

## 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**

### Contents

#### **Preliminary comments from the Secretary of GRSG informal group on AECS**

1. This document was produced by the informal group Secretary as a working document, for serving as a basis for discussions within the GRSG informal group on AECS. It is expected to evolve and improve along the discussions that will take place during the meetings of the informal group.
2. This document is an attempt to show the status of the discussions after the 9<sup>th</sup> meeting of the informal group. The changes compared to AECS-02-02-Rev.4 (status after 8<sup>th</sup> meeting) are indicated in bold and strikethrough characters, save for Part III for ease of reading and because it was not discussed at AECS-09.
3. Basis of the document is AECS-02-02-r4 (Secretary), AECS-09-02 (OICA, on behalf of preparatory task-force), AECS-09-03 (J), AECS-09-07 (GSA) and AECS-09-05 (RUS – European Commission)
4. Annexes 9 (Test method for emergency call) and Annex 10 (functional check of AECD) reflect the proposals from Industry per the document AECS-09-02. These proposals were not accepted as such by AECS-09, the group did not reach any common understanding of the adequate provision for these items.
5. Some editorial or secondary amendments are indicated (annexes 1 to 5, annex 8) while they were not discussed in the meeting. Annex 8 is also adapted according to the revision proposed by GSA per document AECS-09-07.

## 1. Scope

1.1 This Regulation applies to:

- (a) Part I: the approval of Accident Emergency Call Devices which are intended to be fitted to vehicles of categories M1 and N1<sup>1</sup>;
- (b) Part II: the approval of vehicles of categories M1 and N1<sup>1</sup> with regard to the installation of an Accident Emergency Call Device which has been approved to Part I of this regulation.
- (c) Part III: the approval of vehicles of categories M1 and N1<sup>1</sup> with regard to their Accident Emergency Call System or with regard to the installation of an Accident Emergency Call Device which has not been separately approved according to Part I of this Regulation.

1.2 It does not apply to:

- (a) Communication module functionality and communication antenna functionality, unless otherwise prescribed in this Regulation;
- (b) The data additional to MSD to be conveyed to PSAP, the format of the data, the mechanism and logic of data transmission, data exchange protocol, operation modes and conditions of transitions between such modes, performance of the test call and test data transfer, response to protocol commands received from infrastructure and network registration logic;
- (c) Privacy, data protection and personal data processing.

1.3 Vehicles

- in the scope of neither Regulation No. 94 nor Regulation No. 95 and not fitted with an automatic triggering system,
- of category M1 in the scope of Regulation No.94 and not equipped with frontal airbag
- of category N1 in the scope of Regulation No.95 and not equipped with side airbag, or

shall be excluded from the scope of this regulation.

1.4 GNSS positioning may be approved at the request of the applicant.

However, if the applicant opts to request approval ~~to~~ of AECD/AECS without the GNSS positioning as described in this regulation, national requirements of the Contracting Parties apply.

**1.4a Hands-free audio performance may be approved at the request of the applicant.**

**However, if the applicant opts to request approval of AECS without the hands-free audio performance assessment as described in this regulation, national requirements of the Contracting Parties apply.**

<sup>1</sup> As defined in Section 2 of the Consolidated Resolution on the Construction of Vehicles (R.E.3) (document TRANS/WP.29/78/Rev.2) – [www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html](http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html).

- 1.5 Vehicles of the following categories shall be excluded from the scope of this regulation:
- Armoured vehicles<sup>1</sup>,
  - M1 vehicles with a total permissible mass above 3.5t

## 2. Definitions - general

For the purposes of this Regulation:

- 2.1 “*Communication module*” means a component of an AECD designed for voice communication and to transmit data about an accident using terrestrial mobile telephone communications networks;
- 2.2 “*Human/Machine interface (HMI)*” 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;
- 2.3 “*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).
- 2.4 “*Public/Private Safety Answering Point (PSAP)*” means a physical location where emergency calls are first received under the responsibility of a public authority or a private organization recognized by the national government / responsible authorities.
- 2.5 “*power supply*” means back-up battery when fitted, or in its absence, any power source feeding the AECD after the sled-test defined in Annex 7.
- 2.6 “*Airbag*” means a device which, in the event of a severe impact affecting the vehicle, automatically deploys a flexible structure intended to limit the gravity of the contacts of one or more parts of the body of an occupant of the vehicle with the interior of the passenger compartment.
- 2.7 “*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).

## Part I: APPROVAL OF ACCIDENT EMERGENCY CALL DEVICES (AECD) WHICH ARE INTENDED TO BE FITTED TO VEHICLES OF CATEGORIES M1 AND N1

### 3. Definitions

For the purpose of Part I of this regulation,

- 3.1 “*AECD (Accident Emergency Call Device)*” means a unit or a set of units performing at least the following functions;
- receiving and/or generating the automatic and manual triggering signals,
  - receiving or determining the vehicle location,
  - providing a warning signal
  - sending the data, and
  - allowing bidirectional audio signals for voice communication
- 3.2 “*Global Navigation Satellite System receiver*” (“*GNSS receiver*”) means a component of an AECD/AECS designed to determine the vehicle positioning **and time** information 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 positioning information in case of an event.

- ~~3.4~~ **3.3** “*Control module*” means a component of an AECD designed to ensure the combined functioning of all components of the AECD;
- ~~3.5~~ **3.4** “*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;  
~~(c) Dimensions, structure and materials of the attachments and supports.~~
- ~~3.6~~ **3.5** “*AECD information signal device*” means a device that provides information on the status of the emergency call transaction.
- ~~3.7~~ **3.6** “*AECD warning signal device*” means a tell-tale that provides a failure indication of the AECD.

## **4. Application for approval of an AECD**

- 4.1 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.
- 4.2 A model of the information document is given in Annex 4.
- 4.3 For each type of AECD, the application shall be accompanied by samples of complete sets of AECDs **representative of the type to be approved**, 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.

## **5. Markings of an AECD**

- 5.1 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 communication module. It shall be clearly legible and be indelible.
- 5.2 The unit or units containing the navigation system receiver and communication module shall possess a space large enough to accommodate the approval mark. This space shall be shown on the drawings referred to in Annex 4.

## **6. Approval**

- 6.1 If the samples submitted for approval meet the requirements of paragraph ~~7~~ **6** of this Regulation, approval of the pertinent type of AECD shall be granted.
- 6.2 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.
- 6.3 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 ~~1~~ **3** to this Regulation.

- 6.4 There shall be affixed, conspicuously and in the space referred to in paragraph 5.2 above, to every AECD conforming to a type approved under this Regulation, in addition to the mark prescribed in paragraph 5.1, an international approval mark conforming to the model given in annex 1, consisting of:
- 6.4.1 A circle surrounding the letter “E” followed by the distinguishing number of the country which has granted approval;
- 6.4.2 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 6.4.1.
- 6.5 The approval mark shall be clearly legible and be indelible.

## 7. General requirements

Upon reception of a triggering signal, the AECD shall send data and establish voice connection with the PSAP.

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

If the AECD has successfully sent the data and then loses the voice connection, it shall try to re-establish 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 to establish a voice connection.

- 7.1. The effectiveness of AECD shall not be adversely affected by magnetic or electrical fields. This shall be demonstrated by compliance with the technical requirements and transitional provisions of Regulation No. 10, 04 series of amendments or any later series of amendments.
- 7.2 Position determination
- If the AECD is fitted, in accordance with paragraph 1.4., with GNSS receiver supporting at least three GNSS including GLONASS, Galileo and GPS, and is capable of reception and processing of SBAS signals, then the AECD shall comply with the requirements of paragraphs 7.2.1 to 7.2.10. AECD compliance with respect to positioning capabilities shall be demonstrated by performing test methods described in Annex 8: Test methods for the navigation module.
- 7.2.1 The GNSS receiver shall be able to output the navigation solution in a NMEA-0183 protocol format (RMC, GGA, VTG, GSA and GSV message). The AECD setup for NMEA-0183 messages output to external devices shall be described in the operation manual.
- 7.2.2 The GNSS receiver being a part of the AECD shall be capable of receiving and processing individual GNSS signals in L1/E1 band from at least three global navigation satellite systems, including GLONASS, GALILEO and GPS.
- 7.2.3 The GNSS receiver being a part of the AECD shall be capable of receiving and processing combined GNSS signals in L1/E1 band from at least three global navigation satellite systems, including GLONASS, GALILEO, GPS and SBAS.
- 7.2.4 The GNSS receiver being a part of the AECD shall be able to provide positioning information in WGS-84 and ~~PZ-90~~ coordinate systems.
- 7.2.5 Horizontal position error shall not exceed:
- under open sky conditions: 15 m at confidence level 0.95 with Position Dilution of Precision (PDOP) **in the range from 2.0 to not less than 2.5**;

- in urban canyon conditions: 40 m at confidence level 0.95 with Position Dilution of Precision (PDOP) **in the range from 3.5. to not less than 4.**
- 7.2.6 The specified requirements for accuracy shall be provided:
- at speed range from 0 to 140 km/h;
  - linear acceleration range from 0 to 2 G.
- 7.2.7 Sensitivity at receiver input shall be:
- GNSS signals detection (cold start) do not exceed 3600 s at signal level on the antenna input of the AECD of minus 144 dBm;
  - GNSS signals tracking and navigation solution calculation is available for at least 600 sec at signal level on the antenna input of the AECD of minus 155 dBm;
  - Re-acquisition of GNSS signals and calculation of the navigation solution is possible and does not exceed ~~20~~ **60** s at signal level on the antenna input of the AECD of minus 150 dBm.
- 7.2.8 Cold start time to first fix shall not exceed
- 60 s for signal level down to minus 130 dBm
  - 300 s for signal level down to minus 140 dBm
- 7.2.9 GNSS signal re-acquisition time after block out of 60 s at signal level down to minus 130 dBm shall not exceed 20 s after recovery of the navigation satellite visibility.
- 7.2.10 The testing procedures in Annex 8 can be performed either on the AECD unit including post processing ability or directly on the GNSS receiver being a part of the AECD.
- 7.3 Mean of access to mobile networks
- The AECD shall be fitted with an embedded hardware allowing **registration/authentication on, and access to a mobile network.**
- 7.4 AECD information and warning signal
- If the applicant for approval so requests, the AECD information and warning signals verification may be part of the approval of a type of AECD. In this case the following provisions shall apply.
- 7.4.1 ~~As~~ **The following** information shall be provided regarding the status of the emergency call transaction when the AECD is automatically or manually activated:
- **system is processing (ecall is triggered, connection is being set up, data transmission is in progress or completed, or voice call is in progress)**
  - **transmission failed (connection failed or data transmission failed)**
- 7.4.2 A warning signal shall be provided in case of AECD internal malfunction. Visual indication of the AECD malfunction shall be displayed while the failure is present. It may be cancelled temporarily, but shall be repeated whenever the ignition or the vehicle master control switch is being activated (whatever applicable).
- 7.4.2.1 The manufacturer shall provide a statement which explains malfunction indication strategy of the AECS system.

**[OPTION 1**

The manufacturer shall provide the type-approval authority with an explanation and technical documentation which shows, in overall terms, how this is achieved. This documentation shall be maintained by the manufacturer and shall

be made open for inspection by the technical service at the time of the type approval.

**This should at least cover the following items:**

- **AECD control unit**
- **network access device**
- **GNSS receiver and antenna**
- **connection to crash control unit (crash detection sensor system, triggering device)**

**Verification of the performance of the AECD malfunction shall be conducted against the manufacturer's specification. This can be either by actual test, simulation or documentation]**

**[OPTION 2**

**The manufacturer shall provide the technical authorities with documentation in accordance with Table 1, which shall contain the following information.**

- (a) Which of the items listed are being monitored by the self-test function.**
- (b) For each item that is being monitored: The technical principle applied to monitor the item.**
- (c) For each item that is not being monitored: The technical reason why it is not feasible to monitor the item in the chosen system design.**

Table 1: Template of information for self-test function

<i>Item</i>	<i>Monitored by self-test function?</i>	<i>If yes: Technical principle applied for monitoring</i>	<i>If no: Technical reasons prohibitive of monitoring</i>
<i>eCall ECU is in working order (e.g. no internal hardware failure, processor/memory is ready, logic function in expected default state)</i>	<i>yes/no</i>		
<i>External mobile network antenna is connected</i>	<i>yes/no</i>		
<i>Mobile network communication device is in working order (no internal hardware failure, responsive)</i>	<i>yes/no</i>		
<i>External GNSS antenna is connected</i>	<i>yes/no</i>		
<i>GNSS receiver is in working order (no internal hardware failure, output within expected range)</i>	<i>yes/no</i>		
<i>Crash control unit is in working order (e.g. no internal hardware failure, processor is ready, logic function in expected default state)</i>	<i>yes/no</i>		
<i>No communication failures (bus connection failures) of relevant components</i>	<i>yes/no</i>		
<i>SIM is present</i>	<i>yes/no</i>		
<i>Software image integrity</i>	<i>yes/no</i>		
<i>Dedicated battery is connected</i>	<i>yes/no</i>		
<i>State of health of dedicated battery</i>	<i>yes/no</i>		
<i>Microphone(s) are connected</i>	<i>yes/no</i>		
<i>Loudspeaker(s) are connected</i>	<i>yes/no</i>		
<i>Manual call button is connected</i>	<i>yes/no</i>		
<i>Status indicator is connected</i>	<i>yes/no</i>		



7.4.3 Instead of providing information or warning signal, the AECD may provide the electric signal to other vehicle components, e.g. instrument panel, which enable to provide information or warning signal.

