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National Standard of the People's Republic of China

GB 45672—2025

On-board accident emergency call system

车载事故紧急呼叫系统

(English Translation)

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Foreword

This document is drafted in accordance with the rules given in the GB/T 1.1-2020 Directives for standardization -- Part 1: Rules for the structure and drafting of standardizing documents.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The issuing body of this document shall not be held responsible for identifying any or all such patent rights.

This document was proposed and prepared by Ministry of Industry and Information Technology of the People's Republic of China.

On-board accident emergency call system

1 Scope

This document specifies the technical requirements, determination requirements of the same type of on-board accident emergency call system, and describes the corresponding test methods.

This document is applicable to on-board accident emergency call system of categories M₁ and N₁ vehicles.

2 Normative References

The following documents for the application of this document are essential. For dated reference documents, only the dated edition applies to this document. For undated reference documents, the latest edition (including all amendments) applies to this document.

GB 11551-2014 *The protection of the occupants in the event of a frontal collision for motor vehicle*

GB/T 15089 *Classification of power-driven vehicles and trailers*

GB 16735 *Road vehicle — Vehicle identification number (VIN)*

GB 20071-2025 *The protection of the occupants in the event of a lateral collision*

GB 20072-2024 *The requirements of safety in the event of rear-end collision for passenger car*

GB/T 20913-2007 *The protection of the occupants in the event of an off-set frontal collision for passenger car*

GB 34660-2017 *Road vehicles — Requirements and test methods of electromagnetic compatibility*

GB 39732-2020 *Vehicle event data recorder system*

GB/T 43187-2023 *On-board wireless communication terminal*

GB/T 45086.1-2024 *Technical requirements and test methods for on-board positioning system -- Part 1: Satellite positioning*

GB/T 45314-2025 *Road vehicles -- Performance requirements and test methods for hands free communication and voice interaction*

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1 On-board accident emergency call system; AECS

A system that synchronously sends the vehicle's location and vehicle's relevant status information to emergency call service platform and establishes voice communication after it is automatically activated in the event of an accident through vehicle's internal strategy or manually triggered by the personnel in the vehicle.

3.2 On-board wireless communication terminal

An electronic device which is installed on vehicle and is able to establish connection through technologies such as cellular mobile communication and conduct information interaction.

Note: On-board wireless communication terminal usually consists of components such as transmitter, receiver, antenna, controller and cable.

[Source: GB/T 43187-2023, 3.1]

3.3 Emergency call service platform

A service-based platform that responds to or transfers emergency call information from vehicles.

3.4 Power supply

The component that supplies power to AECS.

3.5 Back-up power supply

The component that supplies power to AECS in case of power supply fault.

3.6 On-board satellite positioning system

A system that is installed on a vehicle and utilizes radio signals emitted by artificial earth satellites for positioning, velocity measurement and timing.

[Source: GB/T 45086.1-2024, 3.1]

3.7 Control module

A module used in AECS to confirm that it implements the combined function of all of its modules.

4 Technical Requirements

4.1 General requirements

4.1.1 Categories M_1 and N_1 vehicles shall be equipped with AECS. AECS usually consists of components such as control module, on-board wireless communication terminal, on-board satellite positioning systems, warning signal devices, information signal device, power supply and back-up power supply (if any).

4.1.2 AECS shall be connected to the vehicle's electrical and electronic network, and when the vehicle's ignition (start) switch is in the "ON" (RUN) state or between the "ON" (RUN) and "start" states, the following functions shall be achieved:

- Receive and/or generate automatic and manual triggering signals;
- Send Set of Data and at least meet the requirements of Annex A;
- Provide warning signals and information signals;
- Establish a two-way voice communication with the emergency call service platform.

4.1.3 When AECS attempts to establish a connection with the emergency call service platform after receiving and/or generating a trigger signal, it shall meet the following requirements:

- Minimum Set of Data (MSD) is stored in non-volatile memory, MSD is sent to the emergency call service platform through authentic digital identity authentication, and a two-way voice communication connection is established with the emergency call service platform;
- In case of failure of send of MSD, then attempts are made to send the MSD again at intervals of not more than 2min until the sending is successful or the attempt time is not less than 60min;
- If the voice communication connection fails to be established, then attempts are made to establish the voice communication connection again at intervals not more than 2min until the connection is successful or the attempt time is not less than 60min.

4.1.4 After the voice communication connection is established, the voice communication connection is only allowed to be hung up by the emergency call service platform, and is not allowed to be actively hung up by AECS. If the voice communication connection is interrupted due to

abnormal conditions, AECS shall make attempt to establish the voice communication connection with the emergency call service platform again.

4.1.5 The back-up power supply of AECS (if any) shall have charging function. The power supply and back-up power supply of AECS (if any) shall support the AECS to autonomously conduct a voice communication mode for not less than 5min initially, then enter a standby mode for not less than 60min, and finally enter voice communication mode for not less than 5min.

4.1.6 AECS shall not be deactivated through human-machine interface (HMI) means except in special scenarios such as maintenance.

4.2 Position information requirements

On-board satellite positioning system used by AECS shall support the Beidou Priority or Beidou Single Mode specified in GB/T 45086.1-2024, and meet the corresponding mode requirements except for 5.5 in Chapter 5 of GB/T 45086.1-2024.

