

The primary attachments of the envelope to the basket, trapeze, or other means provided for carrying occupants must be designed so that failure is extremely remote or so that any single failure will not jeopardize safety of flight.

(d) In applying factors of safety, the effect of temperature, and other operating characteristics, or both, that may affect strength of the balloon must be accounted for.

(e) For design purposes, an occupant weight of at least 170 pounds must be assumed.

[Doc. No. 1437, 29 FR 8258, July 1, 1964, as amended by Amdt. 31-2, 30 FR 3377, Mar. 13, 1965]

#### § 31.27 Strength.

(a) The structure must be able to support limit loads without detrimental effect.

(b) The structure must be substantiated by test to be able to withstand the ultimate loads for at least three seconds without failure. For the envelope, a test of a representative part is acceptable, if the part tested is large enough to include critical seams, joints, and load attachment points and members.

(c) An ultimate free-fall drop test must be made of the basket, trapeze, or other place provided for occupants. The test must be made at design maximum weight on a horizontal surface, with the basket, trapeze, or other means provided for carrying occupants, striking the surface at angles of 0, 15, and 30 degrees. The weight may be distributed to simulate actual conditions. There must be no distortion or failure that is likely to cause serious injury to the occupants. A drop test height of 36 inches, or a drop test height that produces, upon impact, a velocity equal to the maximum vertical velocity determined in accordance with § 31.19, whichever is higher, must be used.

[Doc. No. 1437, 29 FR 8258, July 1, 1964, as amended by Amdt. 31-4, 45 FR 60179, Sept. 11, 1980]

### Subpart D—Design Construction

#### § 31.31 General.

The suitability of each design detail or part that bears on safety must be established by tests or analysis.

#### § 31.33 Materials.

(a) The suitability and durability of all materials must be established on the basis of experience or tests. Materials must conform to approved specifications that will ensure that they have the strength and other properties assumed in the design data.

(b) Material strength properties must be based on enough tests of material conforming to specifications so as to establish design values on a statistical basis.

#### § 31.35 Fabrication methods.

The methods of fabrication used must produce a consistently sound structure. If a fabrication process requires close control to reach this objective, the process must be performed in accordance with an approved process specification.

#### § 31.37 Fastenings.

Only approved bolts, pins, screws, and rivets may be used in the structure. Approved locking devices or methods must be used for all these bolts, pins, and screws, unless the installation is shown to be free from vibration. Self-locking nuts may not be used on bolts that are subject to rotation in service.

#### § 31.39 Protection.

Each part of the balloon must be suitably protected against deterioration or loss of strength in service due to weathering, corrosion, or other causes.

#### § 31.41 Inspection provisions.

There must be a means to allow close examination of each part that require repeated inspection and adjustment.