

Regulation No. XXX

- UNIFORM PROVISIONS CONCERNING THE APPROVAL OF**
- I EMERGENCY CALL DEVICES (AECD)**
 - II VEHICLES WITH REGARD TO THE INSTALLATION OF AN AECD OF AN APPROVED TYPE**
 - III VEHICLES WITH REGARD TO THEIR AECS**

1. Scope :

This Regulation applies to:

- (a) Part I: the AECDs which are intended to be fitted to vehicles of categories M1 and N1¹;
- (b) Part II: the installation on vehicles of categories M1 and N1¹ of AECDs which have been approved to Part I of this regulation.
- (c) Part III: vehicles of categories M1 and N1¹ with regard to their AECS or equipped with an AECD which has not been separately approved according to Part I of this Regulation.

Part I: Emergency Call Devices (AECD)

2. Definition:

- 2.1 “*AECD (Accident Emergency Call Device)*” means a device or a set of devices that at least:
 - generates a communication toward emergency services if a vehicle suffers a serious road accident and provides two-way voice communication on existing mobile telephone communication networks; and
 - has the ability to provide the vehicle location using signals from (an) existing global navigation system(s).
 - 2.2 “*Global Navigation Satellite System receiver*” (“*GNSS receiver*”) means a component of an AECD designed to determine time, the coordinates
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and direction of the vehicle using signals from global navigation satellite systems; the GNSS receiver can be included in the AECD or in another external control unit, as long as the AECD ensure its ability to provide the vehicle location in case of an event.

- 2.3 “Satellite-Based Augmentation System” (SBAS) is a system ensuring the correction of local errors of GNSS systems due to interferences via a network of ground-based stations. (ex: EGNOS, WASS, QZSS)
- 2.4 “*Communications module*” means a component of an AECD designed for voice communication and to transmit data about an accident using terrestrial mobile telephone communications networks;
- 2.5 “*User interface*” means a component or function of an AECD designed to allow the user to interact with the device, including by receiving visual information, obtaining visual information and introducing control commands;
- 2.6 “*Control module*” means a component of an AECD designed to ensure the combined functioning of all components of the AECD;
- 2.7 “*Type of AECD*” means devices that do not differ in such essential respects as:
- (a) The manufacturer's trade name or mark;
 - (b) Their construction;
- 2.8 “*Data exchange protocol*” means the set of rules and agreements that define the content, format, time parameters, sequence and error checks in messages exchanged between an AECD and the devices of Public Service Answering Party (PSAP).
- 2.9 “*Public/Private Safety Answering Point (PSAP)*” means a call center responsible for answering calls to an emergency telephone call. It can be of two types
- Public Safety Answering Point managed by the public services of a Contracting Party to the 58 Agreement;
 - Private Safety Answering Point managed by a private company.

3. Application for approval

- 3.1 The application for approval of a type of AECD shall be submitted by the holder of the trade name or mark or by his duly accredited representative.
- 3.2 A model of the information document is given in Annex 1.
- 3.3 For each type of AECD, the application shall be accompanied by samples of complete sets of AECDs in sufficient quantities for the tests prescribed by this

regulation. Additional specimens may be called for at the request of the technical service responsible for conducting the test.

4. Markings of AECD

- 4.1 The samples of AECD submitted for approval shall bear the trade name or mark of the manufacturer. This marking shall figure at least on the unit or units containing the navigation system receiver and communications module. It shall be clearly legible and be indelible.
- 4.2 The unit or units containing the navigation system receiver and communications module shall possess a space large enough to accommodate the approval mark. This space shall be shown on the drawings referred to in Annex 1.

