



Deviation request #61 for an ETSO approval for CS-ETSO applicable to Airborne Multipurpose Electronic Displays (ETSO-113) complemented by SAE ARP4256A for Liquid Crystal Displays for Part 25 (Transport) Aircraft Consultation Paper

1. Introductory note

The hereby presented deviation request shall be subject to public consultation, in accordance with EASA Management Board Decision No 7-2004¹ products certification procedure dated 30 March 2004, 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.”

2. ETSO-C113#2 – Airborne Multipurpose Electronic Displays

Deviate from ETSO-C113 §3.1.1 which references SAE AS8034 (Airborne Multipurpose Electronic Displays) to adapt some further referenced requirements of SAE ARP4256A for Liquid Crystal Displays for Part 25 (Transport) Aircraft to meet human factors' analysis of a specific installation.

Requirement:

Deviate from SAE ARP4256A §4.2.2.2 for minimum luminance. Contrary to SAE ARP4256A §4.2.2.2 which requires the minimum luminance to be inferior or equal to 0.343 cd/m², it is not possible for this display to diminish the luminance value under 1.88cd/m².

Industry:

This display is to be installed as retrofit in order to implement additional navigation capabilities. Therefore, the required minimum and maximum values and uniformity of lighting across the range of brightness for this additional display have been specified by the customer. This specification has been assessed in the flight simulator with the aim to integrate this additional display smoothly into the existing cockpit. The dimming range for this additional display has to be as consistent as possible with all the other displays. The dimming is controlled externally. This dimming control adjusts the dimming of all the additional displays implementing the additional navigation capabilities. The values of the maximum and minimum luminance for the dimming have been fine tuned in the flight simulator. The hardware display itself is capable of complying with SAE ARP4256A §4.2.2.2 requirement for minimum luminance. The specific requirement is implemented via the software embedded into the display.

EASA:

The human eye does not perceive light linearly. It is desirable to have the lighting range adequate to cover the full range of lighting conditions that will be encountered². The lighting on different displays needs to be matched in a manner so that the eye perceives equal light levels on all the cockpit displays and controls as much as possible. It is

¹ Cf. EASA Web: http://www.easa.europa.eu/ws_prod/g/doc/About_EASA/Manag_Board/2004/mb_decision_0704.pdf

² Cf. AMC 25-11, paragraph 6.b(1). See also recommended Practices and Guidelines for Part 23 Cockpit/Flight deck design, Industry review draft, GAMA publications No. 10 as referenced in FAA AC23.1311-1B

accepted that one of the best ways to determine the optimum display performance and tradeoffs is to conduct actual measurement of ambient light for the particular cockpit configuration. Thus, the flight simulator assessment enabled to determine key characteristics of this additional display. Moreover, the flight simulator assessment confirmed that the relative brightness and dimming of this additional display matched those of the existing displays. It is recognised that the human factors integration criteria cannot be determined at the equipment level (ETSO). The overall human factors performance will have to be assessed in detail for the complete cockpit installation.

For all those reasons, we agree to the requested deviation. A limitation will be indicated in the Declaration of Design and Performance “for all installations requiring a minimum luminance inferior or equal to 1,88 cd/m²”. The limitation would not specifically address the specific installation since a modification of the software could get rid of the deviation or implement another one. With this design, such modification of the minimum luminance would be considered as a minor change for the ETSO (change of a parameter, optical measure of minimum luminance). The deviation will also be clearly indicated in the Declaration of Design and Performance.