7.5 Power supply

[PROPOSAL BY THE SECRETARIAT PER PARA. 4.2.5. OF THE AECS-09 REPORT]

2.8. **“Power supply” means the component that supplies power to the AECD.**

2.9. **“Back-up power supply” means the component(s) that supplies(y) power to the AECD when the main power supply fails.**

7.5.1. **Perform the sled test described in Annex 7**

7.5.2. **Immediately after the sled test, simulate the trigger such to emit the MSD**

7.5.3. **The AECD shall send the MSD and shall produce status indication (if relevant) upon triggering. This shall be verified by one of the methods described in Annex 10.**

7.5.4. **In the case of an AECD not equipped with back-up power supply, the absence of back-up power supply shall be clearly indicated in the information document of Annex 4.**

~~If the AECD is fitted with built in power supply, it shall be able to operate autonomously for a period of first not less than 5 minutes in voice communication mode followed by 60 minutes in call back mode (idle mode, registered in a network) and finally not less than 5 minutes in voice communication mode.~~

~~This capability shall be tested after performing the AECD sled test in accordance with Annex 7 in the following conditions:~~

- ~~- Built in AECD battery has to be fully charged at the time the test begins, at the discretion of the applicant;~~
- ~~- Ambient air temperature:  $(25 \pm 10)^{\circ}\text{C}$~~

~~If the AECD is not fitted with built in power supply, then the AECS power supply assessment is performed as described in paragraph 16.6. of Part II of this Regulation.~~

7.6. Resistance to impact

The AECD shall remain operational after impact. This shall be demonstrated according to Annex 7 and Annex 9, paragraphs 1 (MSD emission), paragraph 2 (MSD emission assessment) and paragraph 5.2 (status indication).

7.6.1. The following AECD components shall be tested to Annex 7:

- Control module,
- Communication module excluding microphones and loudspeakers.
- **back-up power supply (if fitted) ~~Power supply~~**
- Connectors<sup>1/</sup>
- Network access antenna,

1/

- **Only connectors related to the parts listed in this paragraph**
- **The length of the harness, and when applicable its fixation, can be decided by the applicant, in agreement with the Technical Service, so that it is representative for the different installation configurations of the AECD.**

- 7.6.2. If the applicant for approval so requests, the following AECD components may be tested to Annex 7:
- AECD warning signal device,
  - Hands-free audio equipment (microphones and loudspeakers),
  - AECD information signal device
  - **power supply other than back-up power supply mentioned in paragraph 7.6.1.**
  - GNSS antenna and
  - GNSS receiver

## 8. Modification and extension of approval of the type of AECD

- 8.1 Every modification of the AECD type shall be notified to the administrative department which approved the AECD type. The department may then either:
- 8.1.1 Consider that the modifications made are unlikely to have an appreciable adverse effect, and that in any case the vehicle still complies with the requirements; or
- 8.1.2 Require a further test report from the technical service responsible for conducting the tests.
- 8.2 Notice of the confirmation of approval, specifying the alterations made, or refusal shall be communicated to the Parties to the Agreement applying this Regulation by means of a form conforming to the model in annex 1 to this Regulation.
- 8.3 The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such extension.

## 9. Conformity of production

- 9.1 The conformity of production procedure shall comply with the requirements set out in the Agreement, Appendix 2 (E/ECE/324 E/ECE/TRANS/505/Rev.2).
- 9.2 Every AECD approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set out in paragraph 7 above.

## 10. Penalties for non-conformity of production

- 10.1 The approval granted in respect of an AECD type pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 9.1 above is not complied with or if the AECD fails to pass the checks prescribed in paragraph 9.2 above.
- 10.2 If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "APPROVAL WITHDRAWN".

## 11. Production definitively discontinued

If the holder of the approval completely ceases to manufacture a vehicle type approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement which apply this Regulation by means of a copy of the approval form bearing at the end, in

large letters, the signed and dated annotation "PRODUCTION DISCONTINUED".

12. Names and addresses of technical services responsible for conducting approval tests, and of administrative departments

The Parties to the Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or refusal, or extension or withdrawal of approval, issued in other countries, are to be sent.

## **Part II APPROVAL OF VEHICLES WITH REGARD TO THE INSTALLATION OF AN AECD OF AN APPROVED TYPE**

### **13. Definitions**

For the purposes of Part II of this Regulation:

13.1 "*Type of vehicle*" with regard to its AECD means vehicles that do not differ in such essential respects as:

- (a) Their manufacturer;
- (b) The type of their AECD, or
- (c) Vehicle features which significantly influence the performances of the AECD

13.4 "*Total permissible mass*" means the vehicle technically permissible maximum mass stated by the manufacturer.

13.5 "*R point*" means a reference point defined for each seat by the manufacturer in relation to the vehicle's structure, as indicated in Annex 6 to Regulation No.94

13.6 "*Triggering signal*" means a logic signal that requests MSD transmission.

13.7 "*MSD*" means a set of data as defined in Annex 11

13.8 "*AECS*" (Accident Emergency Call System) means an AECD when installed in a vehicle.

13.9 "*Multi-task display*" means a display on which more than one message can be shown simultaneously.

13.10 "*AECS information signal device*" means a device that provides information on the status of the emergency call transaction.

13.11 "*AECS warning signal device*" means a tell-tale that provides a failure indication of the AECD.

### **14. Application for approval of a vehicle type equipped with an AECD which has been approved to Part I of this regulation**

14.1 The application for approval of a vehicle type equipped with an AECD shall be submitted by the holder of the trade name or mark or by his duly accredited representative.

14.2 A model of the information document is given in **Annex 2**.

14.3 For each vehicle type equipped with an AECD, the application shall be accompanied by samples of complete sets of vehicles **representative of the type to be approved**, 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.

**15. Approval**

15.1 If the vehicle type submitted for approval pursuant to this Regulation meets the requirements of paragraph 15. below, approval of that vehicle type shall be granted.

Before granting approval for a vehicle type with regard to the installation of an AECD approved to Part I of this Regulation, the competent authority shall ensure that the verifications not being part of the Part I approval are included in the Part II approval.

Approval for a vehicle type with regard to the installation of an AECD shall be granted according to one of the approval procedures I and II described in Table 1<sup>2</sup>.

Approval procedure	General	HMI	Resistance to impact & Triggering signal emission	AECS functionality	HF Audio
Procedure I	16.1	Paragraph <b>16.3.</b> Paragraph <b>16.4.</b>	Paragraph 17.3.1. Paragraph 17.3.2.	Paragraph 17.5.	Paragraph 16.5.
Procedure II			Paragraph 17.3.3		

Table 1: approval procedures

15.2 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 vehicle.

15.3 Notice of approval or of refusal, or of extension or withdrawal of approval, or of production definitively discontinued of a type of vehicle 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.

15.4 There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation an international approval mark conforming to the model given in annex 2, consisting of:

15.4.1 A circle surrounding the letter “E” followed by the distinguishing number of the country which has granted approval;

<sup>2</sup> Procedure II shall only apply to:

- the extension of type approvals to this Regulation, or
- vehicles already approved to Regulations Nos.94 or 95 prior the entry into force of this regulation

15.4.2 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 15.4.1.

15.5 The approval mark shall be clearly legible and be indelible.

## 16. General requirements

16.1 General

16.1.1. The AECD installed in the vehicle shall be of a type approved under Part I of this Regulation.

16.1.2. The AECD shall be connected to the vehicle’s on-board electrical network, so that the AECD functions in all the required modes, and the backup battery (if fitted) is charged.

16.1.3. The installation of the AECD shall be such to obtain reception of the GNSS signal and access to a mobile telephone communication network.  
The applicant shall provide the relevant information with regard to the mobile network and GNSS to which the AECS is intended.

16.1.4 The AECS shall, upon receiving a trigger signal during the vehicle impact test described in this paragraph, ensure the AECS functionality described in paragraph 17.5 (verification of AECS functionality)

16.1.5 Vehicles of category M1 shall be subject to the following:

16.1.5.1. Vehicles of category M1 with a total permissible mass less or equal to 2,5 tons and R-point height at or below 700 mm:

16.1.5.1.1. Paragraphs 17.3.1. and 17.3.2., or paragraph 17.3.3

16.1.5.1.3. Paragraph 16.2.

16.1.5.2. Vehicles of category M1 with a total permissible mass less or equal to 2,5 tons and R-point height above 700 mm:

16.1.5.2.1. Paragraphs 17.3.1. ~~and 17.3.2.~~ or frontal impact provisions of paragraph 17.3.3.

16.1.5.2.3. **Paragraph 16.2.**

16.1.5.3. Vehicles of category M1 with a total permissible mass above 2,5 tons and R-point height less or equal to 700 mm:

16.1.5.3.1. Paragraph 17.3.2. or side impact provisions of paragraph 17.3.3.

16.1.5.3.3. Paragraph 16.2.

16.1.5.4. Vehicles of category M1 with a total permissible mass above 2,5 tons and R-point height above 700 mm: paragraph 17.4.

16.1.6. Vehicles of category N1 shall be subject to the following:

16.1.6.1. Vehicles of category N1 with a R-point height at or below 700 mm:

16.1.6.1.1. Paragraph 17.3.2 or side impact provisions of paragraph 17.3.3

16.1.6.1.3. Paragraph 16.2.

16.1.6.2. Vehicles of category N1 with a R-point height above 700 mm: paragraph 17.4.

16.1.7. A summary of the tests to be performed in function of the vehicle categories can be found in Annex 13

16.2. Position determination

If the AECS is fitted, in accordance with paragraph 1.4. and not yet verified according to Part I of this Regulation, with GNSS receiver supporting at least three GNSS including GLONASS, Galileo and GPS, and is capable of reception

and processing of SBAS signals, then the AECS shall comply with the requirements of paragraphs 17.2.1 to 7.2.10.

AECS compliance with respect to positioning capabilities shall be demonstrated by performing test methods described in Annex 8: Test methods for the navigation module.

- 16.3. AECS control
- 16.3.1. The AECS control shall be installed such to comply with the relevant requirements and transitional provisions of Regulation No.121, 01 series of amendments or any later series of amendments.
- 16.3.2. The AECS control shall be designed and/or placed in such a way that the risk of an inadvertent activation is reduced.
- 16.3.3. If the AECS control is embedded into a multi-task display, its operation shall be possible with two deliberate actions or less.
- 16.3.4. If the AECS control assessment is not part of the AECD approval per Part I of this regulation, the emergency call control functionality shall be subject to paragraph 17.5.
- 16.4. AECS information and warning signal
- The following provisions are applicable if the AECS information and/or warning signal verification is not part of the approval of an AECD per Part I of this regulation and shall be verified by compliance with the provisions of paragraph 17.5.
- 16.4.1. The AECS information and/or warning signal shall be installed such to comply with the relevant installation requirements of Regulation No.121, 01 series of amendments or any later series of amendments.
- 16.4.2. **The following** information shall be provided regarding the status of the emergency call transaction when the AECS is automatically or manually activated:
- **system is processing (ecall is triggered, connection is being set up, data transmission is in progress or completed, or voice call is in progress)**
  - **transmission failed (connection failed or data transmission failed)**
- 16.4.3. A warning signal shall be provided in case of AECD internal malfunction. Visual indication of the AECD malfunction shall be displayed while the failure is present. It may be cancelled temporarily, but shall be repeated whenever the ignition or the vehicle master control switch is being activated (whatever applicable).
- 16.4.4. The manufacturer shall provide a statement which explains the malfunction indication strategy of the AECS system.

#### **[OPTION 1**

The manufacturer shall provide the type-approval authority with an explanation and technical documentation which shows, in overall terms, how this is achieved. This documentation shall be maintained by the manufacturer and shall be made open for inspection by the technical service at the time of the type approval.

**This should at least cover the following items:**

- **AECD control unit**
- **network access device**
- **GNSS receiver and antenna**

- connection to crash control unit (crash detection sensor system, triggering device, ???)

Verification of the performance of the AECD malfunction shall be conducted against the manufacturer's specification. This can be either by actual test, simulation or documentation]

**[OPTION 2**

The manufacturer shall provide the technical authorities with documentation in accordance with Table 1, which shall contain the following information.

- (a) Which of the items listed are being monitored by the self-test function.
- (b) For each item that is being monitored: The technical principle applied to monitor the item.
- (c) For each item that is not being monitored: The technical reason why it is not feasible to monitor the item in the chosen system design.