5. Approval

- 5.1 If the samples submitted for approval meet the requirements of paragraph 6 of this Regulation, approval of the pertinent type of AECD shall be granted.
- 5.2 An approval number shall be assigned to each type approved. The first two digits (at present 00) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another type of AECD.
- 5.3 Notice of approval or of refusal, or of extension or withdrawal of approval, or of production definitively discontinued of a type of AECD pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in annex 3 to this Regulation.
- 5.4 There shall be affixed, conspicuously and in the space referred to in paragraph 4.2 above, to every AECD conforming to a type approved under this Regulation, in addition to the mark prescribed in paragraph 4.1., an international approval mark conforming to the model given in annex 5, consisting of:
 - 5.4.1 A circle surrounding the letter “E” followed by the distinguishing number of the country which has granted approval;²

- 5.4.2 The number of this Regulation, followed by the letter “R”, a dash and the approval number to the right of the circle prescribed in paragraph 5.4.1.
- 5.5 The approval mark shall be clearly legible and be indelible.

6. Requirements

6.1 EMC

The effectiveness of AECD shall not be adversely affected by magnetic or electrical fields. This requirement shall be met by ensuring compliance with Regulation No. 10.05.

6.2 Reception and processing of navigation signals

The testing procedures in Annex A can be performed either on the AECD unit including post processing ability or directly on the GNSS chipset.

6.3 Mean of access to mobile networks

The AECD shall be fitted with a non-removable— hardware allowing to get registered/authenticated and to use the mobile network

6.4 Base function and operation principles

The AECD shall first try to send data and then try to establish voice connection with the PSAP.

If the sending of data failed then the AECD should retry sending the data.

If the AECD has successfully sent the data and then loose the voice connection, it should then try to reestablish voice connection.

In case it was not possible to establish voice connection and/or send data using mobile communication networks, the AECD shall store the data in non-volatile memory and attempt re-transmission of the data and establish voice connection until PSAP ends communication.

Whenever, a third party emergency system is installed in the vehicle compliant with regional or national standards for private eCall [e.g. for EU CEN 16102:2011 standard “Operating requirements for third party support” (TPS eCall)], the driver has the free choice to use this system. It has to be ensured that there is only one system active at a time.

- 6.5 AECD warning signal
Clear visual and/or audible information shall be provided regarding the status of the connection when the AECD is automatically or manually activated. In addition, visual and/or audible information shall be provided when the AECD is not functioning properly.
- 6.6 Power supply
The AECD shall be able to operate autonomously for a period of first not less than 5 minutes in voice communication mode followed by 20 minutes in call-back mode and finally not less than 5 minutes in voice communication mode.
This capability is tested for a new AECD, in following conditions:
- Ambient air temperature – $(25 \pm 10)^{\circ}\text{C}$;
- Relative humidity - from 45% to 80 %;
- Bar pressure - from 84,0 to 106,7 kPa (630 - 800 mHg.).
- 6.7 Resistance to impact
The AECD shall remain operational after frontal impact. This shall be demonstrated according to Annex B.
8. **Modification and extension of approval of the type of AECD**
9. **Conformity of production**
10. **Penalties for non-conformity of production**
11. **Production definitively discontinued**
12. **Names and addresses of technical services responsible for conducting approval tests, and of administrative departments**

Annex A

GNSS test scenarios for eCall IVS

1 Test objectives

Five main test objectives have been identified:

1. Position accuracy
2. Receiver sensitivity
3. Time to first fix
4. Reacquisition time (hot fix)

The following test descriptions are based on the 5 above categories. For each category a set of test is defined, using different settings.

The objectives of the test description are to assess the minimum intrinsic receiver performances to be used in the context of Pan EU eCall.

2 Test conditions

2.1 Antenna

This document provides test descriptions to assess the minimum level of performances for the GNSS receiver.

2.2 Testing environment

Testing in a simulation environment is necessary to ensure reproducible test processes.

2.3 Constellation

The test description are intended to be constellation agnostic.

2.4 Signal conditions

The two following different signal conditions are retained for the test scenarios.

