

Update on ASTM standards

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Background

2009 –

Joint FAA and industry team Part 23 Certification Process Study (CPS) recommended reorganization of Part 23 based on performance and complexity rather than weight and propulsion types.

2013 –

US Congress passed the FAA Modernization and Reform Act of 2012, which required the FAA to assess the aircraft certification and approval process.

FAA starts on Part 23 NPRM

US Congress passes Small Airplane Revitalization Act of 2013, which required the FAA to issue a final rule revising the certification requirements for small airplanes.

Background

- FAA replaces prescriptive Part 23 (at amdt. 63) with a performance-based Part 23 (at amdt. 64 +).
- EASA mirrors with CS-23 Issue 5 (2017).
- New Part 23 uses more safety-objective/intent language
- 377 rules down to 71
- Almost all rules renumbered
- Prescriptive technical requirements/standards now not directly administrated by FAA => consensus standards (ASTM F39/F44)

Subpart B—FLIGHT

PERFORMANCE

§23.2100	Weight and center of gravity.
§23.2105	Performance data.
§23.2110	Stall speed.
§23.2115	Takeoff performance.
§23.2120	Climb requirements.
§23.2125	Climb information.
§23.2130	Landing.

FLIGHT CHARACTERISTICS

§23.2135	Controllability.
§23.2140	Trim.
§23.2145	Stability.
§23.2150	Stall characteristics, stall warning, and spins.
§23.2155	Ground and water handling characteristics.
§23.2160	Vibration, buffeting, and high-speed characteristics.
§23.2165	Performance and flight characteristics requirements for flight in icing conditions.

Subpart C—STRUCTURES

Big changes

- Replaced Normal/Utility/Acrobatic/Commuter category with –

Aircraft Certification Levels 1 - 4:

- (1) Level 1—for airplanes with a maximum seating configuration of 0 to 1 passengers.
- (2) Level 2—for airplanes with a maximum seating configuration of 2 to 6 passengers.
- (3) Level 3—for airplanes with a maximum seating configuration of 7 to 9 passengers.
- (4) Level 4—for airplanes with a maximum seating configuration of 10 to 19 passengers

and

Aircraft Performance Levels (Low speed and High speed):

- (1) Low speed—for airplanes with a VNO and VMO \leq 250 Knots Calibrated Airspeed (KCAS) and a MMO \leq 0.6.
- (2) High speed—for airplanes with a VNO or VMO $>$ 250 KCAS or a MMO $>$ 0.6.

Big changes

- Stalling – points system based on stall prevention/warning, envelope protection and stall spinning characteristics. The intent is to prevent LOC. E.g. AoA, FBW
- Stall speed or Minimum steady flight speed... stall speed/minimum steady flight speed could be 0.



ASTM Aerospace Committees

- **F37 Light Sport Aircraft (LSA) –**
34 standards approved, 3 in development
EASA/FAA/CAAs accepted or modified
- **F38 Unmanned Aircraft –**
Systems (UAS) 20 standards approved, 22 in development
- **F39 Aircraft Systems –**
10 standards approved, 10 in development
FAA/EASA accepted
- **F44 General Aircraft –**
38 standards approved, 29 in development
FAA/EASA accepted
- **F46 Aerospace Personnel –**
3 standards approved, 9 in development
- **F47 Commercial Spaceflight –**
2 standards approved, 5 in development

Other Related Committees

- B07 Light Metals and Alloys
- D02.J Aviation Fuels
- D30 Composites
- E05 Fire Standards
- E07 Nondestructive Testing
- E57 3D Imaging Systems
- F07 Aerospace and Aircraft
- F34 Rolling Element Bearings
- F42 Additive Manufacturing

Current Activities – F38

- Draft F38 Large UAS Design Standard (WK62679)
- Small Unmanned Aircraft System (sUAS) Parachutes – F3322



Current Activities – F39/44

- Guide for Design and Production of high capacity Energy Storage Systems – NEW
- Aircraft Electric Propulsion System Design & Installation – F3239
- Electric Propulsion Unit (EPU) Design – F3338
- Simplified Vehicle Operations (SVO) – NEW
- Distributed Electric Propulsion – F3239
- Powerplant Hazard Mitigation – F3066



Current Activities – F39/44

- Energy Shedding (Crashworthiness) – F3239
- Indirect Control Systems - NEW
- Inadvertent Icing – NEW
- Weight and CG – F3082
- Performance – F3179
- Handling Characteristics – F3179
- Aircraft Propeller System Installation – F3065
- Aircraft Propeller Control and Indication – F3064
- Maintenance Standards – NEW
- Acoustic Evaluation Practice – NEW
- Safety Assessment of Systems and Equipment – F3230
- Sensor Fusion – NEW
- Crew Interface – SVO Modifications/Co-ordination – F3117
- Specification for Low-Speed Flight Characteristics of Aircraft – F3180
- Emergency Conditions – F3083
- Bird Strike – F3114

- Guide for classifying alterations – F3361 – FAA accepted

Advantages



Advantages

- More agile rulemaking –
 - Reduced need for project-specific Special Conditions
 - No need for project-specific Equivalent Level of Safety
 - Rules are technology/configuration/propulsion “agnostic”
- Safety enhancing products are quicker to market –
 - Low speed envelope protection
 - Occupant protection

Disadvantages

Part 21 – Certification Procedures

Part 23 Airworthiness Standards: Normal Category Airplanes (up to amdt. 63)



Advisory Circulars



Consensus Standards (SAE/RTCA/ASTM)

Part 23 Airworthiness Standards: Normal Category Airplanes (amdt. 64 +)



ASTM F44 Standard Specifications



ASTM F44 Standard Practices

Advisory Circulars ?

Disadvantages

- **Certification basis –**
 - More upfront planning required before PSCP agreement
 - TCDS will only quote high-level FAR23
 - MOC (ASTM and further) effectively IP of OEM
 - Post-TC changes will be difficult
- **Stall characteristics –**
 - Not clear what credit was given at TC – post-TC changes will be difficult
 - Multiple Level (e.g. Level 1 and Level 3) Category aircraft have complex requirements e.g. Level 4 stall LESS conservative than Level 1 stall
- **Rapid changes –**
 - Difficult to determine intent of requirements if not involved with standard-making process
- **No “1-stop-shop” for airworthiness requirements –**
 - There are multiple standards organisations developing requirements (EUROCAE/RTCA/SAE)

Getting Involved

- **Membership – 75USD per year**
 - Gets you access to ASTM aviation standards (Volume 15) for a year (online and pdf download)
 - Allows full participation (voting/observer/input) to committees drafting and developing technical standards
 - Allows access to F37, F38, F39 and F44...
- **Face to face meetings –**
 - 2 per year, alternate between Europe (~April) and USA (~October)
 - Industry and Regulators
 - Can webex in
 - Normally a free full-day workshop/symposia ahead of ASTM F44 meetings:
 - eAircraft and eVTOL (October 2019)
 - eVTOL (April 2019)
 - Advanced Technology Certification (October 2018)
 - Crashworthiness/Occupant Safety (October 2017)

Thank you