Equivalent Safety Finding on CS 25.1191(b) at amdt 13 : Firewalls

Applicable to Airbus A350

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:

The Rolls Royce Trent XWB-97 engine, powering the Airbus A350, incorporates small components (non-structural elements such as seals and caps) as part of the Intermediate Compressor and Core Designated Fire Zones boundaries that are qualified for a fire resistant (5 minutes) capability on ground.
At CS 25 level this is considered as a deviation from the current CS 25.1191 fire rule which requires a 15 minutes fire withstanding capability (whether in flight or on ground). For the in-flight condition, those components have been demonstrated as fireproof (15 minutes capability).

The CS 25.1191 (b) at amendment 13 stipulates :

(b) Each firewall and shroud must be –
(1) Fireproof;
(2) Constructed so that no hazardous quantity of air, fluid, or flame can pass from the compartment to other parts of the aeroplane;
(3) Constructed so that each opening is sealed with close fitting fireproof grommets, bushings, or firewall fittings; and
(4) Protected against corrosion.

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Proposal:

In lieu of showing that engine firewall components are fireproof for all airplane operating conditions, it may be acceptable to show that these components provide an equivalent level of safety to the fireproof requirement in § 25.1191(b)(1) by demonstrating for airplane ground operations:

1. Firewall structure where the component is installed is fireproof.

2. No air, fluid, or flame can pass from one designated fire zone into another designated fire zone.

3. Component burn-through (or other adverse effects of a fire) will not result in a hazard to the airplane or serious injury to crew, passengers or ground personnel.

4. Hazards of concern include, but are not limited to, events such as:

    a. Spread of fire around the firewall or loss of firewall structural integrity;

    b. Impingement of flame on the wing, potentially resulting in fuel tank breach or explosion;

    c. Spread of fire to flammable fluid sources outside the fire zone;

    d. Spread of fire to areas with systems wiring or flight control cables, rods, etc.;

    e. Engine ingestion of flammable fluid released from the fire zone, which could prevent safe engine shutdown;

    f. Overheating of critical structural elements outside the fire zone;

    g. Failure or significant deformation of the engine mounting system or pylon; and

    h. Fuselage penetration.

5. Compliance with CS 25.865 is maintained for engine mounts and other flight structures located in the designated fire zone after bum-through (or other adverse effects of a fire).

6. Component bum-through (or other adverse effects of a fire) will not compromise fire detection and extinguishing capability of the designated fire zone for a period of at least 5 minutes after the initiation of a detectable fire to allow for fire detection, extinguishing and safe engine shutdown.

Safety Equivalency Demonstration:

Detailed review has revealed only marginal areas where a possible low volume of migration of fluid or flame cannot theoretically be excluded. In the light of the compliance demonstration and total outcome of the analysis, this migration does therefore not increase the hazard when being equivalent in its fire withstanding capabilities as the other listed fire resistant seals and caps.