4.3 Network connection requirements

On-board wireless communication terminal used by AECS shall meet requirements of Chapter 5 of GB/T 43187-2023.

4.4 Trigger requirements

4.4.1 Automatic trigger

4.4.1.1 After conducting the test according to Annex B, AECS shall be automatically triggered, and the type of trigger in the MSD sent shall be automatic trigger, in which:

-- Category M₁ vehicles shall be capable of automatically detecting frontal collision, lateral collision, and rear collision of vehicle. The triggering conditions for AECS shall not exceed the deployment threshold value or equivalent threshold value of the vehicle's irreversible restraint device;

-- Category N₁ vehicles (excluding multi-purpose trucks) with a maximum design total mass not more than 2,500kg shall be capable of automatically detecting frontal collision and lateral collision of vehicle. The triggering conditions for AECS shall not exceed the deployment threshold value or equivalent threshold value of the vehicle's irreversible restraint device;

-- Category N₁ vehicles (excluding multi-purpose trucks) with a maximum design total mass more than 2,500kg shall be capable of automatically detecting lateral collision of vehicle. The triggering conditions for AECS shall not exceed the deployment threshold value or equivalent threshold value of the vehicle's irreversible restraint device;

-- Multi-purpose trucks shall be capable of automatically detecting frontal collision and lateral collision of vehicle. The triggering conditions for AECS shall not exceed the deployment threshold value or equivalent threshold value of the vehicle's irreversible restraint device.

4.4.1.2 If the AECS installed on the vehicle is capable of automatically detecting rollover accidents, then AECS shall be automatically triggered after the test conducted in accordance with Annex B.2.4, and the trigger type in the MSD sent shall be automatic trigger.

4.4.2 Manual trigger

4.4.2.1 The vehicle shall have a physical button for manual triggering AECS, after manual triggering, the type of trigger in the MSD sent shall be manual trigger.

4.4.2.2 The physical button of AECS shall be arranged in area accessible for both the driver and occupants in the front row seats without unfastening the seat belt.

4.4.2.3 The physical button of AECS shall have a function to prevent accidental triggering.

Example: Add a protective cover that can be easily opened with one hand without the help of tools, and configure a delay-triggered countdown mechanism or a long-press trigger mechanism, etc.

4.5 Information and functional requirements

4.5.1 Permanent markings indicating the AECS graphical symbol shall be arranged on or near the AECS physical button, and the AECS graphical symbol shall be selected in one of the following two ways:

- As shown in Figure 1, in which, the direction of the “telephone icon” can be adjusted;
- As shown in Figure 2, only the “SOS” symbol is retained.



Figure 1 Graphical symbol of
AECS -1



Figure 2 Graphical symbol of
AECS -2

4.5.2 The system functionality of AECS shall meet the requirements of Annex C when conducting the following tests:

- The manually triggering AECS;

-- The frontal collision test of GB 11551-2014 or off-set frontal collision test of GB/T 20913-2007 (not applicable to Category N₁ vehicles with a maximum design total mass more than 2,500kg);

-- The lateral collision test of GB 20071-2025;

-- The rear-end collision test of GB 20072-2024 (not applicable to Category N₁ vehicles).

4.5.3 AECS shall feature self-check function and provide visual prompt during failure period. When test is conducted as per D.2, the following requirements shall be met:

a) After completing the test in b) of D.2, the warning signal device of the AECS provides visual prompt;

b) After completing the test in c) of D.2, the warning signal device of AECS does not extinguish;

c) After completing the test in d) of D.2, the warning signal device of AECS extinguishes or quickly extinguishes after being illuminated.

4.6 Requirements on hands free communication performance

Narrowband communication quality and/or wideband communication quality of AECS shall meet the requirements of Chapter 5 in GB/T 45314-2025.

4.7 Shock resistant performance requirements

AECS shall be shock resistant. After conducting the test according to Annex E, AECS shall maintain power supply stability, operability, and functionality, and be able to send MSD through manual triggering.

4.8 Electromagnetic compatibility performance requirements

AECS shall meet the requirements on vehicle's immunity to electromagnetic radiation as specified in GB 34660-2017. During electromagnetic radiation immunity test of vehicles conducted according to GB 34660-2017, the immunity test conditions and failure determination criteria of AECS shall meet the requirements of Annex F.

5 Instruction Manual

The related content of AECS is described in the User Instruction Manual for Power-driven Vehicle Product of the vehicle, which shall include, but is not limited to:

-- The automatic trigger types and trigger conditions of AECS;

-- The manual trigger method of AECS and description of preventing accidental triggering;

-- Data items recorded and issued by AECS along with description of their purposes;

-- Description of AECS warning signal and information signal, as well as relevant handling method.

6 Determination of the Same Type

6.1 For automatic triggering requirements of AECS, it is considered to be the same type if the following stipulations are met:

- a) Change of kerb mass of vehicle is less than 8% (relative to the base model, the same below);
- b) The overall dimensions of the vehicle remain unchanged, and the ground clearance of the vehicle is the same or increased;
- c) The structure, dimension, contour and material of the sidewall of the passenger compartment remain unchanged;
- d) The drive motor or engine are arranged in the same way (transversely or longitudinally) and in the same position (front, middle and rear mounting);
- e) The model, manufacturer, and software version number of AECS (its control module) and module for generating automatic trigger signal (such as airbag electronic control unit) remain unchanged, or changes in their software version numbers do not affect the automatic triggering requirements of AECS;
- f) The AECS trigger threshold remains unchanged.

