

Proposed Equivalent Safety Finding to CS27.921 amendment 3, dated 11 December 2012

Introductory Note:

The hereby-presented Equivalent Safety Finding has been classified as an important Equivalent Safety Finding and as such shall be subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency."

Statement of Issue:

CS-27 amendment 3 requires the rotor brake control to be guarded.

CS 27.921:

*If there is a means to control the rotation of the rotor drive system independently of the engine, any limitations on the use of that means must be specified, **and the control for that means must be guarded** to prevent inadvertent operation.*

AC 27.921

*b) This rule requires (1) that any limitations on the use of the rotor brake must be established, **and (2) that the control for the brake must be guarded** to prevent inadvertent operation.*

c.2) Control guard mechanisms to prevent inadvertent operation may be conventional. A cockpit evaluation of the guard should be conducted by flight test personnel to affirm the function of the guard, that markings, if any, are adequate, and that both latched and unlatched positions of the guard do not interfere with other cockpit functions.

Within some installations a rotor brake is introduced with a rotor brake control means (e.g. Brake handle) which is non-guarded.

Discussion:

In absence of guarding means, the Rotor brake control must demonstrate its robustness against inadvertent brake application.

EASA Safety Equivalency Demonstration proposal:

The applicant is requested to demonstrate that the rotor brake cannot be inadvertently activated with the rotor turning.

The assessment should encompass:

1. **Potential crew mistake:** The brake handle cannot be activated without deliberate action from the crew during normal and emergency procedures.
The assessment should consider proximity to other controls and identification means of the rotor brake control system (colour coding, labels, shape of the controls, direction of motion, visibility in day and night operations, etc)

2. **Inadvertent activation:** The brake handle cannot be activated as a result of physical interference between the crew and the brake control system.
The assessment should consider range of pilot height as per CS27.777 (b) as well as all potential equipment to be used for operation (headsets, helmets and Night Vision Goggles, etc).
3. **Creeping of the handle:** The brake handle cannot be activated due to vibration and/or flight loads. The assessment should demonstrate that:
- The minimum force and displacement angle required by the handle before applying any force on the brake pads is unquestionably noticeable.
 - The mechanical characteristics of the system such as the minimum force required to move the brake handle out of detent cannot degrade in service (environmental condition, operational use).
 - No inadvertent brake pad displacement which could lead to rotor brake engagement or fire initiation is permitted.
 - Maintenance mitigation means are identified and published in accordance with CS27.1529.
4. **Brake system status annunciation:** The status of the rotor brake must be available to the crew. The assessment should demonstrate that the rotor brake status is permanently available from the engine start up to the end of the flight.
Note: CS27.1151 requires a means to warn the crew if the rotor brake has not been completely released before take-off. As per AC27.1151 this means is intended to prevent inadvertent brake application in flight even under conditions of reasonably expected crew error and should provide a signal at any time the rotor brake is engaged.
EASA is in the opinion that considering that the rotor brake control is not guarded, the warning means should be available from engine start to the end of the flight.
Rotor brake engagement annunciation should occur before actual braking force is applied on the rotor brake disc and remain annunciated while braking force is applied to the rotor brake disc.

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