Table 1: Template of information for self-test function

<i>Item</i>	<i>Monitored by self-test function?</i>	<i>If yes: Technical principle applied for monitoring</i>	<i>If no: Technical reasons prohibitive of monitoring</i>
<i>eCall ECU is in working order (e.g. no internal hardware failure, processor/memory is ready, logic function in expected default state)</i>	<i>yes/no</i>		
<i>External mobile network antenna is connected</i>	<i>yes/no</i>		
<i>Mobile network communication device is in working order (no internal hardware failure, responsive)</i>	<i>yes/no</i>		
<i>External GNSS antenna is connected</i>	<i>yes/no</i>		
<i>GNSS receiver is in working order (no internal hardware failure, output within expected range)</i>	<i>yes/no</i>		
<i>Crash control unit is in working order (e.g. no internal hardware failure, processor is ready, logic function in expected default state)</i>	<i>yes/no</i>		
<i>No communication failures (bus connection failures) of relevant components</i>	<i>yes/no</i>		
<i>SIM is present</i>	<i>yes/no</i>		
<i>Software image integrity</i>	<i>yes/no</i>		
<i>Dedicated battery is connected</i>	<i>yes/no</i>		
<i>State of health of dedicated battery</i>	<i>yes/no</i>		
<i>Microphone(s) are connected</i>	<i>yes/no</i>		
<i>Loudspeaker(s) are connected</i>	<i>yes/no</i>		
<i>Manual call button is connected</i>	<i>yes/no</i>		
<i>Status indicator is connected</i>	<i>yes/no</i>		



- 16.5. Hands-free audio performance
- The AECS shall provide sufficient voice intelligibility for the vehicle driver. **Subject to paragraph 1.4a, this can be demonstrated by proving compliance with [ITU-T Recommendation P.1140] in a vehicle prior to conducting any of the tests according to Regulations No.94 and No.95. In addition, subjective testing in accordance with paragraph 16.5.1 shall be conducted after performing tests according to Regulations No.94 and No.95.**
- 16.5.1 Testing languages
- 16.5.1.1 The languages used in the hands free audio performance intelligibility test shall be those of one of the Contracting Parties as identified in Annex 9 and 10 to this Regulation, with the sentences being voiced in good pronunciation. The language used for the testing shall be noted in the test report.
- 16.5.1.2 The vehicle manufacturer shall demonstrate, through the use of documentation, compliance with all the other languages identified in Annex 9, appendix 1 to this Regulation. Any such documentation shall be appended to the test report.
- 16.5.1.3 In the case the vehicle type may be equipped with different variants of the AECS with regional specific adjustments, the manufacturer shall demonstrate through documentation that the requirements of this Regulation are fulfilled in all variants.
- 16.6. Verification of AECS power supply performance
- [PROPOSAL BY THE SECRETARIAT PER PARA. 4.2.5. OF THE AECS-09 REPORT]
- 16.6.1. AECS is equipped with a back-up power supply**
- 16.6.1.1. Before the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS shall be operable for a period of first not less than 5 minutes in voice communication mode followed by 60 minutes in call-back mode (idle mode, registered in a the network) and finally not less than 5 minutes in voice communication mode. This can be demonstrated by real (actual) test or by calculation/simulation.**
- 16.6.1.2. After the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS back-up power supply shall be able to supply power to the AECS. This may be verified by one of the methods described in Annex 10.**
- 16.6.2. AECS is not equipped with a back-up power supply**
- 16.6.2.1. The absence of back-up power supply shall be clearly indicated in the information document of Annex 4.**
- 16.6.2.2. Before the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS shall be operable for a period of first not less than 5 minutes in voice communication mode followed by 60 minutes in call-back mode (idle mode, registered in a the network) and finally not less than 5 minutes in voice communication mode. This can be demonstrated by real (actual) test or by calculation/simulation.**
- This shall be demonstrated by the manufacturer in all expected post-crash power supply conditions, taking into account the vehicle's power management strategy.**
- 16.6.2.3. After the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS back-up power supply shall be able to supply power to the AECS. This may be verified by one of the methods described in Annex 10.**

~~ALTERNATIVE 1 (see para 17.6)~~

~~————— The AECS shall be properly powered after the vehicle has suffered a serious road accident. This shall be verified by compliance with the provisions of paragraph 17.6~~

~~ALTERNATIVE 2 (see para 17.6)~~

~~After the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS shall be operable for a period of first not less than 5 minutes in voice communication mode followed by 60 minutes in call back mode (idle mode, registered in a the network) and finally not less than 5 minutes in voice communication mode. This can be demonstrated by real (actual) test or by calculation/simulation.~~

## 17. Performance requirements

~~17.1. ——— Malfunction indication and status indication check~~

~~17.1.1. ——— Malfunction indication~~

~~————— TBD~~

~~17.1.2. ——— Status indication~~

~~————— TBD~~

~~17.1.2.1. — call triggered and connection is being set up~~

~~————— TBD~~

~~17.1.2.2. — data transmission in progress~~

~~————— TBD~~

~~17.1.2.3. — data transmission successfully completed~~

~~————— TBD~~

~~17.1.2.4. — voice call in progress~~

~~————— TBD~~

~~17.1.2.5. — call not possible ———~~

~~————— TBD~~

17.2. Position determination

17.2.1 The AECS shall be able to output the navigation solution in a NMEA-0183 protocol format (RMC, GGA, VTG, GSA and GSV message). The AECD setup for NMEA-0183 messages output to external devices shall be described in the operation manual.

17.2.2 The AECS shall be capable of receiving and processing individual GNSS signals of standard accuracy in L1/E1 band from at least three global navigation satellite systems, including GLONASS, GALILEO and GPS.

17.2.3 The AECS shall be capable of receiving and processing combined GNSS signals of standard accuracy in L1/E1 band from at least three global navigation satellite systems, including GLONASS, GALILEO, GPS and SBAS.

17.2.4 The AECS shall be able to provide positioning information in WGS-84 and PZ-90 coordinate systems.

17.2.5 Horizontal position error shall not exceed:

- under open sky conditions: 15 m at confidence level 0.95 with Position Dilution of Precision (PDOP) ~~not less than~~ **in the range from 2.0 to 2.5;**

- in urban canyon conditions: 40 m at confidence level 0.95 with Position Dilution of Precision (PDOP) not less than 4.
- 17.2.6 The specified requirements for accuracy shall be provided:
- at speed range from 0 to [140] km/h;
  - linear acceleration range from 0 to [2] G.
- 17.2.7 Sensitivity at receiver input shall be:
- GNSS signals detection (cold start) do not exceed 3600 s at signal level on the antenna input of the AECD of minus 144 dBm;
  - GNSS signals tracking and navigation solution calculation is available for at least 600 s at signal level on the antenna input of the AECD of minus 155 dBm;
  - Re-acquisition of GNSS signals and calculation of the navigation solution is possible and does not exceed 20 s at signal level on the antenna input of the AECD of minus 150 dBm.
- 17.2.8 Cold start time to first fix shall not exceed
- 60 s for signal level down to minus 130 dBm
  - 300 s for signal level down to minus 140 dBm
- 17.2.9 GNSS signal re-acquisition time after block out of 60 s at signal level down to minus 130 dBm shall not exceed 20 s after recovery of the navigation satellite visibility.
- 17.2.10 The testing procedures in Annex 8 can be performed either on the AECD unit including post processing ability or directly on the GNSS receiver being a part of the AECD.
- 17.3 Verification of the trigger signal as well as the AECS after a vehicle impact test.  
Subject to the approval procedures defined in paragraph 15.1, the verification of the trigger signal as well as the AECS functionality per par. 17.5 shall be performed either
- 17.3.1 When performing a collision of the vehicle according to Regulation No.94 (frontal collision),
- 17.3.2 When performing a collision of the vehicle according to Regulation No.95 (lateral collision), or
- 17.3.3 Subject to Footnote 2 to par. 15.1, when demonstrating with existing documentation (report, images, simulation data or equivalent) that during a Regulation No.94 and Regulation No.95 test
- a triggering signal was generated
  - the installation of AECD is not adversely affected by the impact to the vehicle
- 17.4 For the purpose of paragraph 16.1.4.4 and paragraph 16.1.5.2 only, the manufacturer shall demonstrate with existing documentation (report, images, drawing or equivalent) that a triggering signal is available for the purpose of AECS.
- 17.5 Verification of AECS functionality (emission of Ecall, HMI functionality and MSD)  
The following items shall be verified according to the test procedures of Annex 9 or Annex 10 of this regulation as appropriate:
- **Antennas,**
  - **power supply,**
  - **microphone and**

- **speaker**

- 17.5.1 Activation of automatic call
- 17.5.2 When relevant **to complete the test procedures per Annex 9 or 10**, manual emergency call control operation
- 17.5.3 Information signal generation
- 17.5.4 Recording, content and emission of Minimum Set of Data (MSD)
- 17.5.5. Voice communication

**18. Modifications and extension of approval of a vehicle type equipped with an AECD which has been approved to Part I of this regulation**

- 18.1 Every modification of the vehicle type shall be notified to the administrative department which approved the vehicle type. The department may then either:
  - 18.1.1 Consider that the modifications made are unlikely to have an appreciable adverse effect, and that in any case the vehicle still complies with the requirements; or
  - 18.1.2 Require a further test report from the technical service responsible for conducting the tests.
- 18.2 Notice of the confirmation of approval, specifying the alterations made, or refusal shall be communicated to the Parties to the Agreement applying this Regulation by means of a form conforming to the model in annex 2 to this Regulation.
- 18.3 The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such extension.

**19. Conformity of production**

- 19.1 The conformity of production procedure shall comply with the requirements set out in the Agreement, Appendix 2 (E/ECE/324 E/ECE/TRANS/505/Rev.2).
- 19.2 Every vehicle approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set out in paragraph 16 ~~15~~ above.

**20. Penalties for non-conformity of production**

- 20.1 The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 19.1 ~~17.1~~ above is not complied with or if the vehicle fails to pass the checks prescribed in paragraph 19.2 above.
- 20.2 If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "APPROVAL WITHDRAWN".

**21. Production definitively discontinued**

If the holder of the approval completely ceases to manufacture a vehicle type approved in accordance with this Regulation, he or she shall so inform the

authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement which apply this Regulation by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "PRODUCTION DISCONTINUED".

## **22. Names and addresses of technical services responsible for conducting approval tests, and of administrative departments**

The Parties to the Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or refusal, or extension or withdrawal of approval, issued in other countries, are to be sent.

## **Part III APPROVAL OF VEHICLES WITH REGARD TO THEIR AECS OR EQUIPPED WITH AN AECD WHICH HAS NOT BEEN SEPARATELY APPROVED ACCORDING TO PART I OF THIS REGULATION**

### **23. Definitions**

For the purposes of Part III of this Regulation:

- 23.1. "Type of vehicle" with regard to its AECD means vehicles that do not differ in such essential respects as:
- (a) Their manufacturer;
  - (b) The type of their AECD, or
  - (c) Vehicle features which significantly influence the performances of the AECD
- 23.2. "AECS" (Accident Emergency Call System) means
- an AECD when installed in a vehicle, or
  - an AECD fully integrated to the vehicle [electrical and data networks], such that its components cannot be separately tested.
- 23.3. "Multi-task display" means a display on which more than one message can be shown simultaneously.

### **24. Application for approval of a vehicle type equipped with an AECS**

- 24.1 The application for approval of a type of vehicle equipped with an AECS shall be submitted by the holder of the trade name or mark or by his duly accredited representative.
- 24.2 A model of the information document is given in Annex 3.
- 24.3 For each vehicle type equipped with an AECS, the application shall be accompanied by samples of complete sets of vehicles **representative of the type to be approved**, 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.

## 25. Approval

- 25.1 If the vehicle type submitted for approval in accordance with paragraph 22 above meets the requirements of paragraph 24 of this Regulation, approval shall be granted.
- 25.2. 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 vehicle.
- 25.3 Notice of approval or of refusal, or of extension or withdrawal of approval, or of production definitively discontinued of a type of vehicle 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.
- 25.4 There shall be affixed, conspicuously and in a readily accessible place specified on the approval form, to every vehicle conforming to a vehicle type approved under this Regulation, an international approval mark conforming to the model given in annex 3, consisting of:
- 25.4.1 A circle surrounding the letter “E” followed by the distinguishing number of the country which has granted approval;
- 25.4.2 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 14.4.1.
- 25.5 The approval mark shall be clearly legible and be indelible.

