



Standard Specification for Structures¹

This standard is issued under the fixed designation F3114; 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 last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification addresses the structural requirements that apply to all portions of the airframe regardless of component, system, or structure.

1.2 This specification was originally conceived for small airplanes as defined in the F44 terminology standard but may find broader applicability. Use of the term aircraft throughout this specification is intended to allow the relevant CAA(s) to accept this standard as a means of compliance as they determine it to be appropriate, whether for small airplanes or for other types of aircraft.

1.3 The applicant for a design approval must seek individual guidance from their respective CAA body concerning the use of this standard as part of a certification plan. For information on which CAA regulatory bodies have accepted this standard (in whole or in part) as a means of compliance to their Small Airplane Airworthiness Rules (hereinafter referred to as “the Rules”), refer to ASTM F44 webpage (www.ASTM.org/COMMITTEE/F44.htm) which includes CAA website links.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

F3060 Terminology for Aircraft

F3061 Specification for Systems and Equipment in Small Aircraft

F3083 Specification for Emergency Conditions, Occupant Safety and Accommodations

F3093 Specification for Aeroelasticity Requirements

F3115 Specification for Structural Durability for Small Airplanes

F3116 Specification for Design Loads and Conditions

3. Terminology

3.1 See Terminology F3060 for more definitions and abbreviations.

4. Strength

4.1 *Loads*—Strength requirements are specified in terms of limit loads (the maximum loads to be expected in service) and ultimate loads (limit loads multiplied by prescribed factors of safety).

4.2 *Factor of Safety*—Unless otherwise provided, a factor of safety of 1.5 must be used.

4.3 Strength and Deformation:

4.3.1 The structure must be able to support limit loads without detrimental, permanent deformation. At any load up to limit loads, the deformation may not interfere with safe operation.

4.3.2 The structure must be able to support ultimate loads without failure for at least three seconds, except local failures or structural instabilities between limit and ultimate load are acceptable only if the structure can sustain the required ultimate load for at least three seconds. However when proof of strength is shown by dynamic tests simulating actual load conditions, the three second limit does not apply.

4.4 Proof of Structure:

4.4.1 Compliance with the strength and deformation requirements of 4.3 must be shown for each critical load condition. Structural analysis may be used only if the structure conforms to those for which experience has shown this method to be reliable. In other cases, substantiating load tests must be made. Dynamic tests, including structural flight tests, are acceptable if the design load conditions have been simulated.

4.4.2 Certain parts of the structure must be tested as specified.

4.5 *Vibration and Buffeting*—There must be no vibration or buffeting severe enough to result in structural damage, and each part of the airplane must be free from excessive vibration, under any appropriate speed and power conditions up to V_D/M_D , or V_{DF}/M_{DF} for turbojets.

¹ This specification is under the jurisdiction of ASTM Committee F44 on General Aviation Aircraft and is the direct responsibility of Subcommittee F44.30 on Structures.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.