



MOC VTOL Doors and Landing Gear

Prepared by EASA Panel 4 (FCS & Hydromechanical Systems)

Presented by Jonathan Hall CEng FIMechE

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Introduction – MOC VTOL Doors

- The vehicles are unpressurised (as also per Rotorcraft today).
- Covers retention of doors closed, not emergency egress.
- Crew or passenger door opening in-flight is considered unsafe, and seat belt (or equivalent) is not considered adequate mitigation.
- Thus means of retaining the door closed, and indicating the status, is introduced into the MOC.

Scope – MOC VTOL Doors

- Includes any external opening, - not limited to passenger or crew doors, depends on the criticality of the door being open in flight.
- MOC pertains to system aspects to latch the door and indicate status. Structural and emergency egress aspects are covered elsewhere.
- Specific reference to PRA (eg Bird Strike) is important, from service experience on other aircraft types.

Content – MOC VTOL Doors

- MOC-VTOL-Doors will provide:
 - Definitions.
 - A recognition of parts of the ASTM F3061 – 16a insofar as it pertains to Door latching and indication.
 - Additional guidance material to address other specificities

Requirements – MOC VTOL Doors

- Provides MOC material for the following SC-VTOL requirement:
 - VTOL.2250 Design and construction principles
 - (e) Doors, Canopies and Exits

„Doors, canopies, and exits must be protected against inadvertent opening in flight, unless shown to create no hazard, when opened in flight.”

Topics Covered – MOC VTOL Doors

- Definitions and Exemptions
 - To ensure the scope of what is a “Door” is clear.
- Latching
 - To prevent inadvertent or deliberate opening in flight, if this could be unsafe.
- Passenger, Ground/Flight crew awareness of the Door status
 - Directly on or by the door and on Flight Crew display
- Particular Risks
 - Especially Bird Strike, but not limited to.

Introduction – MOC VTOL Landing Gear

- Usually take-off and landing are vertical (except possible emergency landing).
 - With commensurate braking requirements
- Conventional wheels/tyres/brakes. Skid, ski, float etc out of scope.
- Ground resonance is addressed at aircraft-level.
- Any ground steering function is limited to low speed taxi
- No significant longitudinal engine thrust on ground.

Scope – MOC VTOL Landing Gear

- LG Extension/Retraction
- Braking System
- Ground Control (steering) System
- Wheels/Tyres/Brakes
- Warnings and Indications
- Structural Aspects of the LG (including drop test) are covered elsewhere.

Content – MOC VTOL Landing Gear

- MOC-VTOL- Landing Gear will provide:
 - Scope and Definitions.
 - Some limited reference to the ASTM F3061 – 16a as this is more applicable to the LG systems of fixed-wing aircraft whereby normal take-off and landing are running high-speed.
 - Additional guidance material to address other specificities

Requirements – MOC VTOL Landing Gear

- Provides MOC material for the following SC-VTOL requirement:
 - VTOL.2305 Landing Gear Systems

„VTOL.2305 Landing gear systems

(a) The landing gear must be designed to:

- (1) provide stable support and control to the aircraft during surface operation; and
- (2) account for likely system failures and likely operation environment (including anticipated limitation exceedances and emergency procedures).

(b) The aircraft must have a reliable means of stopping the aircraft with sufficient kinetic energy absorption to account for landing and take-off, in all approved conditions, and of holding the aircraft in position when parked.

(c) For aircraft that have a system that actuates the landing gear, there must be:

- (1) a positive means to keep the landing gear in the landing position; and
- (2) an alternative means available to bring the landing gear in the landing position when a non-deployed system position would be a hazard.”

Topics Covered – MOC VTOL Landing Gear (1/2)

- Definitions and Exemptions
 - Typically as stated in previous slides
- Absence of interaction between ground steering and extension/retraction
 - To prevent unwanted interference with the locus of the LG.
- Towing
 - To prevent damage to the LG and its systems, or ensure this is detected prior to take-off
- Qualification of Wheels and Tyres
 - Including wheel approval.
- Brake Stopping Capability
 - Assuming landings are vertical, except in case of emergency.

Topics Covered – MOC VTOL Landing Gear (2/2)

- Park Brake Capability
 - Unbalanced ground forces, emergency egress, 10 deg slope
- Brake wear indication
- Compatibility with airframe and other systems
 - Ground Resonance not in scope
- Indication of LG status
 - Including warning of LG not-extended
- Emergency Extension
 - For retractable LG not manually powered.

Conclusion / Next steps

- Release for public consultation
- Review Comments
- Publish Comment Response Document
- Publish MOC VTOL

Thank you for your attention

Feel free to submit your questions on our live event platform....

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