## 26. Requirements

- 26.1 General
- 26.1.1. The AECD installed in the vehicle shall not be of a type approved under Part I of this Regulation, or shall be fully integrated per paragraph 23.2.
- 26.1.2. In case of an AECD, it shall be connected to the vehicle’s on-board electrical network, so that the AECD functions in all the required modes, and the backup battery (if fitted) is charged. In case of a fully integrated AECS, it shall be such that it functions in all the required modes, and the backup battery (if fitted) is charged.
- 26.1.3. The AECS, or the installation of the AECD when relevant, shall be such to obtain reception of the GNSS signal and access to a mobile telephone communication network.  
The applicant shall provide the relevant information with regard to the mobile network and GNSS to which the AECS is intended.
- 26.1.4 Vehicles of category M1 shall be subject to the following:
- 26.1.4.1. Vehicles of category M1 with a total permissible mass less or equal to 2,5 tons and R-point height at or below 700 mm:
- 26.1.4.1.1. Paragraphs 17.3.1. and 17.3.2., or paragraph 17.3.3
- ~~26.1.4.1.2. paragraph 17.3.1 or frontal impact provisions of paragraph 17.3.3~~
- 26.1.4.1.3. Paragraph 16.2.
- 26.1.4.2. Vehicles of category M1 with a total permissible mass less or equal to 2,5 tons and R-point height above 700 mm:

- 26.1.4.2.1. Paragraphs 17.3.1. or frontal impact provisions of paragraph 17.3.3.
- ~~26.1.4.2.2. paragraph 17.3.1 or frontal impact provisions of paragraph 17.3.3~~
- 26.1.4.2.3. **Paragraph 16.2.**
- 26.1.4.3. Vehicles of category M1 with a total permissible mass above 2,5 tons and R-point height less or equal to 700 mm:
- 26.1.4.3.1. Paragraph 17.3.2. or side impact provisions of paragraph 17.3.3.
- ~~26.1.4.3.2. paragraph 17.3.2 or side impact provisions of paragraph 17.3.3~~
- 26.1.4.3.3. Paragraph 16.2.
- 26.1.4.4. Vehicles of category M1 with a total permissible mass above 2,5 tons and R-point height above 700 mm: paragraph 17.4. ~~paragraphs 17.4.4 and 17.2~~
- 26.1.5. Vehicles of category N1 shall be subject to the following:
- 26.1.5.1. Vehicles of category N1 with a R-point height at or below 700 mm:
- 26.1.5.1.1. Paragraph 17.3.2 or side impact provisions of paragraph 17.3.3
- ~~26.1.5.1.2. paragraph 17.3.2 or side impact provisions of paragraph 17.3.3.~~
- 26.1.5.1.3. Paragraph 16.2.
- 26.1.5.2. Vehicles of category N1 with a R-point height above 700 mm: paragraph 17.4. ~~paragraphs 17.4.4 and 17.2.~~
- 26.1.6 A summary of the tests to be performed in function of the vehicle categories can be found in Annex 13
- ~~Regardless of paragraph 24.1.5, vehicles that meet the technical requirements of Regulation No 95 without a side airbag are not subject to paragraphs 17.3.2., 17.3.3., 17.4.2 and paragraph 17.4.3.~~
- 26.2. AECS control
- When the vehicle is fitted with an AECS control ~~per paragraph 17.1~~, the AECS control shall fulfil the requirements of paragraphs **16.3.1. to 16.3.3.** ~~16.2.1 to 16.2.3.~~
- 26.2.1. The AECS control shall be installed such to comply with the relevant installation requirements of Regulation No.121.
- 26.2.2. The AECS control shall be designed and/or placed in such a way that the risk of an inadvertent activation is reduced.
- 26.2.3. If the AECS control is embedded into a multi-task display, its operation shall be possible with two deliberate actions or less.
- 26.2.4. The emergency call control functionality shall be subject to paragraph 17.5.
- 26.3. AECS information and warning signal
- The following provisions shall be verified by compliance with the provisions of ~~paragraphs 17.1. and~~ **paragraph 17.5.**
- 26.3.1. The AECS information and/or warning signal shall be installed such to comply with the relevant installation requirements of Regulation No.121., **01 series of amendments or any later series of amendments.**
- 26.3.2. **The following** information shall be provided regarding the status of the emergency call transaction when the AECS is automatically or manually activated:
- **system is processing (ecall is triggered, connection is being set up, data transmission is in progress or completed, or voice call is in progress)**

- **transmission failed (connection failed or data transmission failed)**

26.3.3. A warning signal shall be provided ~~when the AECS is not functioning properly.~~ ~~Visual indication of the AECS malfunction shall be displayed at all times while ignition is turned on in case of AECD internal malfunction.~~ **Visual indication of the AECD malfunction shall be displayed while the failure is present. It may be cancelled temporarily, but shall be repeated whenever the ignition or the vehicle master control switch is activated (whatever applicable).**

26.3.4. **The manufacturer shall provide a statement which explains the malfunction indication strategy of the AECS system.**

**[OPTION 1**

**The manufacturer shall provide the type-approval authority with an explanation and technical documentation which shows, in overall terms, how this is achieved. This documentation shall be maintained by the manufacturer and shall be made open for inspection by the technical service at the time of the type approval.**

**This should at least cover the following items:**

- **AECD control unit**
- **network access device**
- **GNSS receiver and antenna**
- **connection to crash control unit (crash detection sensor system, triggering device, ???)**

**Verification of the performance of the AECD malfunction shall be conducted against the manufacturer's specification. This can be either by actual test, simulation or documentation]**

**[OPTION 2**

**The manufacturer shall provide the technical authorities with documentation in accordance with Table 1, which shall contain the following information.**

- (a) Which of the items listed are being monitored by the self-test function.**
- (b) For each item that is being monitored: The technical principle applied to monitor the item.**
- (c) For each item that is not being monitored: The technical reason why it is not feasible to monitor the item in the chosen system design.**



Table 1: Template of information for self-test function

<i>Item</i>	<i>Monitored by self-test function?</i>	<i>If yes: Technical principle applied for monitoring</i>	<i>If no: Technical reasons prohibitive of monitoring</i>
<i>eCall ECU is in working order (e.g. no internal hardware failure, processor/memory is ready, logic function in expected default state)</i>	<i>yes/no</i>		
<i>External mobile network antenna is connected</i>	<i>yes/no</i>		
<i>Mobile network communication device is in working order (no internal hardware failure, responsive)</i>	<i>yes/no</i>		
<i>External GNSS antenna is connected</i>	<i>yes/no</i>		
<i>GNSS receiver is in working order (no internal hardware failure, output within expected range)</i>	<i>yes/no</i>		
<i>Crash control unit is in working order (e.g. no internal hardware failure, processor is ready, logic function in expected default state)</i>	<i>yes/no</i>		
<i>No communication failures (bus connection failures) of relevant components</i>	<i>yes/no</i>		
<i>SIM is present</i>	<i>yes/no</i>		
<i>Software image integrity</i>	<i>yes/no</i>		
<i>Dedicated battery is connected</i>	<i>yes/no</i>		
<i>State of health of dedicated battery</i>	<i>yes/no</i>		
<i>Microphone(s) are connected</i>	<i>yes/no</i>		
<i>Loudspeaker(s) are connected</i>	<i>yes/no</i>		
<i>Manual call button is connected</i>	<i>yes/no</i>		
<i>Status indicator is connected</i>	<i>yes/no</i>		

- 26.4. The AECS shall properly function after the vehicle has suffered a serious road accident. This shall be verified by compliance with the provisions of paragraph 17.5.
- 26.5. Hands-free audio performance
- The AECS shall provide sufficient voice intelligibility for the vehicle driver occupant. ~~Subject to paragraph 1.4a, this can be demonstrated by proving compliance with [ITU-T Recommendation P.1140] in a vehicle prior to conducting any of the tests according to Regulations No.94 and No.95. In addition, subjective testing in accordance with paragraph 16.5.1 shall be conducted after performing tests according to Regulations No.94 and No.95. and the PSAP according to [Annex XXX] [P.Emergency ITU T Recommendation]~~
- 26.5.1 Testing languages**
- 26.5.1.1** The languages used in the hands free audio performance intelligibility test shall be those of one of the Contracting Parties as identified in Annex 9 and 10 to this Regulation, with the sentences being voiced in good pronunciation. The language used for the testing shall be noted in the test report.
- 26.5.1.2** The vehicle manufacturer shall demonstrate, through the use of documentation, compliance with all the other languages identified in Annex 9, appendix 1 to this Regulation. Any such documentation shall be appended to the test report.
- 26.5.1.3.** In the case the vehicle type may be equipped with different variants of the AECS with regional specific adjustments, the manufacturer shall demonstrate through documentation that the requirements of this Regulation are fulfilled in all variants.
- 26.6. Verification of AECS power supply performance
- ~~The AECS shall be properly powered after the vehicle has suffered a serious road accident. This shall be verified by compliance with the provisions of paragraph 17.6.~~

[PROPOSAL BY THE SECRETARIAT PER PARA. 4.2.5. OF THE AECS-09 REPORT]

- 26.6.1. AECS is equipped with a back-up power supply**
- 26.6.1.1.** Before the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS shall be operable for a period of first not less than 5 minutes in voice communication mode followed by 60 minutes in call-back mode (idle mode, registered in a the network) and finally not less than 5 minutes in voice communication mode. This can be demonstrated by real (actual) test or by calculation/simulation.
- 26.6.1.2.** After the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS back-up power supply shall be able to supply power to the AECS. This may be verified by one of the methods described in Annex 10.
- 26.6.2. AECS is not equipped with a back-up power supply**
- 26.6.2.1.** The absence of back-up power supply shall be clearly indicated in the information document of Annex 4.
- 26.6.2.2.** Before the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS shall be operable for a period of first not less than 5 minutes in voice communication mode followed by 60 minutes in call-back mode (idle mode, registered in a the network) and finally not less than 5 minutes in voice communication mode. This can be demonstrated by real (actual) test or by calculation/simulation.

**This shall be demonstrated by the manufacturer in all expected post-crash power supply conditions, taking into account the vehicle's power management strategy.**

- 26.6.2.3. After the impact test under Regulation No. 94 and/or Regulation No. 95 whichever relevant, the AECS back-up power supply shall be able to supply power to the AECS. This may be verified by one of the methods described in Annex 10.**

## **27. Modifications and extension of approval of a vehicle type equipped with an AECS**

- 27.1 Every modification of the vehicle type shall be notified to the administrative department which approved the vehicle type. The department may then either:
- 27.1.1 Consider that the modifications made are unlikely to have an appreciable adverse effect, and that in any case the vehicle still complies with the requirements; or
- 27.1.2 Require a further test report from the technical service responsible for conducting the tests.
- 27.2 Notice of the confirmation of approval, specifying the alterations made, or refusal shall be communicated to the Parties to the Agreement applying this Regulation by means of a form conforming to the model in annex 3 to this Regulation.
- 27.3 The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such extension.

## **28. Conformity of production**

- 28.1 The conformity of production procedure shall comply with the requirements set out in the Agreement, Appendix 2 (E/ECE/324 E/ECE/TRANS/505/Rev.2).
- 28.2 Every vehicle approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set out in paragraph 26 above.

## **29. Penalties for non-conformity of production**

- 29.1 The approval granted in respect of a vehicle type pursuant to this Regulation may be withdrawn if the requirement laid down in paragraph 28.1 above is not complied with or if the vehicle fails to pass the checks prescribed in paragraph 28.2 above.
- 29.2 If a Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "APPROVAL WITHDRAWN".

## **30. Production definitively discontinued**

If the holder of the approval completely ceases to manufacture a vehicle type approved in accordance with this Regulation, he or she shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the Agreement which apply this Regulation by means of a copy of the approval form bearing at the end, in large letters, the signed and dated annotation "PRODUCTION DISCONTINUED".

**31. Names and addresses of technical services responsible for conducting approval tests, and of administrative departments**

The Parties to the Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the administrative departments which grant approval and to which forms certifying approval or refusal, or extension or withdrawal of approval, issued in other countries, are to be sent.

# Annex 1

## Communication

(Maximum format: A4 (210 x 297 mm))



issued by :

Name of administration:

.....  
 .....  
 .....

3

- concerning<sup>4</sup>:
- Approval granted
  - Approval extended
  - Approval refused
  - Approval withdrawn
  - Production definitively discontinued

of a type of AECD intended to be fitted to vehicles of categories M1 and N1 pursuant Part I to Regulation No. AECS

Approval No. .... Extension No. ....

1. Trade name or mark of device: .....
  2. Manufacturer's name for the type of device: .....
  3. Manufacturer's name and address: .....
  4. If applicable, name and address of manufacturer's representative: .....
  5. Submitted for approval on: .....
  6. Technical Service responsible for conducting approval tests: .....
  7. Date of report issued by that Service .....
  8. Number of report issued by that Service .....
  9. Brief description .....
- AECD information and warning signal: yes/no.....  
 Hands-free audio equipment (micros and speakers) : yes/no .....  
 Back-up battery: yes/no.....  
 Network access device antenna: yes/no .....  
 GNSS antenna: yes/no .....  
 GNSS receiver: yes/no .....
10. Component was tested according to the sled test of Annex 4 (components necessary for sending the MSD are by default tested to Annex 4 –TCU, back-up battery, AECD information signal, GNSS antenna when internal to TCU, GNSS receiver when internal to the TCU):
- AECD warning signal: yes/no.....  
 Hands-free audio equipment (micros and speakers) : yes/no .....  
 GNSS antenna (when external to the TCU): yes/no .....  
 GNSS receiver (when external to the TCU) : yes/no .....

<sup>1</sup> Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulations).

<sup>4</sup> Strike out what does not apply.

11. Position of the approval mark: .....
12. Reason(s) for extension (if applicable): .....
13. Approval granted/refused/extended/withdrawn<sup>2</sup>:
14. Place:.....
15. Date:.....
16. Signature: .....
17. The list of documents deposited with the Type Approval Authority which has granted approval is annexed to this communication and may be obtained on request.

## Annex 2

### Communication

(Maximum format: A4 (210 x 297 mm))



issued by :

Name of administration:

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 .....  
 .....

5

- concerning<sup>6</sup>: Approval granted  
 Approval extended  
 Approval refused  
 Approval withdrawn  
 Production definitively discontinued

of a type of vehicle of category M1 or N1 pursuant Part II of Regulation No. AECS, fitted with an AECD approved pursuant to Part I of Regulation No. AECS

Approval No..... Extension No. ....

1. Trade name or mark of device: .....
2. Manufacturer's name for the type of device: .....
3. Manufacturer's name and address:.....
4. If applicable, name and address of manufacturer's representative: .....
5. Submitted for approval on: .....
6. Technical Service responsible for conducting approval tests: .....
7. Date of report issued by that Service .....
8. Number of report issued by that Service .....
9. Brief description .....
- AECD information and warning signal: yes/no.....
10. Position of the approval mark: .....
11. Reason(s) for extension (if applicable): .....
12. Approval granted/refused/extended/withdrawn<sup>2</sup>:
13. Place:.....
14. Date:.....
15. Signature: .....
16. The list of documents deposited with the Type Approval Authority which has granted approval is annexed to this communication and may be obtained on request.

<sup>1</sup> Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulations).

<sup>6</sup> Strike out what does not apply.

### Annex 3

## Communication

(Maximum format: A4 (210 x 297 mm))



issued by :

Name of administration:

.....  
 .....  
 .....