If the sliding table method is used for testing, then only e) and f) shall be used for the determination of same type.

6.2 For information and functional requirements of AECS, it is considered to be the same type if the following stipulations are met:

- a) The model, manufacturer, and software version number of AECS (at least including control module, on-board satellite positioning system, on-board wireless communication terminal) remain unchanged, or changes in their software version numbers do not affect the information and functional requirements of AECS;
- b) The electronic architecture and layout position of AECS remain unchanged;
- c) The manufacturer and capacity of the back-up power supply (if any) remain unchanged or increase (if the capacity of the back-up power supply decreases, then supplementary test shall be conducted as per 4.1.5);
- d) The model and manufacturer of the warning signal device and information signal device of AECS remain unchanged;

e) The automatic triggering conditions [i.e., a) to f) in 6.1] of AECS remain unchanged.

6.3 For requirements on hands free communication performance of AECS, it is considered to be the same type if the following stipulations are met:

a) The dimension and contour of the occupant compartment of vehicle remain unchanged;

b) The model, manufacturer, and layout position of microphone remain unchanged;

c) The model, manufacturer, and layout position of speaker remain unchanged;

d) The model, manufacturer, and software version number of the on-board wireless communication terminal used in AECS remain unchanged or changes in their software version numbers do not affect the requirements on hands free communication performance of AECS.

6.4 For shock resistant performance requirements of AECS, it is considered to be the same type if the following stipulations are met:

a) The model and manufacturer of AECS (at least including control module, on-board satellite positioning system, on-board wireless communication terminal) remain unchanged;

b) The model and manufacturer of power supply or back-up power supply involved in E.1 remain unchanged.

6.5 For electromagnetic compatibility performance requirements of AECS, if the model, manufacturer, electronic architecture and layout of AECS (at least including control module, on-board satellite positioning system, on-board wireless communication terminal) remain unchanged, then it is considered to be of the same type.

7 Implementation of the Standard

7.1 Enforce starting from the date of implementation of this document for new Category M₁ vehicles in type approval application.

7.2 Enforce starting from the 13th month after date of implementation of this document for Category M₁ vehicles with type approval.

7.3 Enforce starting from the 7th month after date of implementation of this document for new Category N₁ vehicles in type approval application.

7.4 Enforce starting from the 19th month after date of implementation of this document for Category N₁ vehicles with type approval.

Annex A
(Normative)
Minimum Set of Data (MSD)

A.1 Data description

A.1.1 Data type

See data type transmitted in protocol as per Table A.1.

Table A.1 Data type

Data Type	Description and Requirement
BYTE	Unsigned single-byte integer type (8-bit).
WORD	Unsigned double-byte integer type (16-bit).
SHORT	Signed double-byte integer type (16-bit).
DWORD	Unsigned four-byte integer type (32-bit).
LONG	Signed four-byte integer type (32-bit).
BYTE[n]	An array of n unsigned single-byte integer types.
LONG[n]	An array of n unsigned signed four-byte integer types.

A.1.2 Transmission rule

Protocol shall adopt big-endian of network byte sequence for transmission of data.

A.2 Minimum Set of Data (MSD) content

The MSD data format sent by AECS to the emergency call service platform shall comply with the provisions of Table A.2. Data items other than MSD shall be arranged after MSD.

Table A.2 Minimum Set of Data (MSD)

Field	Data Type	Length/Byte	Serial Number of Byte	Description
Version information	BYTE	1	0	Data range [1,255]; the corresponding version information number for this document shall be 1.
Identifier	BYTE	1	1	Data range [1,255]; AECS starts counting from 1 each time after trigger; within the same trigger, the count increases by 1 each time after the application layer MSD receives a new transmission request.
Trigger type	BYTE	1	2	1 represents automatic trigger; 0 represents manual trigger.
Test call	BYTE	1	3	1 represents test call; 0 represents real call.
Vehicle type	BYTE	1	4	Data range [1,255]; fill in the vehicle type that meets the definition of GB/T 15089, and fill in 1 for Category M1 vehicles; fill in 4 for Category N1 vehicles.
Vehicle Identification Number (VIN)	BYTE[17]	17	5-21	17-bit character in accordance with GB 16735.
Vehicle powertype	BYTE	1	22	Data range [0,255]; fuel type can be divided into: 0: Other; 1: Gasoline; 2: Diesel; 3: Electricity; 4: Mixed fuel; 5: Natural gas; 6: Liquefied petroleum gas; 7: Methanol; 8: Ethanol; 9: Solar energy; 10: Hydrogen; 11: Biofuel; 12: Dimethyl ether; 13: Gasoline hybrid; 14: Diesel hybrid; 15: Gas fuel hybrid; 16 to 254: Reserve; 255: Invalid Value.
Trigger time	DWORD	4	23-26	Data range [0,232-1]; the initial time is 01 January 1970, unit in seconds, with a resolution of 1. Expressed using Coordinated Universal

