediately following the designation indicates the year of original adoption, in the case of revision, the year of latest revision. A number in parentheses indicates the year of latest revision of a previous edition. A superscripted epsilon (ϵ) indicates an editorial change since the last revision of the standard.

1. Scope

1.1 This specification covers minimum requirements for the design, manufacture, and installation of parachute for airframe. Airframe emergency parachute are added in this specification effective on parachute systems designed, manufactured, and installed on aircraft for airframe and installation applications. This specification is not applicable to deep-pull parachute, pin-cock parachute, dog parachute, or other airframe emergency aerodynamic deceleration parachute intended for use following the airframe and installation program of the ground. The specification is applicable to the use of parachute if the aircraft is in the air of an airframe emergency parachute system designed on aircraft and installation applications for use of deceleration.

1.2 The altitude in SI units is to be regarded as standard. The maximum altitude given in parentheses has a maximum value in inches-pounds units. Values in parentheses are provided for information only and are not considered standard.

1.2.1 Note that in this specification, the International Civil Aviation Organization (ICAO) agreement. While the altitude in SI units is regarded as standard, certain altitude characteristics are not included in the 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*

¹ This specification is intended to be used in conjunction with ASTM Specification F37 on Light Sport Aircraft and the identification of SBComme F37.70 on Certification.

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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 listed as references in this specification.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *ballistic device, n*—manipulative device, motion, motion, and projectile, ping, or other object.

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

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 following conditions:

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

4.1.2 Design altitude (English) may be chosen to have no critical parameters, English altitude of material inflation or load concentration, or both.

4.1.3 The effect of environmental conditions, which are temperature and humidity, specified in the items to be taken into account.

5. Reserved

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

6. Parachute System Design Requirements

6.1 Strength Requirements:

6.1.1 Strength requirements shall be 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 shall be limit load.

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

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

6.1.3 Strength analysis shall be supported in terms of member calibration by an applicable weight and measure of load, force, and deflection.

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 three full drops of the parachute assembly shall be conducted under ultimate load conditions to demonstrate the parachute strength. The maximum parachute opening force measured in the heaviest shall be the ultimate parachute opening load. A net parachute assembly must be used for each test. The weight of the parachute assembly included in the weight. Data acquisition shall be performed for each test and shall include recording of in-air load characteristics.

6.2.1.1 Force full drop of the parachute system shall be able to support the ultimate load demonstrated during the drop. No deformation or permanent damage to the parachute shall occur.

(1) Main attachment point shall be designed and tested for a given weight and altitude.

(2) Harness shall be designed to support the weight of the parachute.

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

(1) Parachute Strength Test with Aircraft in Flight. If the parachute is engaged and held attached to an aircraft in flight, the following parameters shall be applied:

Min. Test Weight = 1.25 Aircraft Maximum Gross Takeoff Weight

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

NOTE 1. In this section, the factor of safety considered applicable to the strength of the aircraft. However, it is not permissible to calculate the weight of the aircraft approach.

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

Min. Test Weight = Aircraft Maximum Gross Takeoff Weight

Min. Test Speed = Aircraft Maximum Inertial Parachute Deployment Speed

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

does not have an pitching oscillation tendency about the opening height, a safety factor of 1.1 shall be used. The effect of the maximum weight and speed shall be limited.

6.2.2 Rate of Descent—Rate of descent shall be controlled for all tests in 6.2.1. This data must be recorded for the analysis in the vehicle weight of the parachute. Descent rate data from parachute canopy shall be recorded to 1500 m (5000 ft) descent altitude and standard temperature. Aircraft manufacturer and parachute manufacturer shall coordinate the installation of the parachute.

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

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

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

6.3.1 Coordination—Aircraft and parachute manufacturer must coordinate and jointly approve the PIM for execution. Design configuration changes have an impact on the parachute installation, performance, operability, etc. The aircraft manufacturer and parachute manufacturer shall coordinate the implementation of changes before implementation. The changes shall be documented in the revised PIM.

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

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

6.3.4 Extraction Performance—Aircraft and parachute manufacturer must coordinate and hold the extraction device clear of the canopy and the canopy opening. The parachute system must be able to open and clear the canopy (line attachment point) without inhibiting or damaging the parachute deployment. While it is recognized that the aircraft configuration is not predictable in an emergency situation (force majeure, broken parachute deployment), all deployment must be able to provide a path of least resistance, minimizing the time to deployment.

6.3.5 Parachute Attachment to the Airframe—The parachute assembly must be attached to the primary structure of the aircraft in an airframe attachment manner that must be composed of a single attachment point of the attachment. The aircraft and parachute manufacturer must coordinate and agree on the parachute attachment method. The aircraft manufacturer shall be responsible for the following conditions:

6.3.5.1 Parachute deployment indicator, the load distribution of the aircraft, the location of the attachment point. The aircraft attachment point and

airframe attachment for each individual aircraft model
must comply with the maximum opening load mea-
sured in the attachment engineering described in 6.2.1. This load
shall contain the required safety factor of 1.5.