7

- concerning<sup>8</sup>: Approval granted  
 Approval extended  
 Approval refused  
 Approval withdrawn  
 Production definitively discontinued

of a type of vehicle of category M1 or N1 approved pursuant Part III of Regulation No. AECS.

Approval No..... Extension No. ....

1. Trade name or mark of device: .....
2. Manufacturer's name for the type of device: .....
3. Manufacturer's name and address:.....
4. If applicable, name and address of manufacturer's representative: .....
5. Submitted for approval on: .....
6. Technical Service responsible for conducting approval tests: .....
7. Date of report issued by that Service .....
8. Number of report issued by that Service .....
9. Brief description .....
10. Position of the approval mark: .....
11. Reason(s) for extension (if applicable): .....
12. Approval granted/refused/extended/withdrawn<sup>2</sup>:
13. Place:.....
14. Date:.....
15. Signature: .....
16. The list of documents deposited with the Type Approval Authority which has granted approval is annexed to this communication and may be obtained on request.

<sup>1</sup> Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulations).

<sup>8</sup> Strike out what does not apply.



**Annex 4**

**Information document relating to the type approval of an emergency call device (AECD)**

The following information, if applicable, shall be supplied in triplicate and shall include a list of contents.

Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 paper or on a folder of A4 format.

Photographs, if any, shall show sufficient detail.

1. Make (trade name of manufacturer):.....
2. Type and general commercial description(s): .....
3. Means of identification of type, if marked on the device:.....
4. Name and address of manufacturer:.....
5. Location of and method of affixing the approval mark: .....
6. Address(es) of assembly plant(s): .....
7. Arrangement (indicate components covered by the application of this type approval): .....
8. Description of method(s) of attachment to the vehicle **(if applicable, dimensions, structure and materials of the attachments and supports of the device):** ~~(for aftermarket devices only)~~;.....
9. Sufficiently detailed drawings to identify the complete device, including installation instructions (for aftermarket devices only); the position for the type-approval mark must be indicated on the drawings: .....

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## Annex 5

### Information document relating to the type approval of a vehicle with regard to the installation of emergency call devices

The following information, if applicable, shall be supplied in triplicate and shall include a list of contents.

Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 paper or on a folder of A4 format.

Photographs, if any, shall show sufficient detail.

#### General

1. Make (trade name of manufacturer): .....
2. Type and general commercial description(s): .....
3. Means of identification of type, if marked on the vehicle: .....
4. Location of the marking: .....
5. Location of and method of affixing the approval mark: .....
6. Category of vehicle: .....
7. Name and address of manufacturer: .....
8. Address(es) of assembly plant(s): .....
9. Photograph(s) and/or drawing(s) of a representative vehicle: .....
10. E-call device/system
- 10.1 Make (trade name of manufacturer): .....
- 10.2 Type and general commercial description(s): .....
- 10.3 Arrangement (indicate components included in delivery): .....
- 10.4 Description of means of automatic transmission of information about the accident (if fitted): .....
- 10.5 Description of method(s) of attachment to the vehicle: .....
- 10.6 Drawing(s) showing the position of the e-call device/system: .....
11. Approval procedure (I, II, ~~III~~) .....

## Annex 6

### Information document relating to the type approval of a vehicle with regard to AECS

The following information, if applicable, shall be supplied in triplicate and shall include a list of contents.

Any drawings shall be supplied in appropriate scale and in sufficient detail on size A4 paper or on a folder of A4 format.

Photographs, if any, shall show sufficient detail.

#### General

1. Make (trade name of manufacturer): .....
2. Type and general commercial description(s): .....
3. Means of identification of type, if marked on the vehicle: .....
4. Location of the marking: .....
5. Location of and method of affixing the approval mark: .....
6. Category of vehicle: .....
7. Name and address of manufacturer: .....
8. Address(es) of assembly plant(s): .....
9. Photograph(s) and/or drawing(s) of a representative vehicle: .....
10. E-call device/system
- 10.1 Make (trade name of manufacturer): .....
- 10.2 Type and general commercial description(s): .....
- 10.3 Arrangement (indicate components included in delivery): .....
- 10.4 Description of means of automatic transmission of information about the accident (if fitted): .....

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## Annex 7

### Test method for resistance to mechanical impact (paragraphs 7.6. and 17.3.)

1. Purpose  
The purpose of this test is to verify the safety performance of the representative AECD installation under inertial loads which may occur during a vehicle crash.
2. Installation
  - 2.1. This test shall be conducted either with the complete representative AECD installation or with related representative AECD installation subsystem(s) including the electrical connections. If the manufacturer chooses to test with related subsystem(s), the manufacturer shall demonstrate that the test result can reasonably represent the performance of the complete representative AECD installation with respect to its safety performance under the same conditions.
  - 2.2. The tested-device shall be connected to the test fixture only by the intended mountings provided for the purpose of attaching the representative AECD installation.
3. Procedures
  - 3.1. General test conditions and requirements  
The following condition shall apply to the test:
    - (a) The test shall be conducted at an ambient temperature of  $20 \pm 10$  °C,
    - (b) At the beginning of the test, the battery shall be charged at the level recommended by the manufacturer;
    - (c) At the beginning of the test, all protection devices which effect the function of the tested-device and which are relevant to the outcome of the test, shall be operational.
  - 3.2. Test procedure  
**The sled with the AECD components shall be decelerated or, at the choice of the applicant, accelerated such that the curve remains within the area of the graph in Table 1 of this Annex, and the total velocity change  $\Delta V$  is maximum 70 [+0/-2km/h]. However if, with the agreement of the applicant, the test was performed at a higher acceleration or deceleration level, a higher  $\Delta V$  and/or longer duration the test shall be considered satisfactory.**  
~~The AECD shall be decelerated or, at the choice of the applicant, accelerated in compliance with the acceleration corridors which are specified in Table 1. The Technical Service in consultation with the manufacturer shall decide whether the tests shall be conducted in either the positive or negative direction or both.~~  
For each of the test pulses specified, a separate tested-device may be used.  
The test pulse shall be within the minimum and maximum value as specified in Table 1. A higher shock level and /or longer duration as described in the maximum value in Table 1 can be applied to the AECD if recommended by the manufacturer.

Figure 1  
Generic description of test pulses

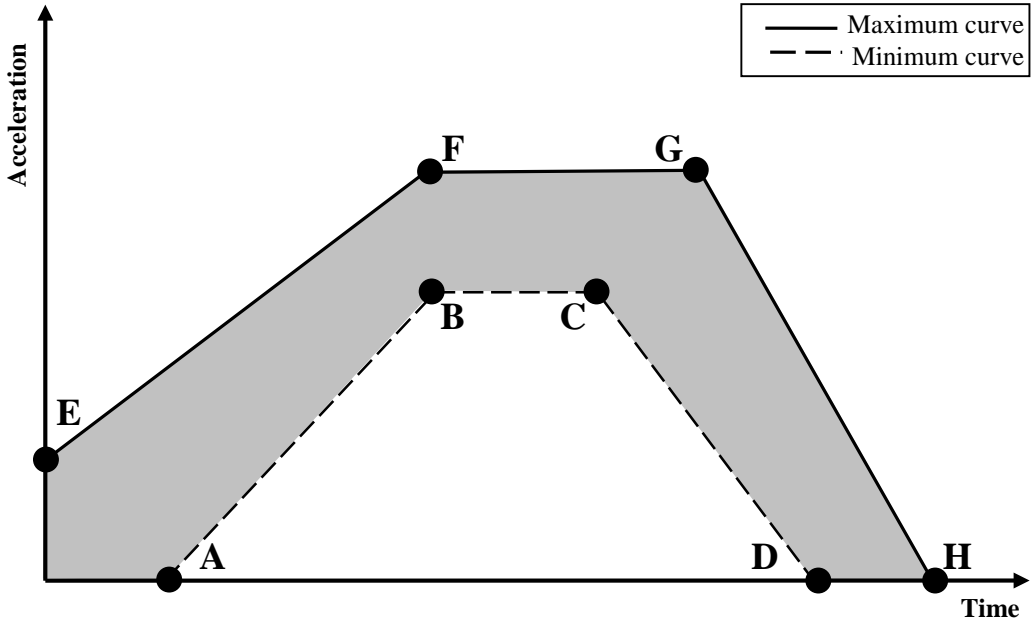


Table 1 for M<sub>1</sub> and N<sub>1</sub> vehicles:

<i>Point</i>	<i>Time (ms)</i>	<i>Acceleration (g)</i>
<b>A</b>	<b>10</b>	<b>0</b>
<b>B</b>	<b>34</b>	<b>65</b>
<b>C</b>	<b>38</b>	<b>65</b>
<b>D</b>	<b>46</b>	<b>0</b>
<b>E</b>	<b>0</b>	<b>16</b>
<b>F</b>	<b>25</b>	<b>77</b>
<b>G</b>	<b>47</b>	<b>77</b>
<b>H</b>	<b>60</b>	<b>0</b>

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## Annex 8

### Test methods for the navigation solutions (paragraphs 7.2 and 17.2)

The purpose of the tests in this Annex is to verify the compliance of navigation characteristics of the AECD/AECS calculated by its GNSS receiver navigation module, to the requirements defined in sections 7.2 and 17.2. of this Regulation.

#### 1. Definitions

For the purposes of this Annex:

- 1.1 “Global Navigation Satellite System (GNSS)” means a satellite based system that is used to pinpoint the location, speed and time of a user's receiver in any point of the Earth surface, water areas, air space, and in the near-Earth space environment.
- ~~1.2 “Global Navigation Satellite System receiver” (“GNSS receiver”) means a component of an AECD/AECS designed to determine time, the position and direction of the vehicle using signals from global navigation satellite systems.~~
- ~~1.3 “Satellite Based Augmentation System” (SBAS) means is a system ensuring the correction of local errors of GNSS systems due to interferences via a network of ground-based stations. (ex: EGNOS, WAAS, SDCM, QZSS)~~
- 1.4 “Cold” start mode” means the condition of the GNSS receiver when position, velocity, time, almanac and ephemeris data are not stored in the receiver, and therefore the navigation solution is to be calculated by means of a full sky search;

#### 2. Test conditions

- 2.1 The test object is the AECD/AECS, which includes a navigation receiver and a GNSS antenna, specifying navigation characteristics and features of the tested system.
- 2.1.1 The number of the AECD/AECS test samples shall be at least 3 pieces.
- 2.1.2 The AECD/AECS is provided for the test with the installed SIM-card, operation manual and the software (provided on electronic media).
- 2.1.3 The attached documents shall contain the following data:
- device serial number;
  - hardware version;
  - software version;
  - device provider identification number ;
  - ~~—unique device identifier, assigned by the system operator in case of the first activation of the device.~~
  - the originals of the **relevant technical documentation to perform the tests.** operation manual containing specified convergence shall be provided. **For carrying out tests**
- 2.1.4. Tests are carried out in normal climatic conditions in accordance with standard ISO 16750-1:2006:
- air temperature  $(23 \pm 5) ^\circ\text{C}$  and
  - relative air humidity of 25 % to 75 %.

~~2.1.5. Technical service of tested samples during tests is not conducted.~~

2.1.6. Tests of the AECD/AECS in respect of its navigation receiver shall be performed with test and auxiliary equipment specified in Table 4.

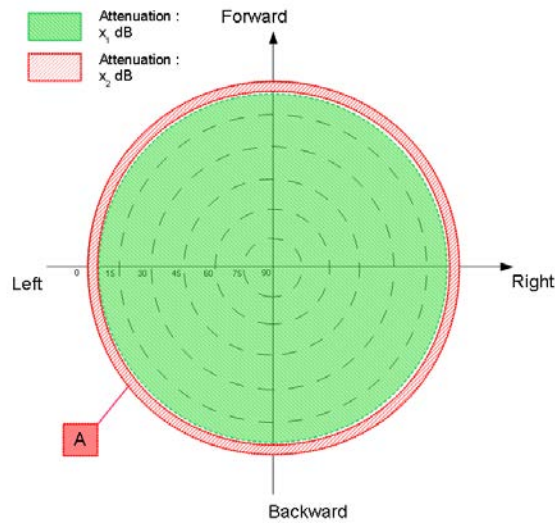
Table XXX4 – Recommended list of measurement instruments, test and auxiliary equipment

Equipment name	Required technical characteristics of test equipment	
	Scale range	Scale accuracy
Global navigation satellite system simulator of GLONASS, Galileo and GPS signals	Number of simulated signals: at least 18	Mean square deviation of random accuracy component of pseudo-range to GLONASS / Galileo / GPS satellites not more: <ul style="list-style-type: none"> <li>- <i>stadiometric code phase: 0,1 m;</i></li> <li>- <i>communication carrier phase: 0,001 m;</i></li> <li>- <i>pseudovelocity: 0,005 m/s.</i></li> </ul>
Digital stopwatch	Maximum count volume: 9h 59 min 59,99s	Daily variation at (25+5)°C: not more + 1,0s. Time discreteness: 0,01s.
Vector network analyzer	Frequency range: 300 kHz .. 4000 kHz  Dynamic range: (minus 85 .. 40) dB	AccF 1·10 <sup>-6</sup> AccA (0,1 .. 0,5) dB
Low-noise amplifier	Frequency range: 1200.. 1700 MHz  Noise coefficient: not more 2,0 dB  Amplifier gain coefficient: 24 dB	
Attenuator	Dynamic range: (0 .. 11) dB	Acc ± 0,5 dB
Attenuator	Dynamic range: (0 .. 110) dB	Acc ± 0,5 dB
Power source	Range of direct current voltage setting from 0,1 to 30 V  Current intensity of output voltage at least 3A	Acc 0 ± 3% Acc 1 ± 1%
N o t e – it is allowed to apply other similar types of equipment providing determination of characteristics with required accuracy.		