2.4.1 Open Sky test conditions

Table 1: Open sky definition

Zone	Elevation range (deg)	Azimuth range (deg)
A	0 – 5	0 – 360
Background	Area out of Zone A	

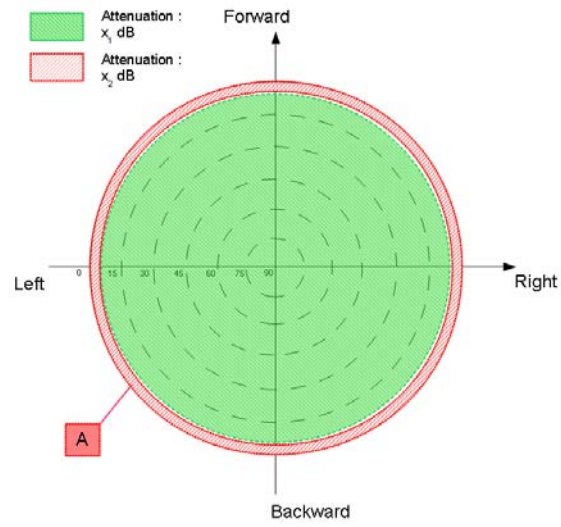


Figure 1: Open Sky plot.

Attenuation:

	0 dB
A	$-\infty$ dB

2.4.2 Urban Canyon test conditions

Table 2: Urban canyon definition

Zone	Elevation range (deg)	Azimuth range (deg)
A	0 - 5	0 - 360
B	5 - 30	210 - 330
C	5 - 30	30 - 150
Background	Area out of Zones A, B, C	

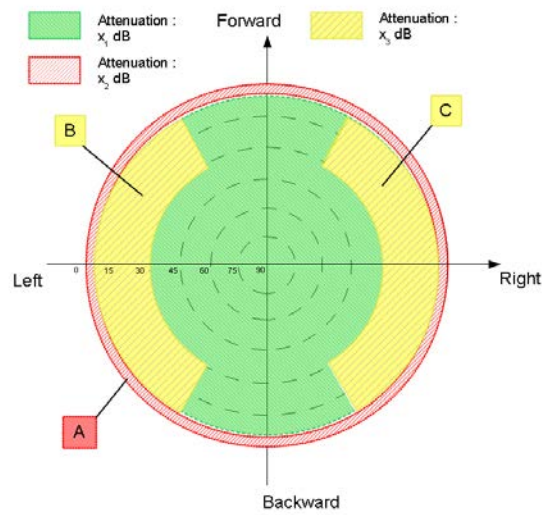


Figure 2: Urban canyon plot.

Attenuation:

	0 dB
B	-40 dB
C	-40 dB
A	$-\infty$ dB

3 Test scenarios

3.1 Position accuracy group

Test#	1.1
Objective	Horizontal accuracy <15 m - static
Error conditions	95% of measurement <15m and always <100m
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	0 km/h (mandatory: worse condition)
Test conditions	Test loop – 1 hours – 1 test/s Without SBAS

Test#	1.2
Objective	Horizontal accuracy <15 m - dynamic
Error conditions	95% of measurement <15m and always <100m
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	90 km/h
Test conditions	Test loop – 1 hours – 1 test/s Without SBAS

Test#	1.3
Objective	Horizontal accuracy <40 m –urban canyon
Error conditions	95% of measurement < 40 m
Signal conditions	Urban Canyon (see 2.4.2)
Speed conditions	0 km/h (mandatory: worse condition)
Test conditions	Test loop – 1 hours – 1 test/s Without SBAS

Test#	1.4
Objective	Heading accuracy <15°
Error conditions	95% of measurement
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	50 km/h
Test conditions	Test loop – 1 hours – 1 test/s Without SBAS

3.2 Receiver sensitivity group

Test#	2.1
Objective	Receiver sensitivity < - 144dBm – cold start
Error conditions	(To be proposed later)
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	0 km/h (mandatory: worse condition)
Test conditions	a. Test ramp +1 dB decrement starting -130 dBm b. At each step acquisition to be met < 300s until -144dBm c. Cold start at each step

Test#	2.2
Objective	Receiver sensitivity < - 155dBm – tracking
Error conditions	(To be proposed later)
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	0 km/h (mandatory: worse condition)
Test conditions	<ul style="list-style-type: none"> a. Test ramp +1 dB decrement starting -140 dBm b. At each step acquisition to be met < 300s until -155dBm c. No cold start – continuous test.