				Time (UTC), 0 represents invalid value.
Longitude of accident position	LONG	4	27-30	When AECS is triggered, the vehicle's longitude information. The east longitude is positive and the west longitude is negative. Data range [-231,231-1], unit in milliarcsec, with a resolution of 1. 2147483647 represents invalid value.
Latitude of accident position	LONG	4	31-34	When AECS is triggered, the latitude information of the vehicle. North latitude is positive and south latitude is negative. Data range [-231,231-1], unit in milliarcsec, with a resolution of 1. 2147483647 represents invalid value.
The latitude and longitude of 9 points before accident	LONG[18]	72	35-106	The acquisition frequency is 1Hz, and record the longitude and latitude of 9 points moved at last before the AECS is triggered. The data format refers to the longitude and latitude of the accident position. The recording method is shown in Table A.3.
Longitudinal velocity change of the vehicle	BYTE	1	107	The maximum value of longitudinal velocity change (ΔV) of the vehicle, unit in km/h, with a resolution of 1; the calculation method is in accordance with GB 39732-2020.
Lateral velocity change of the vehicle	BYTE	1	108	The maximum value of lateral velocity change (ΔV) of the vehicle, unit in km/h, with a resolution of 1; the calculation method is in accordance with GB 39732-2020.
Actual number of occupants	BYTE	1	109	Data range [0,255], fill in the actual number of occupants in the vehicle, if the total number of occupants in the vehicle cannot be obtained, fill in 255.
Rollover accident	BYTE	1	110	1 represents that rollover accident has occurred; 0 represents that no rollover

				accident has occurred; 255 represents invalid value.
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Table A.3 The data structure of longitude and latitude of the 9 points before the occurrence of data

LONG0 Serial Number of Byte 35 to 38				LONG1 39 to 42				LONG2 43 to 46				LONG3 47 to 50				LONG16 99 to 102				LONG17 103 to 106			
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		16	17	18	19	20	21	22	23
Longitude 1				Latitude 1				Longitude 2				Latitude 2					Longitude 9				Latitude 9			
Note: Latitude and longitude 1 is the point that is the closest from the “latitude and longitude of the accident position” in terms of time , the latitude and longitude 9 is the point that is the furthest from the “latitude and longitude of the accident position” in terms of time.																								

Annex B
(Normative)
Automatic Trigger Test Methods

B.1 Test conditions

B.1.1 When test is conducted according to B.2.1.1, B.2.2.1, B.2.3.1 and B.2.4.1, AECS -related components shall be installed on the body-in-white or tooling as per the original vehicle status, the installation direction of all components shall be the same as that of the original vehicle and including but not limited to the following components:

- a) Control module;
- b) On-board wireless communication terminal (can be without microphone and speaker);
- c) The power supply or back-up power supply, and shall be charged to the voltage recommended by manufacturer;
- d) Connector;
- e) On-board satellite positioning system;
- f) Module for generating automatic trigger signal (if any).

Manufacturers are allowed to choose to provide a test box which is connected to AECS to simulate the peripheral signal and load of AECS under real vehicle conditions. The test box meets the following conditions:

- The test chamber shall feature bus signal simulation function, simulation of real vehicle signal and transmission to AECS, however, the power supply and trigger signals for AECS shall not be provided by the test box;
- The test chamber shall feature necessary accessories such as peripheral sensor connected with AECS, load and hardwire connection components, and ensure normal work of AECS;
- For devices that operate during vehicle operation or are triggered to operate under certain computational logic, their status shall be preset to be "ON" .

B.1.2 When test is conducted according to B.2.1.2, B.2.2.2, B.2.3.2 and B.2.4.2, shall include all equipment normally installed, and shall be in a condition capable of normal operation. It is allowed to replace certain parts and components with equivalent mass substitutes under the precondition that the results of the automatic trigger test of AECS are not affected.

B.2 Test items

B.2.1 Frontal collision

B.2.1.1 Frontal collision test on sliding table

B.2.1.1.1 Fix the body-in-white or tooling on the collision test sliding table in such a way that the mounting direction simulates frontal collision.

B.2.1.1.2 The sliding table shall undergo collision testing according to one of the following acceleration waveforms:

- a) The test can be conducted using the acceleration waveform specified by the manufacturer, which shall be the acceleration-time curve collected from the non-deformable area of the vehicle body under the real vehicle collision test conditions described in B.2.1.2, and filtered with the filter class CFC 60 or 100Hz low-pass filter. The integrated velocity change $\Delta V_s(t)$ of the actual test result waveform shall not exceed the range of the specified waveform's integrated velocity change $[\Delta V_t(t) \pm 1]$ km/h at any time.
- b) Acceleration or deceleration is performed according to the standard acceleration channel range in Figure B.1 and the parameters in Table B.1, and the velocity change ΔV is (25 ± 1) km/h.