2.1.7. Unless otherwise specified, GNSS signal simulation shall follow “Open sky” pattern as shown in Figure 1.

Figure 1: Open sky definition

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



1) Open Sky plot - Attenuation:

	0 dB
A	-100 dB or signal is switched off

3. Test procedures
  - 3.1. NMEA-0183 messages output test.
    - 3.1.1 Make connections according to Figure 2.

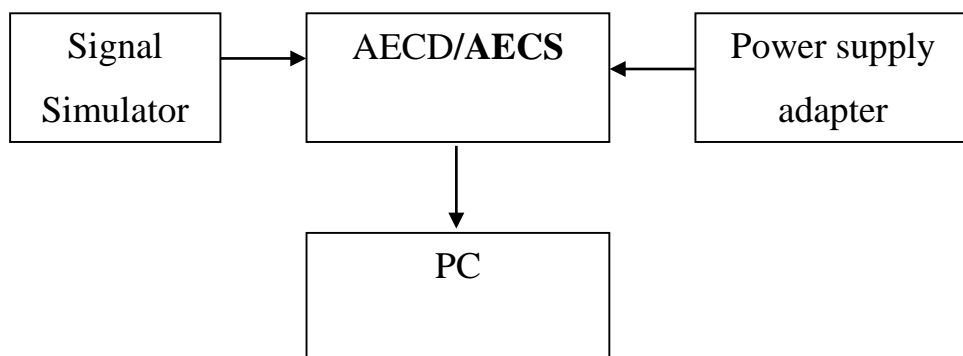


Figure 2 – Diagram of test stand



- 3.1.2 Prepare and turn on the AECD/AECS. By means of operation manual and developer software set up the GNSS receiver for receiving signals from GLONASS, Galileo, GPS GNSS and SBAS . Set up the GNSS receiver to output NMEA-0183 messages (messages RMC, GGA, VTG, GSA and GSV).
- 3.1.3 Set up the simulator according to the simulator user guide. Initialize simulator script with the parameters, given in Table 5 for GLONASS, Galileo, GPS GNSS and SBAS signals.

T a b l e 5 – Main parameters of simulation script for static scenario

Simulated parameter	Value
Test duration, hh:mm:ss	01:00:00
Output frequency	1 Hz
AECD/AECS location:	Any specified land point between latitude range 80°N and 80°S in coordinate system WGS84
Troposphere: Ionosphere:	Standard predefined model by the GNSS simulator  Standard predefined model by the GNSS simulator
PDOP value	$\leq \geq 2.5$ in the test time interval
Simulated signals	- GNSS GLONASS (L1 frequency band CT code); - GNSS Galileo (E1 frequency band OS); - GNSS GPS (L1 frequency band C/A code); - Combined GNSS GLONASS/Galileo/GPS/SBAS.
Signal strength: - GNSS GLONASS; - GNSS Galileo; - GNSS GPS	minus 141 dBm; minus 135 dBm; minus 138,5 dBm.
Number of simulated satellites:	- at least 6 GLONASS satellites; - at least 6 Galileo satellites; - at least 6 GPS satellites; - at least 2 SBAS satellites

- 3.1.4 By means of corresponding serial interface set the connection between the AECD/AECS and PC. Control the possibility of receiving navigation information via NMEA-0183 protocol. The value of field 6 in the GGA messages is set to “2”.
- 3.1.5 Test results are considered successful if navigation information via NMEA-0183 protocol is received.

- 
- 3.2 Assessment of positioning accuracy in autonomous static mode.
- 3.2.1 Make connections according to Figure 2.
- 3.2.2 Prepare and turn on the AECD/AECS. By means of developer software make sure that GNSS receiver is set up for receiving GNSS GLONASS, Galileo, GPS and SBAS combined signals. Set up navigation the GNSS receiver to output messages according to the NMEA-0183 protocol (GGA, RMC, VTG, GSA and GSV messages)
- 3.2.3 Set up the simulator in accordance with its operational manual. Start simulation of for combined GNSS GLONASS, Galileo, GPS and SBAS signals script with set parameters, given in Table 5.
- 3.2.4 Set up the recording of NMEA-0183 messages after receiving the navigation solution. Up to the moment the simulation script is complete, the NMEA-0183 messages are output by the GNSS receiver to a file.
- 3.2.5 Upon receiving the navigation solution set up recording of NMEA-0183 messages output by **GNSS receiver** to a file, up to the moment the simulation script is complete.
- 3.2.6 Extract coordinates: latitude (B) and longitude (L) contained in GGA (RMC) messages.
- 3.2.7 Calculate the systematic inaccuracy of coordinate's determination on stationary intervals according to formulas (1), (2), for example for latitude coordinate (B):

$$(1) \quad \Delta B(j) = B(j) - B_{truej},$$

$$(2) \quad dB = \frac{1}{N} \cdot \sum_{j=1}^N \Delta B(j),$$

Where

- Btruej is the actual value of B coordinate in “j” time moment, in angle seconds.;
- B(j) is the determined by the GNSS receiver value of B coordinate in “j” time moment, angle seconds;
- N is the amount of GGA (RMC) messages, received during the test of GNSS receiver.

Similarly calculate the systematic inaccuracy of L (longitude) coordinate.

- 3.2.8 Calculate Standard Deviation (SD) value according to formula (3) for B coordinate:

$$(3) \quad \sigma_B = \sqrt{\frac{\sum_{j=1}^N (B(j) - dB)^2}{N - 1}},$$

Similarly calculate the (SD) value for L (longitude) coordinate.

- 3.2.9 Convert calculated SD values of latitude and longitude determination from angle seconds to meters according to formulas (4) – (5):

- for latitude:

$$(4) \quad dB(M) = 2 \cdot \frac{a(1 - e^2)}{(1 - e^2 \sin^2 \varphi)^{3/2}} \cdot \frac{0,5'' \cdot \pi}{180 \cdot 3600''} \cdot dB,$$

- for longitude:

$$(5) \quad dL(M) = 2 \cdot \frac{a \cdot \cos \varphi}{\sqrt{1 - e^2 \sin^2 \varphi}} \cdot \frac{0,5'' \cdot \pi}{180 \cdot 3600''} \cdot dL,$$

Where

- a is the major semiaxis of ellipsoid, m
- e is the first eccentricity
- φ is the current latitude, in radian.

3.2.10 Calculate horizontal coordinates error (at confidence level 0.95) according to formula (6):

$$(6) \quad \Pi = \sqrt{dB^2(m) + dL^2(m)} + 2 \cdot \sqrt{\sigma_B^2(m) + \sigma_L^2(m)},$$

3.2.11 Repeat test procedures according to 3.2.3 – 3.2.9 only for GLONASS GNSS signals with simulation parameters, given in Table 5.

3.2.12 Repeat test procedures according to 3.2.3 – 3.2.9. only for GPS GNSS signals with simulation parameters, given in Table 5.

3.2.13 Repeat test procedures according to 3.2.3 – 3.2.9. for Galileo GNSS signals with simulation parameters, given in Table 5.

3.2.14 Repeat test procedures according to 3.2.3 – 3.2.9. with other AECD/AECS samples, provided for the test.

3.2.15 Determine average values according to (6) obtained for all tested AECD/AECS samples.

3.2.16 Tests results are considered satisfactory if horizontal position errors as defined by formula (6) obtained with all AECD/AECS samples do not exceed 15 m under open sky conditions at confidence level 0.95 for all simulation scripts.

3.3 Assessment of positioning accuracy in autonomous dynamic mode.

3.3.1 Repeat test procedures described in paragraph 3.2, but 3.2.10 - 3.2.12 with simulation script for manoeuvring movement given in Table 6

Table 6 – Main parameters of simulation script for manoeuvring movement

Simulated parameter	Value
Test duration, hh:mm:ss	01:00:00
Output frequency	1 Hz
AECD location: - CS WGS-84;	Any specified land point between latitude range 80°N and 80°S in coordinate system WGS84

Model of movement: - speed, km/h; turn radius, m; - turn acceleration, m/s <sup>2</sup>	Manoeuvring movement 140 500 0,2
Troposphere: Ionosphere:	Standard predefined model by the GNSS simulator Standard predefined model by the GNSS simulator
PDOP value	≤ ≥ 2.5 in the test time interval
Simulated signals	Combined GLONASS / Galileo / GPS / SBAS.
Signal strength: - GNSS GLONASS; - GNSS Galileo; - GNSS GPS	minus 141 dBm; minus 135 dBm; minus 138,5 dBm.
Number of simulated satellites:	- at least 6 GLONASS satellites; - at least 6 Galileo satellites; - at least 6 GPS satellites; - at least 2 SBAS satellites

- 3.3.2 Determine average values according to (6) obtained for all tested AECD/AECS samples.
- 3.3.3 Tests results are considered satisfactory if horizontal positions errors obtained with all AECD/AECS samples do not exceed 15 m under open sky conditions at confidence level 0.95.
- 3.4 Movement in shadow areas, areas of intermittent reception of navigation signals and urban canyons.
- 3.4.1 Repeat test procedures described in section 3.3 for simulation script for movement in shadow areas and areas of intermittent reception of navigation signals (Table 7) with an urban canyon signal pattern described in Fig.3.

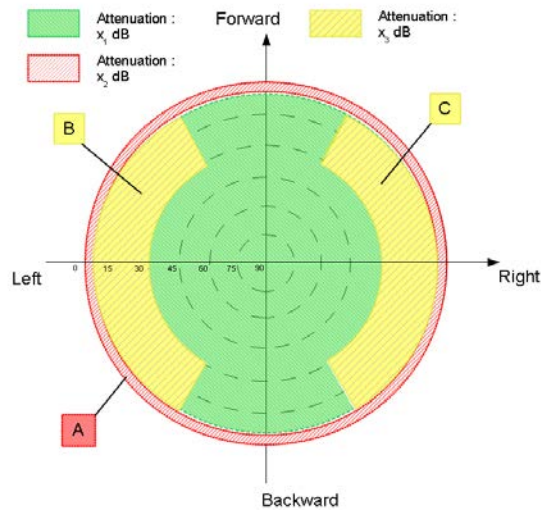
T a b l e 7 – Main parameters of movement in shadow areas and areas of intermittent reception of navigation signals

Simulated parameter	Value
Test duration, hh:mm:ss	01:00:00
Output frequency	1 Hz

Simulated parameter	Value
AECD/AECS location	Any specified land point between latitude range 80°N and 80°S in coordinate system WGS84
Model of movement: - speed, km/h; turn radius, m; - turn acceleration, m/s <sup>2</sup>	Maneuvering movement 140 500 0,2
Satellite visibility: - signal visibility intervals, s; - signal absence intervals, s.	300 600
Troposphere: Ionosphere:	Standard predefined model by the GNSS simulator Standard predefined model by the GNSS simulator
<b>PDOP value</b>	$\leq \geq 4$ in the test time interval
Simulated signals	Combined GLONASS / Galileo / GPS / SBAS.
Signal strength: - GNSS GLONASS; - GNSS Galileo; - GNSS GPS	minus 141 dBm; minus 135 dBm; minus 138,5 dBm.
Number of simulated satellites:	- at least 6 GLONASS satellites; - at least 6 Galileo satellites; - at least 6 GPS satellites; - at least 2 SBAS satellites

Figure 3: 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	



2) Urban canyon plot attenuation:

0 dB	0 dB
B	-40 dB
C	-40 dB
A	-100dB or signal is switched off

3.4.2 Tests results are considered satisfactory if horizontal coordinates errors obtained with all AECD samples do not exceed 40 m in urban canyon conditions at confidence level 0.95.

3.5 Cold start time to first fix test.

3.5.1 Prepare and turn on the AECD/AECS. By means of developer software make sure that GNSS module is set to receive GNSS GLONASS, Galileo and GPS signals.

3.5.2 Delete all position, velocity, time, almanac and ephemeris data from the navigation receiver.

3.5.3 Set up the simulator according to the simulator user guide. Initialize simulator script with the parameters, given in Table 5 for GNSS GLONASS, Galileo and GPS signals with signal level minus 130 dBm.

3.5.4 By means of a stop watch measure time interval between signal simulation start and the first navigation solution result.

3.5.5 Conduct test procedures according to 3.5.2 – 3.5.4 at least 10 times.

3.5.6 Calculate average time to first fix in cold start mode based on measurements for all AECD/AECS samples, provided for the test.

3.5.7 The test result is considered to be positive, if average values of time to first fix, calculated as described in 3.5.6 do not exceed 60 s for signal level down to minus 130 dBm for all the simulated signals.

3.5.8 Repeat test procedure according to 3.5.1-3.5.5 with signal level minus 140 dBm.

3.5.9 The test result according to 3.5.8 is considered to be positive, if average values of time to first fix, calculated as described in 3.5.6 do not exceed 300 s for signal level down to minus 140 dBm for all the simulated signals.

