

# Comment Response Document (CRD) to Equivalent Safety Finding on CS-E 40 "Ratings", CS-E 60 "Provision for Instruments" and CS-E 740 "Endurance Tests" at Amdt 3

(Published for consultation on 21 March 2018)

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 23<sup>rd</sup> May 2018  
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<b>Comment from:</b>	The Boeing Company (18 April 2018)	<b>Comment#</b>	1
<b>Paragraph</b>	4a		
<b>Comment</b>	Any credit taken for maintenance action must be documented in the engine installation documents provided to the Airframer. The documents must require that the Airframer display appropriate indications to prevent dispatch and point to the required maintenance action to be accomplished.		
<b>EASA position</b>	Accepted		
<b>EASA response</b>	Although not essential for the description of the requirement EASA understands that the proposed text clarifies better the need to communicate the required maintenance actions to the Aircraft manufacturer.		
<b>Proposed Text (if applicable) ( added text in bold)</b>	<i>"a) The Engine manuals will be revised to incorporate evaluation criteria and appropriate maintenance action instructions after an APR/MPR use to ensure that the over-temperature transient will be limited to its use in one flight after which appropriate maintenance action will be taken. These maintenance instructions will be agreed with the EASA. <b>Instructions to perform maintenance action after APR/MPR use will be provided to the Aircraft manufacturer via engine installation manual as required by CS-E 20(d). The engine installation documents will enable the Aircraft manufacturer to display appropriate indications to prevent dispatch and point to the required maintenance action to be accomplished.</b>"</i>		

<b>Comment from:</b>	The Boeing Company (18 April 2018)	<b>Comment#</b>	2
<b>Paragraph</b>	4c		
<b>Comment</b>	The proposed ESF circumvents the typical certification of a transient EGT / ITT range detailed in CS-E 740(f)(4)(iii). Justification is provided by conducting at least two periods of continuous operation "at conditions above those to be noted in the Engine TCDS (time and temperature)", as being conservative demonstration of engine integrity for a single worst case exceedance. It is not clear from the text whether testing has actually been conducted for two blocks of two minutes at 12°C above the existing redline, or above the values that define the over-temperature range.		
<b>EASA position</b>	Partially Accepted		
<b>EASA response</b>	EASA agrees that the description of the required testing can be improved. The number of periods of 2 minutes that need to be tested has been modified to match the number that can be justified by the		

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	applicant. More clarity as per the proposed text by the Boeing Company is also added.
<b>Proposed Text (if applicable) ( added text in bold)</b>	“c) The applicant will show that the amount of testing above the certified MTO ITT limit is sufficiently extensive to conservatively demonstrate the durability of the turbine assembly <b>for a number of periods of 2 minutes. The applicant will show that this number of periods will not be exceeded in a single flight. At least this number of periods of continuous testing of at least 2 minutes each will be demonstrated by test at an ITT equal to or higher than the proposed transient ITT which is above the existing ITT redline noted in the Engine TCDS.</b> The condition of the Engine will be shown to be satisfactory for safe continued operation after the test.”

<b>Comment from:</b>	The Boeing Company (18 April 2018)	<b>Comment#</b>	3
<b>Paragraph</b>	4d		
<b>Comment</b>	<p>The text implies that exposure to the over-temperature would be limited to one occurrence per flight, followed by mandatory maintenance before next flight. The text does not explain how it was determined that multiple occurrences in a single flight would be either improbable, or that the engine is able to withstand them. Our suggested text would add that aspect.</p> <p>To claim credit for the maintenance mitigation after APR activation, the applicant needs to be sure the masking logic is active only when APR is used, rather than a generic 2-minute bloom masking. (If the logic is generic, it could mask a genuine engine problem during a non-APR takeoff, without triggering any maintenance action.)</p>		
<b>EASA position</b>	Partially Accepted		
<b>EASA response</b>	<p>Regarding the first part of the comment, the previous comment of this CRD partially answers this concern by linking the number of 2 minutes periods to those justified by the applicant for a single flight. Paragraph 4d has been slightly modified to align it with the new text on 4c.</p> <p>Regarding the second part of the comment, the “Statement of Issue” paragraph already defines the APR (or MPR) mode as a required condition for the activation of the ITT trimming logic. Therefore no change is considered necessary.</p>		
<b>Proposed Text (if applicable) ( added text in bold)</b>	“d) The lack of ITT exceedance display to the pilot is acceptable provided that the exposure is limited to one <b>flight</b> after which appropriate maintenance action will be taken, as ensured by point a) above, and successful testing is demonstrated as specified on point c).”		