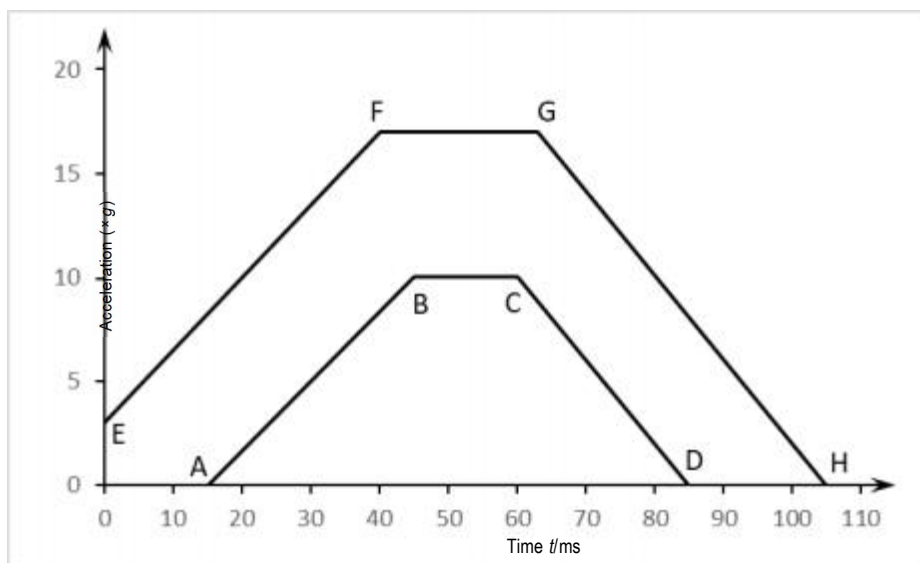


Figure B.1 Acceleration channel for automatic trigger in case of frontal collision

Table B.1 Acceleration parameters for automatic trigger in case of frontal collision

Point	Time t ms	Lower limit of acceleration (x g)	Point	Time t ms	Upper limit of acceleration (x g)
A	15	0	E	0	3
B	45	10	F	40	17
C	60	10	G	63	17
D	85	0	H	105	0

B.2.1.2 Frontal collision test on real vehicle

The test shall be conducted according to the provisions of GB 11551-2014, except for the following different test conditions:

- The test velocity is specified by the manufacturer and shall meet the requirements of 4.4.1 and shall not exceed (30 ± 1) km/h;
- It is allowed not to install collision dummy during the test, but it is necessary to arrange corresponding counterweight.

B.2.1.3 Result

After performing test according to B.2.1.1 or B.2.1.2, checking the trigger type in the received MSD.

B.2.2 Lateral collision

B.2.2.1 Lateral collision test on sliding table

B.2.2.1.1 Fix the body-in-white or tooling on the collision test sliding table in such a way that the mounting direction simulates lateral collision, the test shall be conducted on the driver's side. If the vehicle body structure or protective system is asymmetric, and the difference has an impact on the lateral collision performance, then the test shall be conducted on the side that is most unfavorable to the lateral collision performance as per the principle of the most unfavorable condition.

B.2.2.1.2 The sliding table shall undergo collision testing according to one of the following acceleration waveforms:

a) The test can be conducted using the acceleration waveform specified by the manufacturer, which shall be the acceleration-time curve collected from the non-deformable area of the vehicle body under the real vehicle collision test conditions described in B.2.2.2, and filtered with CFC 60 or 100Hz low-pass filter. The integrated velocity change $\Delta V_s(t)$ of the actual test result waveform shall not exceed the range of the specified waveform's integrated velocity change $[\Delta V_t(t) \pm 1]$ km/h at any time.

b) Acceleration or deceleration is performed according to the standard acceleration channel range in Figure B.2 and the parameters in Table B.2, and the velocity change ΔV is (15 ± 1) km/h.

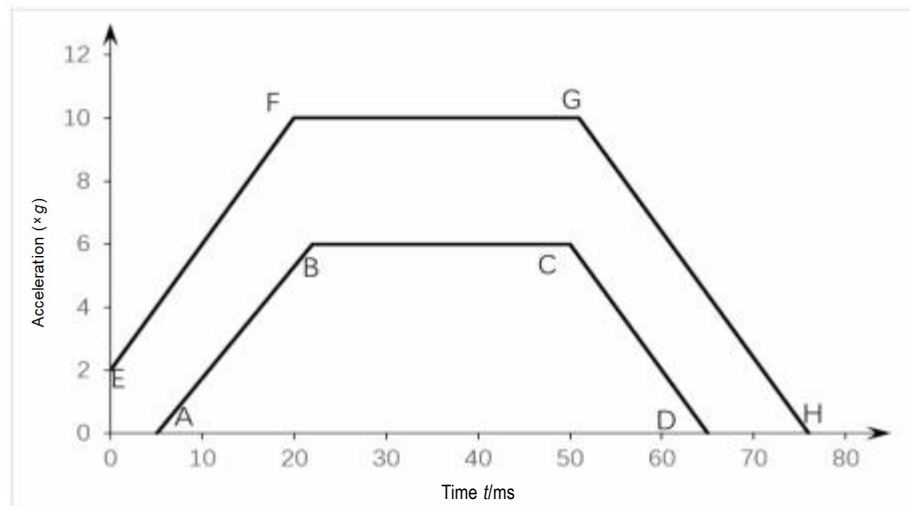


Figure B.2 Acceleration channel for automatic trigger in case of lateral collision

Table B.2 Acceleration parameters for automatic trigger in case of lateral collision

Point	Time t ms	Lower limit of acceleration ($\times g$)	Point	Time t ms	Upper limit of acceleration ($\times g$)
A	5	0	E	0	2
B	22	6	F	20	10
C	50	6	G	51	10
D	65	0	H	76	0

B.2.2.2 Lateral collision test on real vehicle

The test shall be conducted according to the provisions of GB 20071-2025, except for the following different test conditions:

- The test velocity is specified by the manufacturer and shall meet the requirements of 4.4.1 and shall not exceed (30 ± 1) km/h;
- It is not required to install collision dummy during the test, but it is necessary to arrange corresponding counterweight;
- The test shall be conducted on the driver's side. If the vehicle body structure is asymmetric and the difference has an impact on the lateral collision performance, then the test shall be conducted on the side that is most unfavorable to the lateral collision performance as per the principle of the most unfavorable condition.