- 3.6 Test of re-acquisition time of tracking signals after block out of 60 s.
- 3.6.1 Prepare and turn on the AECD according to operational manual. By means of developer software make sure that the GNSS receiver is set up to receive GNSS GLONASS, Galileo and GPS signals.
- 3.6.2 Set up the simulator according to the simulator user guide. Initialize simulator script with the parameters, given in Table 5 for GNSS GLONASS, Galileo and GPS signals with signal level minus 130 dBm.
- 3.6.3 Wait for 15 minutes and make sure the GNSS receiver has calculated AECD/AECS position.
- 3.6.4 Disconnect the GNSS antenna cable from the AECD/AECS and connect it again after time interval of 60 s.  
By means of stopwatch determine time interval between cable connection moment and restoration of satellites tracking and calculation of the navigation solution.
- 3.6.5 Repeat test procedure according to 3.6.4 at least 10 times.
- 3.6.6 Calculate average value of re-acquisition time of satellite tracking signals by the AECD/AECS for all performed measurements and all AECD/AECS samples provided for the test.
- 3.6.7 The test result is considered to be positive, if average values of re-acquisition time after block out of 60 s measured as described in 3.6.6 do not exceed 20 seconds.
- 3.7 Test of navigation receiver sensitivity in cold start mode, tracking mode, and re-acquisition scenario.
- 3.7.1 Turn on the vector network analyser. Calibrate the network vector analyser according to its operational manual.
- 3.7.2 Set up the diagram according to Figure 4.

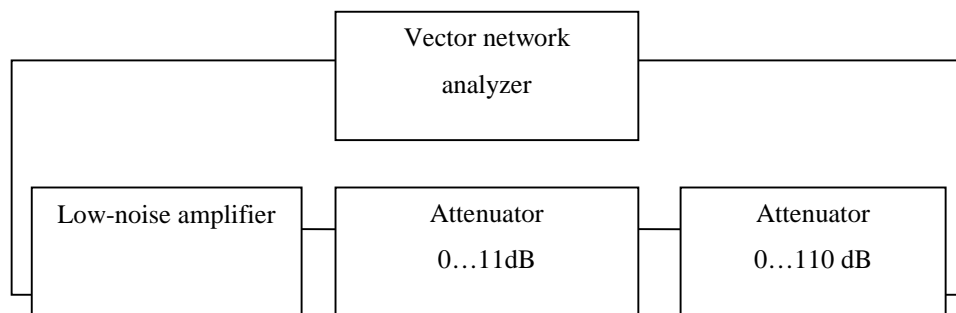
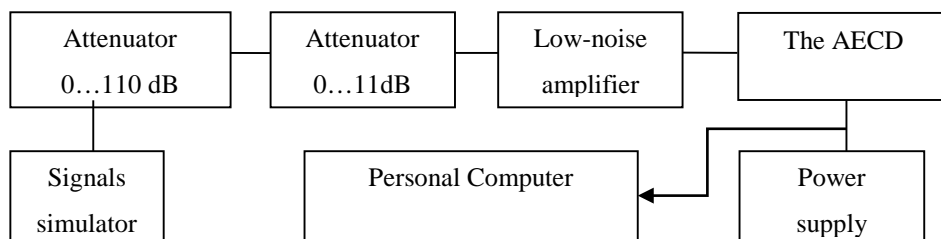


Figure 4 – Diagram of path calibration

- 3.7.3 Set zero signal path attenuation on attenuators. Measure the frequency response for a given signal path in the L1/E1 band of GNSS GLONASS/Galileo/GPS. Record the average path transmission factor in [dB] in this frequency band.
- 3.7.4 Assemble the circuit shown in Figure 5.



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Figure 5 – Arrangement for evaluation of GNSS module sensitivity

- 3.7.5** Prepare and turn on AECD/AECS according to operational manual. By means of developer software make sure that GNSS receiver is set to receive GNSS GLONASS, Galileo and GPS signals. Clear the navigation module RAM such that the “cold” start mode of the navigation module of the AECD/AECS is achieved. Check that the position, velocity and time information is reset.
- 3.7.6** Prepare GNSS signals simulator according to its operation manual. Start GNSS GLONASS/Galileo/GPS signals simulation script, with parameters given in Table 5. Set output power level of the simulator to minus 144 dBm..
- 3.7.7** By means of a stopwatch, measure time interval between signal simulation start and the first navigation solution result.
- 3.7.8** Set the signal path attenuation on attenuators such that the signal on AECD/AECS antenna input is equal to minus 155 dBm
- 3.7.9** By means of a stopwatch, verify that AECD/AECS still provides navigation solution for at least 600 s.
- 3.7.10** Set the signal path attenuation on attenuators such that the signal on AECD/AECS antenna input is equal to minus 150 dBm.
- 3.7.11** Disconnect the GNSS antenna cable from the AECD/AECS and connect it again after time interval of 20 s.
- 3.7.12** By means of stopwatch, determine time interval between cable connection moment and restoration of satellites tracking and calculation of the navigation solution.
- 3.7.13** The test result is considered to be positive, if
- The value of time to first fix in “cold” start mode as measured in 3.7.7 do not exceed 3600 s at signal level on the antenna input of the AECD/AECS of minus 144 dBm,
  - The GNSS navigation solution is available for at least 600 s at signal level on the antenna input of the AECD/AECS of minus 155 dBm as measured in 3.7.9, and
  - The re-acquisition of GNSS signals and calculation of the navigation solution at signal level on the antenna input of the AECD/AECS of minus 150 dBm is possible and time interval measured in 3.7.12 does not exceed 20 s.



## Annex 9

### Test method for emergency call (paragraphs 7.6 7.4 and 17.5.)

1. MSD emission assessment shall include verification of at least the following:
  - 1.1. Vehicle location data is transmitted correctly,
  - 1.2. time stamp is transmitted correctly, and
  - 1.3. Vehicle identification number is transmitted correctly
2. MSD emission assessment can be performed either
  - 2.1. By transmitting MSD to a simulator, or
  - 2.2. By transmitting MSD via real PLMN (Public Land Mobile Network)
3. Hands-free voice communication assessment (subjective test) shall include verification of the following:
  - 3.1. Voice originating inside the vehicle can be clearly heard by the remote listener with satisfactory intelligibility, and
  - 3.2. Speech of the remote speaker can be clearly heard in the vehicle with satisfactory intelligibility
  - 3.3. The language and sentence used for the test shall be one of those listed in appendix 1 to this Annex.**
  - 3.4. The rated performance according to appendix 2 to this Annex shall, be at least “3”**
4. Hands-free voice communication assessment can be performed either
  - 4.1. By establishing voice communication to a simulator, or
  - 4.2. By establishing voice communication via real PLMN
5. HMI operation assessment shall include the following
  - 5.1. Manual trigger (call generation) is working correctly. This is verified by checking if manual trigger leads to
    - 5.1.1. MSD transmission, which is verified according to paragraph 1 of this Annex, and
    - 5.1.2. Voice communication being established, which is verified according to paragraph 3 of this Annex.
  - 5.2. Call status indication is working properly. This is verified by checking that the following statuses are displayed during test according paragraph 5.1 of the current Annex: {
    - 5.2.1. system is processing (ecall is triggered, connection is being set up, data transmission is in progress or completed, or voice call is in progress)**
    - 5.2.2. transmission failed (connection failed or data transmission failed**
    - ~~5.2.3. Call initiated (dialing)~~
    - ~~5.2.4. MSD transmitted~~
    - ~~5.2.5. Waiting for PSAP operator to answer~~
    - ~~5.2.6. Call in progress}~~

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## Annex 9, appendix 1

### Language and sentence for Hands free voice assessment

Test sentence pairs, as defined in ITU-T P.501, Annex B, shall be used for the exchange of test messages in the send and receive directions.

Test sentence pairs in the language most commonly spoken by the testers shall be selected from a list.

Test sentences

All speech samples shall be processed such that the levels measured using a speech level voltmeter according are equal.

Examples, only languages relevant for Contracting parties signing UNECE AECS are relevant

- B.3.2 Dutch (fullband)

*Female 1:*

Dit produkt kent nauwelijks concurrentie.

Hij kende zijn grens niet.

*Female 2:*

Ik zal iets van mijn carrière vertellen.

Zijn auto was alweer kapot.

*Male 1:*

Zij kunnen de besluiten nemen.

De meeste mensen hadden het wel door.

*Male 2:*

Ik zou liever gaan lopen.

Willem gaat telkens naar buiten.

- B.3.3 English (fullband)

*Female 1:*

These days a chicken leg is a rare dish.

The hogs were fed with chopped corn and garbage.

*Female 2:*

Rice is often served in round bowls.

A large size in stockings is hard to sell.

*Male 1:*

The juice of lemons makes fine punch.

Four hours of steady work faced us.

*Male 2:*

The birch canoe slid on smooth planks.

Glue the sheet to the dark blue background.

- B.3.4 English (American)

*Female 1:*

We need grey to keep our mood healthy.

Pack the records in a neat thin case.

*Female 2:*

The stems of the tall glasses cracked and broke.

The wall phone rang loud and often.

*Male 1:*

The shelves were bare of both jam or crackers.

A joy to every child is the swan boat.

*Male 2:*

Both brothers were the same size.

In some form or other we need fun.

- B.3.5 Finnish (fullband)

*Female 1:*

Ole ääneti tai sano sellaista, joka on parempaa kuin vaikeneminen.

Suuret sydämet ovat kuin valtameret, ne eivät koskaan jäädy.

*Female 2:*

Jos olet vasara, lyö kovaa. Jos olet naula pidä pääsi pystyssä.

Onni tulee eläen, ei ostaen.

*Male 1:*

Rakkaus ei omista mitään, eikä kukaan voi sitä omistaa.

Naisen mieli on puhtaampi, hän vaihtaa sitä useammin.

*Male 2:*

Sydämellä on syynsä, joita järki ei tunne.

On opittava kärsimään voidakseen elää.

- B.3.6 French (fullband)

*Female 1:*

On entend les gazouillis d'un oiseau dans le jardin.

La barque du pêcheur a été emportée par une tempête.

*Female 2:*

Le client s'attend à ce que vous fassiez une réduction.

Chaque fois que je me lève ma plaie me tire.

*Male 1:*

Vous avez du plaisir à jouer avec ceux qui ont un bon caractère.

Le chevrier a corné pour rassembler ses moutons.

*Male 2:*

Ma mère et moi faisons de courtes promenades.

La poupée fait la joie de cette très jeune fille.

- B.3.7 German

*Female 1:*

Zarter Blumenduft erfüllt den Saal.

Wisch den Tisch doch später ab.

*Female 2:*

Sekunden entscheiden über Leben.

Flieder lockt nicht nur die Bienen.

*Male 1:*

Gegen Dummheit ist kein Kraut gewachsen.

Alles wurde wieder abgesagt.

*Male 2:*

Überquere die Strasse vorsichtig.

Die drei Männer sind begeistert.

- B.3.8 German (fullband)

*Female 1:*

Im Fernsehen wurde alles gezeigt,

Alle haben nur einen Wunsch.

*Female 2:*

Kinder naschen Süßigkeiten.

Der Boden ist viel zu trocken.

*Male 1:*

Mit einem Male kam die Sonne durch.

Das Telefon klingelt wieder.

*Male 2:*

Sekunden entscheiden über Leben.

Flieder lockt nicht nur die Bienen.

- B.3.9 Italian (fullband)

*Female 1:*

Non bisogna credere che sia vero tutto quello che dice la gente. Tu non conosci ancora gli uomini, non conosci il mondo.

Dopo tanto tempo non ricordo più dove ho messo quella bella foto, ma se aspetti un po' la cerco e te la prendo.

*Female 2:*

Questo tormento durerà ancora qualche ora. Forse un giorno poi tutto finirà e tu potrai tornare a casa nella tua terra.

Lucio era certo che sarebbe diventato una persona importante, un uomo politico o magari un ministro. Aveva a cuore il bene della società.

*Male 1:*

Non bisogna credere che sia vero tutto quello che dice la gente tu non conosci ancora gli uomini, non conosci il mondo.

Dopo tanto tempo non ricordo più dove ho messo quella bella foto ma se aspetti un po' la cerco e te la prendo.

*Male 2:*

---

Questo tormento durerà ancora qualche ora. Forse un giorno poi tutto finirà e tu potrai tornare a casa nella tua terra. Lucio era certo che sarebbe diventato una persona importante, un uomo politico o magari un ministro, aveva a cuore il bene della società.

▪ B.3.10 Japanese (fullband)

*Female 1:*

彼は鮎を釣る名人です。

Kare wa ayu wo tsuru meijin desu.

古代エジプトで十進法の原理が作られました。

Kodai ejipto de jusshinhou no genri ga tsukuraremashita.

*Female 2:*

読書の楽しさを知ってください。

Dokusho no tanoshisa wo shitte kudasai.

人間の価値は知識をどう活用するかで決まります。

Ningen no kachi wa chishiki wo dou katsuyou suruka de kimarimasu.

*Male 1:*

彼女を説得しようとしても無駄です。

Kanojo wo settoku shiyoutoshitemo mudadesu.

その昔ガラスは大変めずらしいものでした。

Sono mukasi garasu wa taihen mezurashii monodeshita.

*Male 2:*

近頃の子供たちはひ弱です。

Chikagoro no kodomo tachi wa hiyowa desu.

イギリス人は雨の中を平気で濡れて歩きます。

Igrisujin wa ameno nakawo heikide nurete arukimasu.

▪ B.3.11 Polish

*Female 1:*

Pielęgniarki były cierpliwe.

Przebiegał szybko przez ulicę.

*Female 2:*

Ona była jego sekretarką od lat.

Dzieci często płaczą kiedy są głodne.

*Male 1:*

On był czarującą osobą.

