

# European Aviation Safety Agency

## European Technical Standard Order (ETSO)

Subject: AIRBORNE NAVIGATION SENSORS USING THE GLOBAL POSITIONING SYSTEM AUGMENTED BY THE SATELLITE BASED AUGMENTATION SYSTEM

### 1 – Applicability

This ETSO gives the requirements which new models of airborne navigation sensors using the Global Positioning System (GPS) augmented by the Satellite Based Augmentation System (SBAS) that are manufactured on or after the date of this ETSO must meet in order to be identified with the applicable ETSO marking.

The standards of this ETSO apply to equipment intended to provide position information to a navigation management unit that outputs deviation commands referenced to a desired flight path, Pilots or autopilots will use these deviations to guide the aircraft.

### 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 for functional equipment Class Beta in RTCA document DO-229D, Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment dated December 13, 2006, Section 2, except as modified in **Appendix 1** of this ETSO.

Class Beta equipment is defined in DO-229D, Section 1.4.

##### 3.1.2 - Environmental Standard

See CS-ETSO Subpart A paragraph 2.1

##### 3.1.3 - Computer Software

See CS-ETSO Subpart A paragraph 2.2

##### 3.1.4 Electronic Hardware Qualification.

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 defined in paragraph 3.1.1 of this ETSO is a:

- *Major* failure condition for loss of function and malfunction of en route, terminal, approach lateral navigation (LNAV), and approach LNAV/vertical navigation (VNAV) position data,
- *Major* failure condition for loss of function of approach localiser performance without vertical guidance (LP), and approach localiser performance with vertical guidance (LPV) position data, and
- *Hazardous* failure condition for malfunction of approach (LP and LPV) position data.

3.3. - Functional qualifications.

None

#### **4 - Marking**

4.1 - General

Marking is detailed in CS-ETSO Subpart A paragraph 1.2

4.2 – Specific

At least one major component must be permanently and legibly marked with the operational equipment class as defined in Section 1.4.2 of RTCA document DO-229D (e.g., Class 2). A marking of Class 4 indicates compliance to Delta-4 requirements. The functional equipment class defined in Section 1.4.1 of RTCA document DO-229D (e.g. Gamma, Delta) is not required to be marked.

It is sufficient to declare the proper functional equipment class in the DDP.

#### **5 - Availability of Referenced Document**

See CS-ETSO Subpart A paragraph 3

APPENDIX 1

MPS for airborne navigation sensors using GPS augmented by SBAS

1. This appendix prescribes EASA modifications to the MPS for functional equipment Class Beta in RTCA document DO-229D, Section 2. Operational Class 3 equipment already complies with the MPS changes below. These MPS changes apply for operational Class 1 or Class 2 equipment only.

a Section 2.5

Section 2.5.6.1, Scenario #1, Step 3)

Change step 3) to read: "Broadband external interference noise ( $I_{Ext, Test}$ ) of spectral density equal to -170.5 dBm/Hz at the antenna port."

Section 2.5.6.1, Scenario #2, Step 4)

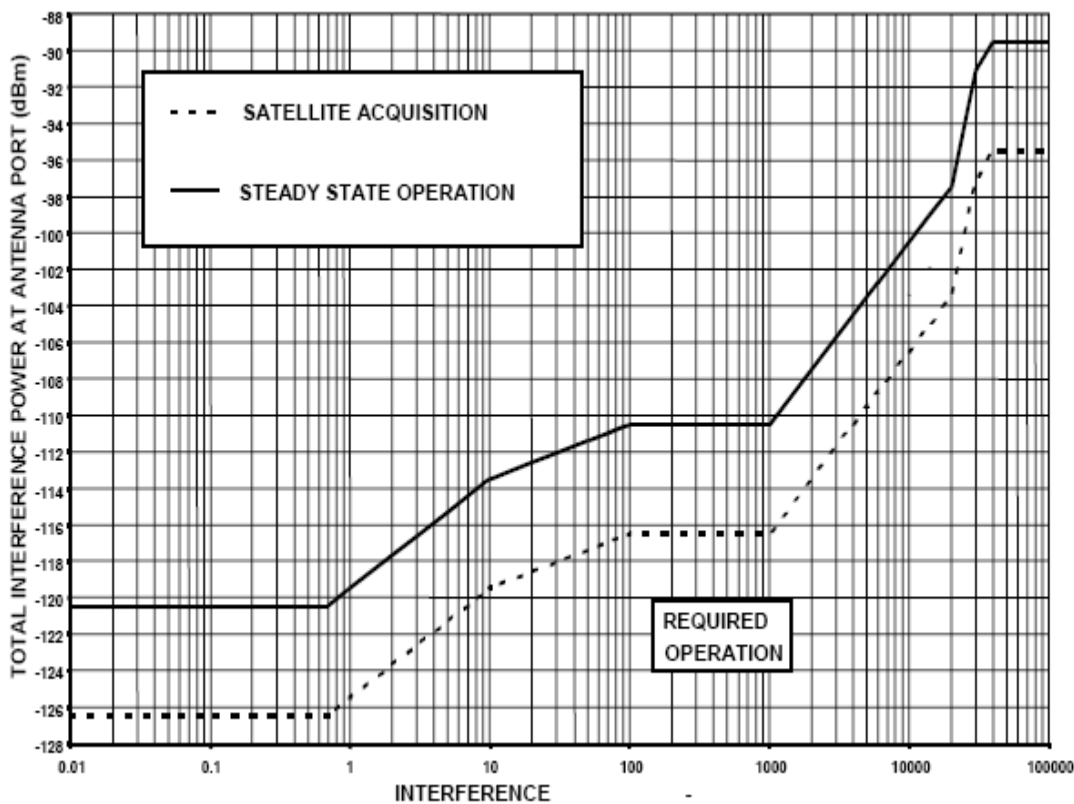
Change step 4) to read: "Broadband external interference noise ( $I_{Ext, Test}$ ) of spectral density equal to -170.5 dBm/Hz at the antenna port."

Section 2.5.8.2, Requirement 1), Item a)

Change item a) to read: "The broadband external interference noise ( $I_{Ext, Test}$ ) of spectral density equal to -170.5 dBm/Hz at the antenna port."

b Appendix C, Figure C-2, In-Band and Near-Band Interference Environments

Replace Figure C-2 with the following:



**c Appendix C, Section C.2.2**

Change the first paragraph to read:

The baseline in-band and near-band interference environments apply to steady-state operation. For initial acquisition of the GPS and SBAS signals prior to steady-state navigation, the in-band and near-band interference levels are 6 dB less than those for steady-state operation. The interference bandwidth is the 3 dB bandwidth.

Delete the last paragraph in the section (as shown below).

The in-band and near-band interference levels for the LNAV approach steady-state navigation operations are 3 dB less than those for LNAV/VNAV, LP, and LPV approach steady-state navigation operations. For terminal area and en route steady-state navigation operations, and for initial acquisition of the GPS and WAAS signals prior to steady-state navigation for all flight phase operations, the in-band and near-band interference levels are 6 dB less than those for LNAV, LNAV/VNAV, and LPV approach steady-state navigation operations.