6.3.5.2 The harness and attachment must be
constructed in a manner that provides adequate
and landing airframe attachment capability of the airframe
structure to absorb the anticipated landing load and minimize
the probability of injury to the occupant.

6.3.5.3 The airframe attachment must be
formed in a manner that provides adequate
and attached in a manner that will provide sufficient impact
normal opening. It must be shown that the harness
will be sufficient to provide adequate functioning of the
attachment system.

6.3.5.4 The airframe attachment design must
minimize the potential for contact with the occupant. If contact
with the occupant is unavoidable during opening
operation, the attachment shall be designed so that the engine,
airframe attachment must be manufactured from
material having a reasonable likelihood of providing a contact
with the occupant.

6.3.6 *Activating Housing Routing*—The attachment
must be 6.4(d)-235.8(6.2354(doei. eial)-269(no6.3.5.)-46.5i)-269i f)64.8(f)60(i(l f)64.8 .)-3179(The)doei. eai f ame
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11.2.1 *Installation and Size of Placard or Label*—The identification placard shall be maintained in all the following placard or label in a manner deemed by the manufacturer and documented in 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 boldface type (see 11.2.2.1.1) and shall include the following graphic elements:

(1) *Danger Placard for Interior Parachute Installation*—A 7.62 cm (3 in.) minimum height placard or label shall be used. 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 remain visible from the exterior.

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

S3.1.1 The emergency package manufacturer shall establish in procedure and necessary to ensure each article produced conforms to the original engineering specification, as defined below:

S3.1.1.1 In procedure for a material, purchased item, and part and assemblies produced by supplier, including method, edoent, acceptable, liability of part and assembly shall cannot be completed in procedure for conformity and liability when delivered to the package manufacturer's facility.

S3.1.1.2 Production in procedure of individual part and complete assemblies, including the identification of an special manufacturer in procedure in order, the manufacturer, edocontrol

the procedure, and the national liability in procedure of the completed emergency package item.

S3.1.1.3 A nonconforming material item shall include documentation of part disposition decision and a edocontrol of rejected part.

S3.1.1.4 A item for informing company in procedure of a change in engineering drawing, specification, and liability 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.