Lato wreszcie nadeszło.

*Male 2:*

Większość dróg było niezmiernie zatłoczonych.

Mamy bardzo entuzjastyczny zespół.

▪ B.3.12 Spanish (American)

*Female 1:*

No arroje basura a la calle.

Ellos quieren dos manzanas rojas.

*Female 2:*

No cocinaban tan bien.

Mi afeitadora afeitada al ras.

*Male 1:*

Vé y siéntate en la cama.

El libro trata sobre trampas.

*Male 2:*

El trapeador se puso amarillo.

El fuego consumió el papel.

## Annex 9, appendix 2

## Intelligibility/listening effort (ITU P1100)

## Description:

The rating table is applied to evaluate the effort required to understand the meaning of words and sentences. The applicable test cases are single talk and the rating scale is given in Table C.5.

The question heading this scale shall be:

*“How would you judge the effort required to understand words and sentences of your remote partner?”*

Table C.5 – Intelligibility/listening-effort

Rating description Grade

**Table C.5 – Intelligibility/listening-effort**

<b>Rating description</b>		<b>Grade</b>
Every word was clearly understood with no effort required		5
Speech of the other side was understood with no appreciable effort required		4
Some words were hard to understand, moderate effort was required		3
Many words were hard to understand, considerable effort was required		2
No meaning understood with any feasible effort		1

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## Annex 10

### **Test method for verifying the on-board AECD via functional check (paragraph 17.5. ~~17.3.3~~ ~~16.3.3~~.)**

1. The functional check of the in-vehicle system shall be performed via one out of the three methods laid down in paragraphs 2. to 5. below.

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 the function of all devices belonging to the AECD scope (Antennas, power supply, microphone, 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.**

(\*) **An obstruction of the antenna by a metallic part could be detected and indicated as a network failure. In this case, a visual control can be performed around the antenna (or AECD Unit in the case of an internal antenna), if the antenna is not within the safe zone.**

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

When

- the vehicle's diagnostic bus is still functioning and the AECS Unit is still 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 the for following devices (Antennas, power supply, Mic, speaker, wiring harness, information signal and manual control ), 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 the memory.

4. Verification of functional state of the in-vehicle system by 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 (Antennas, power supply, Microphone, speaker, wiring harness and manual control) are removable and/or 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.

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 **or** removable for the visual control or 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

## Annex 10, Appendix 1: Verification of functional state of the in-vehicle system by separated functional test

This appendix defines minimum test conditions (as far as applicable) and failure criteria for verification of functional state of the in-vehicle system by separate functional test

### (3) AECD

Subject	Item subject to confirmation	Criteria	Example of confirmation method
AECD	Generation of triggering (when a collision detection signal (CDS) is received)	<ul style="list-style-type: none"> <li>- No record of triggering signal in AECS unit before collision test.</li> <li>- Record of triggering signal is correctly stored in the AECD memory. The time stamp of the record should be same or right after the time of collision test if unit has a capability to store time stamp of record.</li> <li>- Activation of emergency calling is confirmed.</li> </ul>	<ul style="list-style-type: none"> <li>- The record confirmation of the internal memory using a diagnostic tool.</li> <li>- The visual observation of the eCall operation display</li> </ul>
	Initiate transmission of MSD	MSD is correctly stored in the AECD memory. The time stamp of the record should be same or right after the time of crash test if unit has a capability to store time stamp of record.	<ul style="list-style-type: none"> <li>- Confirm that MSD data (notice data of a collision transmitted to a call center) remains in the internal memory as un-transmitting</li> <li>- The record confirmation of the internal memory</li> </ul>

### (2) Harness

Subject	Item subject to confirmation	Criteria	Example of the confirmation method
Battery and battery harness (in case of absence of sub-battery)	Battery function	Voltage above operating minimum value (at AECD side)	<ul style="list-style-type: none"> <li>- Battery voltage confirmation</li> <li>- Terminal <del>11</del> <del>12</del> <del>13</del> <del>14</del> <del>15</del> <del>16</del> <del>17</del> <del>18</del> <del>19</del> <del>20</del> <del>21</del> <del>22</del> <del>23</del> <del>24</del> <del>25</del> <del>26</del> <del>27</del> <del>28</del> <del>29</del> <del>30</del> <del>31</del> <del>32</del> <del>33</del> <del>34</del> <del>35</del> <del>36</del> <del>37</del> <del>38</del> <del>39</del> <del>40</del> <del>41</del> <del>42</del> <del>43</del> <del>44</del> <del>45</del> <del>46</del> <del>47</del> <del>48</del> <del>49</del> <del>50</del> <del>51</del> <del>52</del> <del>53</del> <del>54</del> <del>55</del> <del>56</del> <del>57</del> <del>58</del> <del>59</del> <del>60</del> <del>61</del> <del>62</del> <del>63</del> <del>64</del> <del>65</del> 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<del>663</del> <del>664</del> <del>665</del> <del>666</del> <del>667</del> <del>668</del> <del>669</del> <del>670</del> <del>671</del> <del>672</del> <del>673</del> <del>674</del> <del>675</del> <del>676</del> <del>677</del> <del>678</del> <del>679</del> <del>680</del> <del>681</del> <del>682</del> <del>683</del> <del>684</del> <del>685</del> <del>686</del> <del>687</del> <del>688</del> <del>689</del> <del>690</del> <del>691</del> <del>692</del> <del>693</del> <del>694</del> <del>695</del> <del>696</del> <del>697</del> <del>698</del> <del>699</del> <del>700</del> <del>701</del> <del>702</del> <del>703</del> <del>704</del> <del>705</del> <del>706</del> <del>707</del> <del>708</del> <del>709</del> <del>710</del> <del>711</del> <del>712</del> <del>713</del> <del>714</del> <del>715</del> <del>716</del> <del>717</del> <del>718</del> <del>719</del> <del>720</del> <del>721</del> <del>722</del> <del>723</del> <del>724</del> <del>725</del> <del>726</del> <del>727</del> <del>728</del> 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<del>1180</del> <del>1181</del> <del>1182</del> <del>1183</del> <del>1184</del> <del>1185</del> <del>1186</del> <del>1187</del> <del>1188</del> <del>1189</del> <del>1190</del> <del>1191</del> <del>1192</del> <del>1193</del> <del>1194</del> <del>1195</del> <del>1196</del> <del>1197</del> <del>1198</del> <del>1199</del> <del>1200</del> <del>1201</del> <del>1202</del> <del>1203</del> <del>1204</del> <del>1205</del> <del>1206</del> <del>1207</del> <del>1208</del> <del>1209</del> <del>1210</del> <del>1211</del> <del>1212</del> <del>1213</del> <del>1214</del> <del>1215</del> <del>1216</del> <del>1217</del> <del>1218</del> <del>1219</del> <del>1220</del> <del>1221</del> <del>1222</del> <del>1223</del> <del>1224</del> <del>1225</del> <del>1226</del> <del>1227</del> <del>1228</del> <del>1229</del> <del>1230</del> <del>1231</del> <del>1232</del> <del>1233</del> <del>1234</del> <del>1235</del> <del>1236</del> <del>1237</del> <del>1238</del> <del>1239</del> <del>1240</del> <del>1241</del> 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## (3) Component

Subject	Item subject to confirmation	Criteria	Example of the confirmation method
Telephone antenna (internal)	Function	No damage/deformation of AECD	Visual observation of AECD
Telephone antenna (external)	Function	No damage/deformation	No breakage by visual observation
		Measured Voltage Standing Wave Ratio (VSWR) satisfies the prescribed value	When there are breakage and deformation, remove antenna and confirm receiving sensitivity
Tell-tale	Display	<ul style="list-style-type: none"> <li>- No damage/deformation</li> <li>- Tell-tale lights on</li> </ul>	<ul style="list-style-type: none"> <li>- Visual observation of the display</li> <li>- apply prescribed voltage</li> </ul>
Microphone	Possibility of voice communication	Keep initial prescribed performance	<ul style="list-style-type: none"> <li>- Output sound pressure measurement by the standard input</li> <li>- Confirm by hearing the output of speaker with input (voice) to microphone (using function confirming software)</li> <li>- The language and sentence used for the test shall be one of those listed in appendix 1 to this Annex.</li> <li>- The rated performance according to appendix 2 to this Annex shall, be at least "3"</li> </ul>
Speaker	The possibility of voice communication	Keep initial prescribed performance	<ul style="list-style-type: none"> <li>- Output voltage measurement by the standard input sound</li> <li>- Confirm by hearing the output of speaker with input(voice) to microphone (using function confirming software)</li> <li>- The language and sentence used for the test shall be one of those listed in appendix 1 to this Annex.</li> <li>- The rated performance according to appendix 2 to this Annex shall, be at least "3"</li> </ul>
Wiring Harness	<ul style="list-style-type: none"> <li>- Wire snapping</li> <li>- Wire short-circuit</li> </ul>	No damage	Continuity check
Manual control	Function	No damage/	Disconnect button and measure the open and closed condition

## Annex 10, Appendix 2 Verification of functional state of the in-vehicle system by functional transmission test with wired procedure (for AECS with external antenna)

This appendix defines minimum test conditions (as far as applicable) and failures criteria for verification of functional state of the in-vehicle system by functional transmission test with wired procedure (for AECS with external antenna)

### (1) AECD

Subject	Item subject to confirmation	Criteria	Example of the confirmation method
AECD	Activation of automatic call and dial-up.	No calling sequence to PSAP performed before collision test	Connect AECD to Radio communication tester by wire or confirm status of indicator.
		Calling sequence to PSAP is performed after collision test	Confirm emergency calling sequence by PSAP simulator.
	Emission of MSD with antenna wire connection to simulator after the collision.	MSD has been emitted.	After completion of the emergency calling sequence, confirm the content of MSD

### (2) Harness

Subject	Item subject to confirmation	Criteria	Example of the confirmation method
Battery and battery harness (in case of absence of sub-battery)	Battery function	Voltage above operating minimum value (at AECD side)	Availability of battery can be confirmed by communication test with wire.
Sub battery (in case of presence of sub-battery)	Battery function	Correct AECS operation AECS with regard to prescribed functional items	-
Telephone antenna feeder wire	<ul style="list-style-type: none"> <li>- Wire snapping</li> <li>- Wire short-circuit</li> </ul>	No evidence of snapping damage and of wire short-circuit	By conducting the following tests: <ul style="list-style-type: none"> <li>3. measurement of resistance value between termination of lines</li> <li>ii. measurement of resistance value between line and vehicle structure ground</li> </ul>

## (3) Component

Subject	Item subject to confirmation	Criteria	Example of the confirmation method
Telephone antenna	Function	No damage/deformation	No breakage by visual observation
Tell-tale	Display	- No damage deformation - Tell-tale lights on	- Visual observation of the display - Apply prescribed voltage
Microphone	Possibility of voice communication	Voice message from vehicle can be confirmed at PSAP simulator.	Confirm voice condition during talking test with wire procedure.
			- One inspector of the technical service makes telephone call to another inspector of PSAP simulator side through PSAP simulator. - The language and sentence used for the test shall be one of those listed in appendix 1 to this Annex. - The rated performance according to appendix 2 to this Annex shall, be at least "3"
Speaker	Possibility of voice communication	Voice message from PSAP simulator can be confirmed at vehicle side.	- One inspector of the technical service makes telephone call to another inspector of PSAP simulator side through PSAP simulator. - The language and sentence used for the test shall be one of those listed in appendix 1 to this Annex. - The rated performance according to appendix 2 to this Annex shall, be at least "3"
Manual control	Function	No damage/deformation	Disconnect button and measure the open and closed condition

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## Annex 11

### Definition of Minimum Set of Data – MSD (paragraph 13.7)

The following table lists the minimum set of data (MSD) that shall be conveyed during the Ecall data transmission to the PSAP.

**Table 1 — Minimum Set of Data (MSD) to be conveyed to PSAP**

<b>Short Name of MSD Element</b>	<b>Description</b>
automaticActivation	Indicates whether a call was automatically or manually triggered
testCall	Indicates whether the call is a test call or a real emergency call
positionCanBeTrusted	Indicates whether the position given in the position elements can be trusted or has only low confidence
vehicleType	Provides a vehicle type
VIN	Vehicle Identification number
vehiclePropulsionStorageType	Provides the propulsion type of the vehicle
timeStamp	Timestamp of the initial data message generation within the current Ecall incident event
positionLatitude	The last known vehicle Latitude position determined at the latest moment possible before message generation
positionLongitude	The last known vehicle Longitude position determined at the latest moment possible before message generation
vehicleDirection	The vehicle's last known real direction of travel determined at the latest moment possible before message generation.

**Annex 12**

## Annex 13

### TABLE OF TESTS

		M1				N1	
		M1 ≤ 2.5 t		M1 > 2.5 t		R ≤ 700 mm	R > 700 mm
		R ≤ 700 mm § 16.1.5.1.	R > 700 mm § 16.1.5.3.	R ≤ 700 mm § 16.1.5.1.	R > 700 mm § 16.1.5.4.		
UN R94 impact test	§ 17.3.1.		-	-	-	-	
UN R95 impact test	§ 17.3.2.	-	§ 17.3.2.	-	§ 17.3.2.	-	
Documentation	§ 17.3.3.	Frontal impact provisions of § 17.3.3.	Side impact provisions of § 17.3.3.	§ 17.4.	Side impact provisions of § 17.3.3.	Relevant provisions of § 17.4.	
GNSS	§ 16.2.						