B.2.2.3 Result

After performing test according to B.2.2.1 or B.2.2.2, checking the trigger type in the received MSD.

B.2.3 Rear collision

B.2.3.1 Rear collision test on sliding table

Fix the body-in-white or tooling on the collision test sliding table in such a way that the mounting direction simulates rear collision , the velocity change ΔV is (27 ± 1) km/h. The sliding table accelerates or decelerates according to the acceleration channel range in Figure B.3 and the parameters in Table B.3.

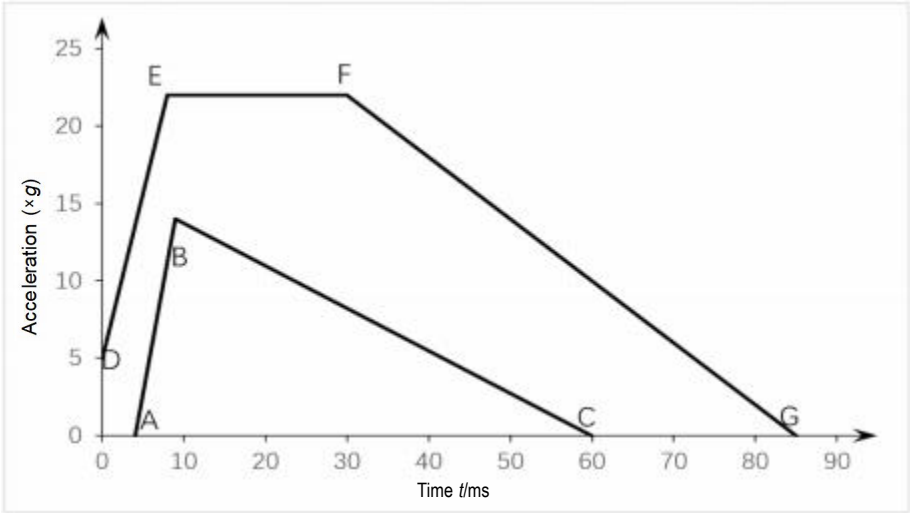


Figure B.3 Acceleration channel for automatic trigger in case of rear collision

Table B.3 Acceleration parameters for automatic trigger in case of rear collision

Point	Time <i>t</i> ms	Lower limit of acceleration (× <i>g</i>)	Point	Time <i>t</i> ms	Upper limit of acceleration (× <i>g</i>)
A	4	0	D	0	5
B	9	14	E	8	22
C	60	0	F	30	22
			G	85	0

B.2.3.2 Rear collision test on real vehicle

The test is conducted in compliance with the test methods specified in GB 20072–2024.

B.2.3.3 Result

After performing test according to B.2.3.1 or B.2.3.2, checking the trigger type in the received MSD.

B.2.4 Rollover

B.2.4.1 Simulated rolling test

Fix the body-in-white or tooling on the rollover test bench, which shall initially be in a horizontal status. The rollover test bench simulates rollover motion according to the angular velocity channel range in Figure B.4 and the parameters in Table B.4, integral angular displacement shall be 90° to 95°. The test shall be performed with a roll to the left, and if the vehicle body structure or protection system of the vehicle is asymmetrical, and the difference affects the rolling performance, the test shall be carried out on the side with the most unfavorable rolling performance according to the principle of least favorable.