Test#	2.3
Objective	Receiver sensitivity < - 150dBm – reacquisition
Error conditions	(To be proposed later)
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	0 km/h (mandatory: worse condition)
Test conditions	<ul style="list-style-type: none"> a. Test ramp +1 dB decrement starting -130 dBm b. At each step acquisition to be met < 300s until -144dBm c. Reacquisition (hot start) at each step
Notes	

3.3 Time to first fix group

Test#	4.1
Objective	< 60s to the first fix – cold start
Error conditions	95% of measurement <15m and always <100m
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	0 km/h (mandatory: worse condition)
Test conditions	Signal level: -130 dBm - Test repeated 10 times with 100 % success

Test#	4.2
Objective	< 300s to the first fix – cold start
Error conditions	95% of measurement <15m and always <100m
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	0 km/h (mandatory: worse condition)
Test conditions	Signal level: -140 dBm - Test repeated 10 times with 100 % success

3.4 Reacquisition time group

Test#	5.1
Objective	< 20s to reacquisition from: <ul style="list-style-type: none"> a. Having previously acquired a position b. Having interrupted the GNSS signal during at least 60 s c. Having moved towards a newer position of > 1000 m
Error conditions	95% of measurement <15m and always <100m
Signal conditions	Open Sky (see 2.4.1)
Speed conditions	0 km/h (mandatory: worse condition)
Test conditions	Signal level: -130 dBm - Test repeated 10 times with 100 % success

Annex B

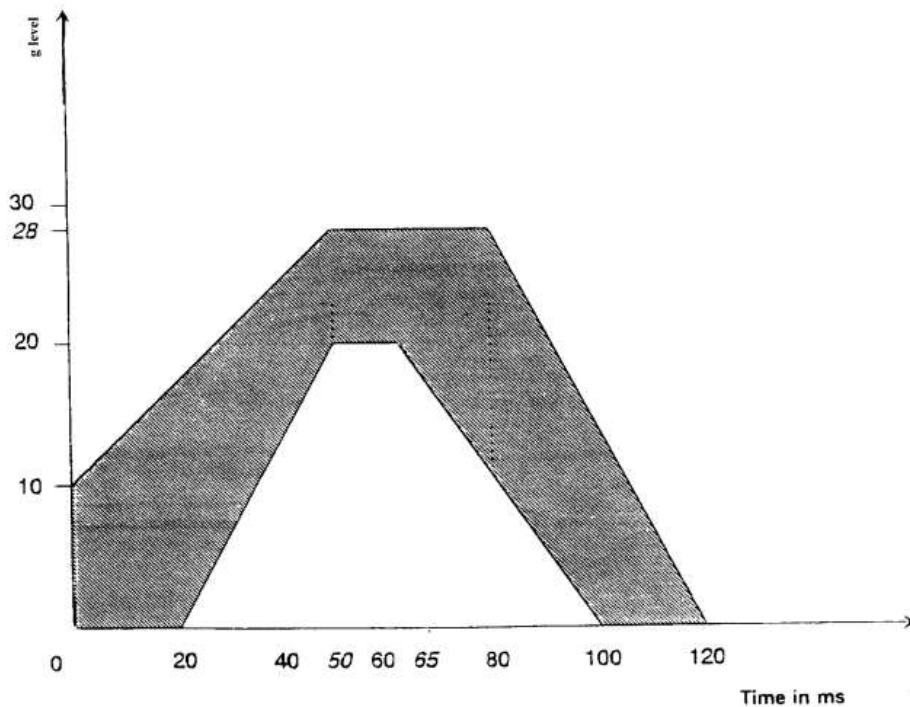
Frontal impact demonstration test for AECD

1. Preparation for the test

- 1.1 The main components of AECD shall be rigidly fasten on the test cart by means of the same elements of fastening which will be used for installation of the main components of the AECD on the vehicle, and this fastening shouldn't increase strength of the specified components.
- 1.2 Deceleration of the test cart is defined with the help of system measurement for frequency characteristics with a class 60, corresponding to characteristics of the international ISO 6487 (2002) standard.

