# ETSO-C164a

## NIGHT VISION GOGGLES (NVG)

**1 Applicability**

This ETSO gives the requirements which Night Vision Goggle (NVG) equipment that is manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

**2 Procedures**

2.1 General

Applicable procedures are detailed in CS-ETSO, Subpart A.

2.2 Specific

None.

**3 Technical conditions**

3.1 Basic

3.1.1 Minimum performance standard

Standards set forth in the applicable sections of RTCA DO-275, 'Minimum Operational Performance Standards for Integrated Night Vision Imaging System Equipment', dated 12/10/2001, as modified by Appendix 1 to this ETSO.

Note that the equipment is portable (battery-powered only), and does not have an interface with aircraft systems. For details on batteries, see CS-ETSO, Subpart A, paragraph 2.8.

The NVG power source shall be designed to minimise the simultaneous loss of battery power to both tubes using one of the two following methods.

a. Provide separate and independent power sources to each tube.

b. Provide the user with a visual alert of pending power loss. The time available between the alert and the actual loss of power to the tubes must be at least 30 minutes. The performance of this alert requirement shall be demonstrated to not be affected when the NVGs are operated or stored within the environmental conditions for which the equipment is qualified.

3.1.2 Environmental standard

See CS-ETSO, Subpart A, paragraph 2.1.

3.1.3 Software

See CS-ETSO, Subpart A, paragraph 2.2.

3.1.4 Airborne electronic hardware

See CS-ETSO, Subpart A, paragraph 2.3.

3.2 Specific

3.2.1 Failure condition classification

See CS-ETSO, Subpart A, paragraph 2.4.

Failure of the function (i.e. a loss of image or an inaccurate image) defined in paragraph 3.1.1 of this ETSO has been determined to be not less than major condition.

3.2.2 Manuals

a. The installation and/or operational manual shall include operating instructions and equipment limitations sufficient to describe the equipment's operational capability. Include notes with the following statements.

- 'Night vision imaging systems (NVIS) are an aid to night VFR flight. NVIS systems consist of a set of night vision goggles (NVG) and NVG compatible aircraft lighting systems. NVG compatibility with aircraft lighting is not part of this ETSO authorisation and requires separate installation approval.'
- 'CAUTION: some light-emitting diode (LED) lighting systems that are clearly visible to the naked eye are not visible to NVGs, including some red LED obstruction lights.'

See EASA Safety Information Bulletin SIB 2019-04 for additional information.

b. The maintenance manual shall include instructions covering periodic maintenance, calibration and repair to ensure that the NVGs continue to meet the ETSO-approved design. Include recommended inspection intervals and service life, as appropriate. Inspection intervals must meet the minimum requirements of RTCA DO-275.

## 4 Marking

4.1 General

Marking as detailed in CS-ETSO, Subpart A, paragraph 1.2.

4.2 Specific

If the NVG ETSO article is compatible with a Heads-Up Display (HUD), mark it with 'Modified Class B' when it implements a modified Class B filter designed to allow its use with a HUD.

## 5 Availability of referenced document

See CS-ETSO, Subpart A, paragraph 3.

[Amdt ETSO/8]
[Amdt ETSO/18]

# Appendix 1 to ETSO-C164a — EASA MODIFICATIONS TO RTCA DO-275 MINIMUM OPERATIONAL PERFORMANCE STANDARDS FOR INTEGRATED NIGHT VISION IMAGING SYSTEM EQUIPMENT

The following sections of RTCA DO-275 are updated with these revised standards:

**[DO-275] 2.2.1.1 System Resolution**

The system resolution shall be a minimum of 1.3 cycles per milliradian (cy/mrad) on-axis under optimum light conditions using a nominal 100% contrast dark bar on white background resolution target chart. At 14 degrees off-axis, the resolution shall be not less than 0.81 cycles per milliradian. If each monocular has a variable focus objective lens, then it shall focus through infinity, and at the through-infinity mechanical stop shall maintain an on-axis resolution of not less than 0.49 cycles per milliradian. If each monocular has a fixed focus objective lens, then 1.0 cycle per milliradian will be maintained at infinity.

**[DO-275] 2.2.1.2 System Luminance Gain**

At $1 \times 10^{-4}$ footlamberts input light level, the luminance gain shall not be less than 4,000 footlamberts (fL) per footlambert. The output luminance averaged across the full field of view shall not exceed 4 footlamberts. Output brightness uniformity shall be such that the ratio of the maximum to minimum brightness variation over the useful image area shall not exceed 3:1. The ratio of luminance gain between any two channels shall not exceed 1.5.

**[DO-275] 2.2.1.8 Image Cosmetic Defects (Table 2-1 Spot Criteria)**

| Diameter of Spots [inches] | Quantity of spots allowed within 0.22 inch diameter circle | Quantity of spots allowed within annulus bounded by 2 circles 0.22 and 0.58 inch diameter circle | Quantity of spots allowed within the annulus bounded by 2 circles 0.58 inch diameter circle and total screen diameter |
|---|---|---|---|
| > 0.009 | 0 | 0 | 0 |
| 0.006 - 0.009 | 0 | 1 | 1 |
| 0.003 - 0.006 | 0 | 2 | 2 |

Note: *The circles on the image screen, defined in the table above, shall be concentric and centred on the optical axis of the assembly. Spots smaller than* .003 *inches shall be ignored.*

**[DO-275] 2.2.1.10 Halo Size**

Halos shall be no greater than 1.0 mm in diameter at the output of the image intensifier tube.

**[DO-275] 5.2.1 Description of Maintenance Performed**

Change second paragraph to read: '… preventative maintenance (Pilot/ Crew Member performed preventative maintenance exempt from record keeping except for Removing or Installing Helmet or Headband Mounting Assembly), and alteration …'.

**[DO-275] 5.4 (Table 5-1 Authorised Preventative Maintenance Allocations)**

| **Type** | **Preventive Maintenance** | | | | | |
|---|---|---|---|---|---|---|
| | Functional / Pre-flight Check | Battery Replacement | Cleaning with no disassembly required | Cleaning of Powered Battery Contacts | Removing or Installing Helmet or Headband Mounting Assembly | Minor Adjustments for fit, focus or other adjustments required to complete functional check |
| *Pilot/ Crew Member | Yes | Yes | Yes | Yes | Yes | Yes |
| Airframe Mechanic | Yes | Yes | Yes | Yes | Yes | Yes |
| Repair Station | Yes | Yes | Yes | Yes | Yes | Yes |

([1]) Preventative maintenance performed by a pilot / crew member is exempt from the record-keeping requirement of Section 5.2.1 except for removing or installing Helmet or Headband Mounting Assembly.

**[DO-275] 5.4.1 (Table 5-2 Additional Maintenance Allocations)**

Note: In the table, change 'Pilot' to read 'Pilot /Crew Member'.

[Amdt ETSO/18]