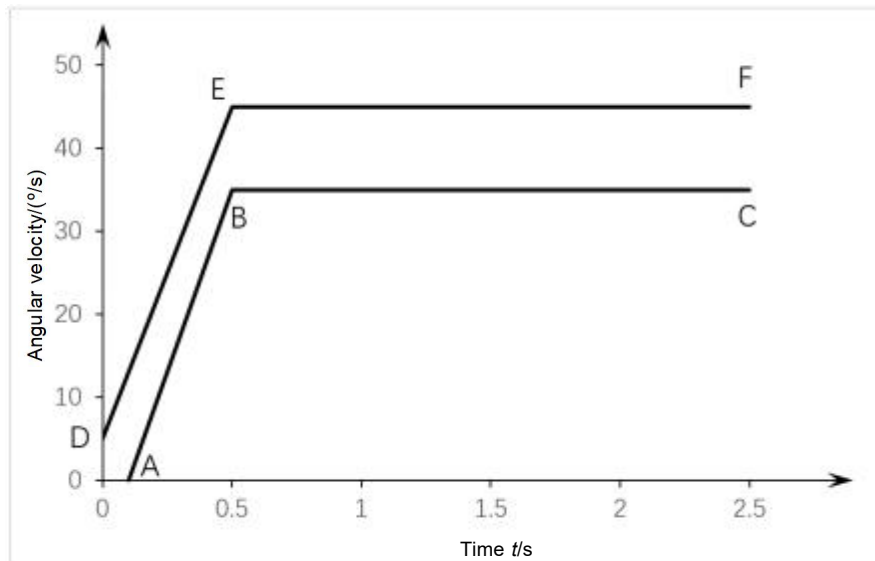


Figure B.4 Angular velocity channel of simulation rollover test

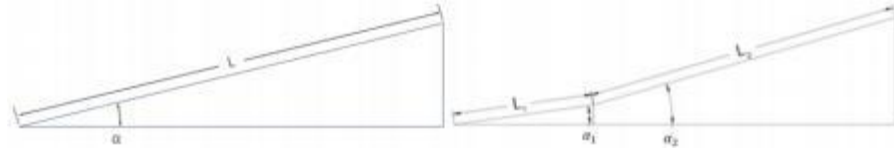
Table B.4 Angular velocity parameters of simulation rollover test

Point	Time t_s	Lower limit of angular velocity °/s	Point	Time t_s	Upper limit of angular velocity °/s
A	0.1	0	D	0	5
B	0.5	35	E	0.5	45
C	2.5	35	F	2.5	45

B.2.4.2 Real vehicle spiral rollover test

The test site shall be able to accommodate the test track, the rollover bench and the technical facilities necessary for the test. The parameters (slope length, slope angle) of the test rollover bench and the velocity of the vehicle's front wheels at the moment of entering the rollover bench are not limited and shall be specified by the manufacturer in such a way to ensure that the vehicle can roll over during the test; schematic diagram of the rollover bench is shown in Figure B.5. The test track shall be level, flat and smooth for at least 5m in front of the rollover bench.

Tow the vehicle to accelerate, the vehicle shall be in neutral gear and the vehicle doors shall be closed but not locked. The convertible roof or detachable roof (if any) shall be in the position set by the manufacturer and closed. The test shall be performed with a roll to the left, and if the vehicle body structure or protection system of the vehicle is asymmetrical, and the difference affects the rolling performance, the test shall be carried out on the side with the most unfavorable rolling performance according to the principle of least favorable.



Indexing serial number description:

L -- Slope length;	L_2 -- Length of the second ramp;
α -- Slope angle;	α_1 -- Angle of the first ramp;
L_1 -- Length of the first ramp;	α_2 -- Angle of the second ramp.

Figure B.5 Schematic diagram of the rollover bench

B. 2. 4. 3 Result

After performing test according to B. 2. 4. 1 or B. 2. 4. 2, checking the trigger type in the received MSD.

Annex C

(Normative)

Functional Test Requirements

C.1 Use network simulator through wireless air interface transmission mode to perform AECS functional test.

C.2 The MSD sent by the AECS shall meet the requirements of Annex A.

C.3 Conduct subjective test of two-way hands free voice communication to the vehicle using Chinese Mandarin, and meet the following requirements:

-- Other entertainment audio channels shall be muted, such as music and radio, during the voice communication connection is being established;

-- Emergency call service platform simulation test equipment side shall be able to normally receive and process the voice communication signal sent by the vehicle side, and the voice shall be clear and understandable;

-- The vehicle side shall be able to normally receive and process voice communication signals sent from the simulation test equipment side of the emergency call service platform, and the voice shall be clear and understandable.

Example: The dialogue during the subjective test is as follows:

Question: Hello, this is the rescue desk. How can I help you?

Answer: Help! My friend is seriously injured and he can't move now.

Question: Hello, please stay calm. Is your friend the only one who is injured?

Answer: 1 person, in the front-row passenger seat.

C.4 The information signal device of AECS shall be able to correctly indicate whether it is in operation status or failure status.

Note 1: The operation status generally refers to the AECS function triggered, connection being established, data transmission in process, data transmission completed, voice communication in process, etc.

Note 2: The failure status generally refers to the failure of voice communication connection establishment or data transmission failure, etc.

Annex D

(Normative)

Self-check Test Method

D.1 Failure types

The failure types of AECS are shown in Table D.1.

Table D.1 Failure types

Items		Remarks
Components	Types	
Control module	Internal failure	For example, hardware failure, etc.
On-board wireless communication terminal	Electrical connection / module communication failure	For example, failure to detect connection between the control module and the on-board wireless communication terminal.
	Internal failure	For example, network registration cannot be completed within the cold start time.
Microphone and speaker	Electrical connection failure	
On-board satellite positioning system	Electrical connection / module communication failure	
	Internal failure	
Mobile network antenna	Electrical connection failure	
On-board satellite positioning system antenna	Electrical connection failure	
Module for generating automatic trigger signal	Electrical connection failure	
Back-up power supply (if any)	Battery failure	According to the manufacturer's instructions, failure occurs when the internal resistance of the back-up battery reaches the resistance value at which the battery fails.

D.2 Test method

When test is conducted, the failure types of each component are introduced one by one according to Table D.1, only a single failure shall be simulated in each test:

- a) Simulates AECS failure, and during the simulation of AECS failure, the electrical connection of the warning signal device shall not be disconnected;
- b) Turn the ignition switch to the “ON” status and observe the prompt status of the warning signal;
- c) After turning the ignition switch to the “OFF” (or “LOCK”) status, then turn the ignition switch to the “ON” status and observe the prompt status of the warning signal;
- d) AECS is deenergized and restored to normal working status, turn the ignition switch to the “ON” status and observe the prompt status of the warning signal.