2. Dynamic test

- 2.1. After installation of the main components of the AECD on the test cart, a deceleration is imparted so that the curve could not go beyond the schedule given in the figure below, and the general change of speed ΔV shall be 50 ± 2 km/h.



SLED DECELERATION CORRIDOR AS A FUNCTION OF TIME

(Frontal impact)

3. AECD operational requirements.

Test conditions

Function tests of the AECD are conducted in normal climate conditions with a new AECD:

- Ambient air temperature – $(25 \pm 10)^{\circ}\text{C}$;
- Relative humidity - from 45% to 80 %;
- Bar pressure - from 84,0 to 106,7 kPa (630 - 800 mHg.).

AECD shall be operational after the dynamic test. The AECD functions operation shall be verified as follows;

- 3.1. The main components shall have no visible damage which causes their disability
- 3.2. Communication with GNSS, mobile networks and PSAP shall be verified after the proper electric connections by using electric cables among the main components, other components and test equipment, if necessary. At the request of the applicant, this verification may be performed either:
 - 3.2.1. by using the test methods described in chapter 4 and 5 of this annex or
 - 3.2.2. by functional check according to the chapter 6 of this annex
- 3.3 In both cases above, simulated GNSS, simulated mobile network and/or PSAP simulator may be used.
- 4. Test method for navigation solution
 - 4.1. Verification of navigation solution using actual GNSS signal.
In case of failure in the actual GNSS signal, test method of paragraph 2 below shall be used.
 - 4.2. Verification of navigation solution using simulated GNSS signal
- 5. Test method for emergency call
 - 5.1 Verification of emergency call and voice communication using actual mobile network
In case of failure in the actual mobile network, test method of paragraph 2 below shall be used.
 - 5.2. Verification of emergency call and voice communication using simulated mobile network
- 6. Test method for verifying the on-board AECD via functional check
 - 6.1. The functional check of the in-vehicle system shall be performed via one out of the four methods laid down in paragraphs 2. to 5. below.

- 6.2. Verification of functional state of the in-vehicle system by using HMI (visual control of tell-tale)

When the in-vehicle AECD is capable to check and diagnose all devices belonging to the AECD scope (Antennas, power supply, Mic, speaker, ...), and discriminate a network failure from an internal failure of the AECD Unit the communication with GNSS and mobile networks and PSAP is deemed to be compliant if no failure warning is indicated by the HMI.

- 6.3. Verification of functional state of the in-vehicle system by internal memory checking

When the AECS Unit is powered (e.g. by main or auxiliary battery), or after AECD Unit disassembly and test bench analysis, and the in-vehicle AECD is capable to check and diagnose all devices belonging to the AECD scope (Antennas, power supply, Mic, speaker, ...), and memorize all steps of an emergency call transaction (e.g.: trigger signal reception, construction of MSD, etc.) the communication with GNSS and mobile networks and PSAP is deemed to be compliant if the AECD unit has memorized the correct emergency call transaction, and no failure is present in memory.

- 6.4. Verification of functional state of the in-vehicle system y separated functional test

When the in-vehicle AECD is capable to memorize all steps of an emergency call transaction (e.g.: trigger signal reception, construction of MSD, etc.), and all devices belonging to the AECD scope are removable and their connectors are accessible (for electrical testing), for the visual control or/and for functional tests the communication with GNSS and mobile networks and PSAP is deemed to be compliant if the AECD unit has memorized the correct emergency call transaction, if all electrical tests are satisfactory and if all devices belonging to the AECD scope are in good condition and functioning correctly.

- 6.5. Verification of functional state of the in-vehicle system by functional transmission test with wired procedure

When the mobile phone antenna connector is accessible, and all other parts (wire) between this antenna and the AECD Unit are accessible/removable for the visual control or/and for functional tests the communication with GNSS and mobile networks and PSAP is deemed to be compliant if the emergency call transaction is correct (with PSAP simulator) and if all the electrical tests between antenna and the AECD unit are satisfactory.