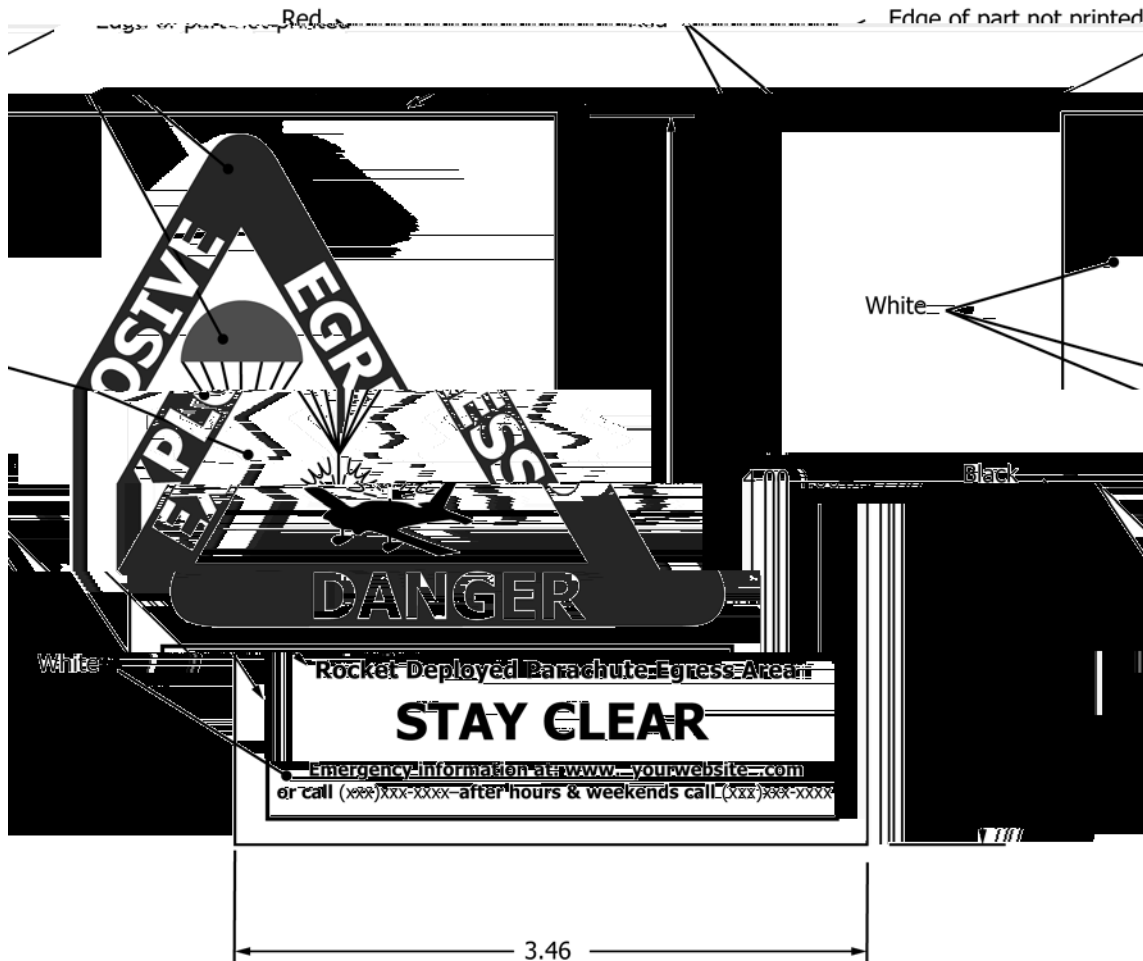


FIG. X1.1 Sample Danger Label

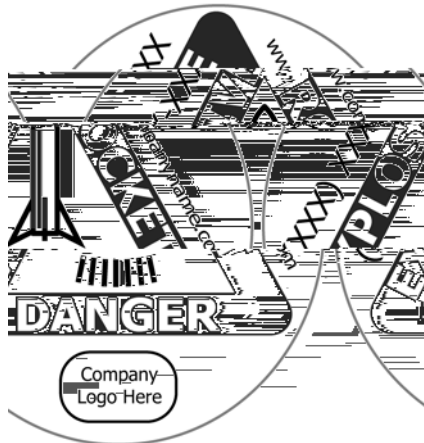


FIG. X1.2 Sample Identifying Label

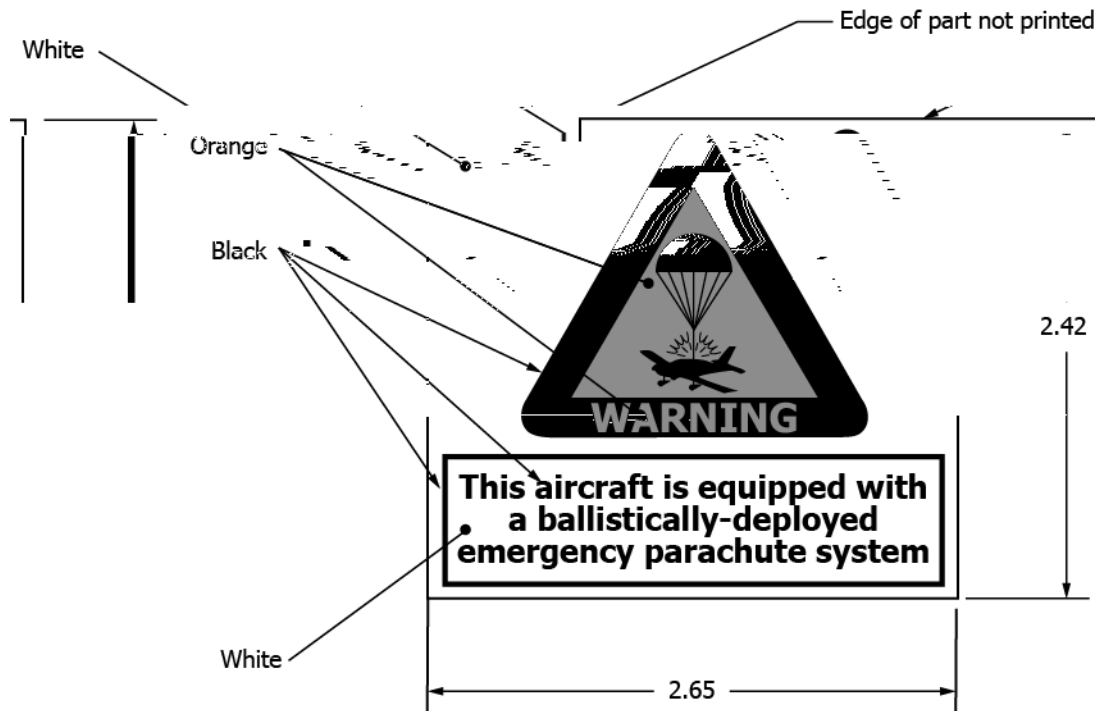


FIG. X1.3 Sample Label

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