Annex E

(Normative)

Shock Resistant Test Method

E.1 Test conditions

Install AECS-related components on body-in-white or tooling in their original vehicle status, and including but not limited to the following components:

- a) Control module;
- b) On-board wireless communication terminal (can be without microphone and speaker);
- c) The power supply or back-up power supply, and shall be charged to the voltage recommended by manufacturer;
- d) Connector;
- e) On-board satellite positioning system;
- f) Manually trigger the physical button.

All components shall be installed in the same direction as the original vehicle. If tooling is used, the fixing method and installation strength of the test components shall be the same as that of the original vehicle.

Manufacturers may choose to provide a test box which is connected to AECS to simulate the peripheral signal and load of AECS under real vehicle conditions. The test box shall meet the following conditions:

- The test chamber shall feature bus signal simulation function, simulation of real vehicle signal and transmission to AECS, however, the power supply and trigger signals for AECS shall not be provided by the test box;
- The test chamber shall feature necessary accessories such as peripheral sensor connected with AECS, load and hardwire connection components, and ensure normal work of AECS;
- For devices that operate during vehicle operation or are triggered to operate under certain computational logic, their status shall be preset to be "ON".

E.2 Test waveform

Fix the body-in-white or tooling on the collision test sliding table in such a way that the mounting direction simulates frontal collision. The sliding table accelerates or decelerates according to the acceleration channel range in Figure E.1 and the parameters in Table E.1, the velocity change ΔV shall be (69 ± 1) km/h. According to the manufacturer's requirements, higher acceleration or velocity change can be used for testing. If AECS is automatically triggered during the test, then a manual trigger shall be performed after the emergency call service platform simulates hanging up this time of automatic trigger event on the test equipment side.

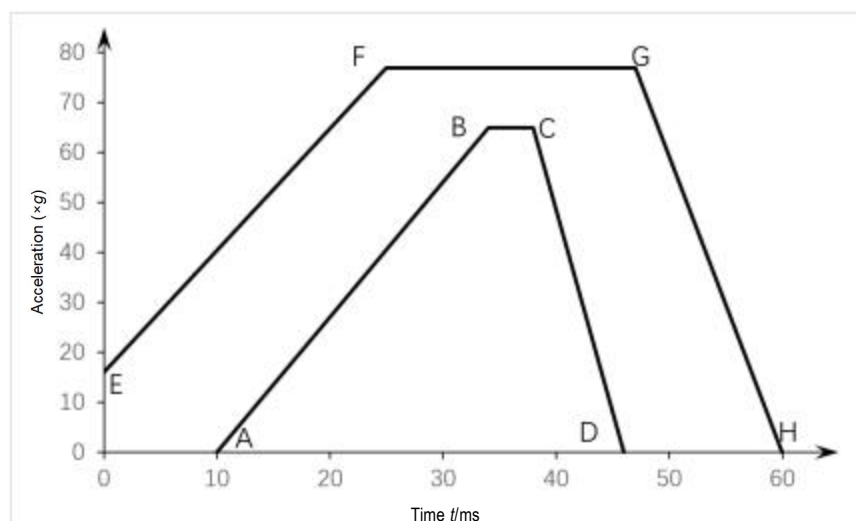


Figure E.1 Acceleration channel for shock resistant test

Table E.1 Parameters for shock resistant test and acceleration

Point	Time t ms	Lower limit of acceleration ($\times g$)	Point	Time t ms	Upper limit of acceleration ($\times g$)
A	10	0	E	0	16
B	34	65	F	25	77
C	38	65	G	47	77
D	46	0	H	60	0

Annex F

(Normative)

Test Conditions and Failure Determination Criteria

AECS' s immunity test conditions and failure determination criteria shall be in accordance with the requirements of Table F.1. The test only needs to be carried out on one channel in one frequency band of the 4G network, and manufacturers and testing institutes shall pre-evaluate the AECS warning signal mechanism to determine that the failure detected by the vehicle in the test is an AECS failure and not a network failure.

Table F.1 AECS immunity test conditions and failure determination criteria

Test items and phase	Vehicle test conditions	Failure determination criteria
Before and after electromagnetic radiation immunity test	AECS shall be triggered manually according to the vehicle manufacturer's instructions under driving conditions or braking conditions of (50 ± 10) km/h.	AECS failed to establish a connection with emergency call service platform.
	After AECS establishes a connection with the emergency call service platform, if a voice communication is available, the call quality shall be evaluated according to C.3.	The voice received by the emergency call service platform is not clear and intelligible; the voice received by the vehicle side is not clear and intelligible.
	After evaluating the call quality, the emergency call shall be terminated. Subsequently, the sent MSD shall be evaluated.	The MSD does not meet the requirements of Annex A.
In the electromagnetic radiation immunity test ^a	Under driving or braking conditions at (50 ± 10) km/h, warning signaling device and all other displays used to indicate AECS failure shall be monitored.	AECS does not work as expected, e.g.: AECS failure indication appears in warning signaling devices or other vehicle displays.
^a No cellular network or satellite navigation signals are required in the test.		