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**Road vehicles - Alarm systems for commercial vehicles of
maximum authorized total mass greater than 3.5t**

道路车辆 3.5t 以上的商用车报警系统

(ISO 15763:2002, Road vehicles - Alarm systems for buses and commercial vehicles
of maximum authorized total mass greater than 3.5t, MOD)

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard uses redrafting method to modify and adopt ISO 15763:2002 “Road vehicles - Alarm systems for buses and commercial vehicles of maximum authorized total mass greater than 3.5t”.

The technical differences and reasons between this Standard and ISO 15763:2002 are as follows:

- changed ISO 10605 used as reference to GB/T 19951 that is identically adopted in China;
- changed 70/388/EEC used as reference to GB 15742 that is same in relevant technical contents;
- CISPR 12 quoted is the vehicle standard while this system shall use the component test method. Therefore, used GB 18655 to replace CISPR 25;
- changed IEC 60068-2-11 to GB/T 2423.17 that is identically adopted in China;
- changed IEC 60068-2-29 to GB/T 2423.6 that is identically adopted in China;
- deleted ISO 7637-1 (the part about terms in ISO 7637-1) because the test pulse in 5.10.1 corresponds to ISO 7637-2;
- changed ISO 7637-2 to GB/T 21437.2 that is identically adopted in China;
- deleted the relevant content used as reference in ISO 512 as well as relevant contents in ISO 15763:2002 because ISO 512 has been abolished;
- deleted ISO 1176 and ISO 3833, because these two standards have been transformed and the content is well known to the industry, it is unnecessary to cite them again;
- to be consistent with GB/T 3730.1, commercial vehicles (including passenger cars, semi-trailer tractors and trucks) are used in the standard name and scope, and the word “buses” is deleted;
- the definition of key is not easy to understand, the definition of scanner is inaccurate, and it is not necessary to define these two words, so delete them;
- the subclauses 5.11 and 5.14 in ISO 15763:2002 are both tests for sound warning devices. This standard incorporates the sound level test of the original text 5.14 into 5.11, which is easier to understand and operate;
- IEC 60529 is changed to ISO 20653, the protection standard specially used for

Road vehicles - Alarm systems for commercial vehicles of maximum authorized total mass greater than 3.5t

1 Scope

This Standard specifies the terms, performance requirements and test methods for alarm systems for commercial vehicles (VAS) of maximum authorized total mass greater than 3.5t.

This Standard applies to vehicle alarm systems that test/detect and warn of abnormal opening of doors, trunk lids, engine hoods, panic situations, cab tilting and trailer decoupling or power failure, including the vehicle alarm system of original vehicle equipment and the vehicle alarm system that is subsequently installed.

Annex A gives 3 test examples for the functional test of the volumetric protection system.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2423.6, *Environmental testing for electric and electronic products - Part 2: Test methods - Test Eb and guidance: Bump* (GB/T 2423.6-1995, idt IEC 60068-2-29:1987)

GB/T 2423.17, *Environmental testing for electric and electronic products - Part 2: Test method - Test Ka: Salt mist* (GB/T 2423.17-2008, IEC 60068-2-11:1981, IDT)

GB 15742, *Performance requirements and test methods of horn for motor vehicles*

GB 18655, *Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers* (GB 18655-2002, idt IEC/CISPR 25:1995)

GB/T 19951, *Road vehicles - Disturbances test methods for electrical/electronic component from electrostatic discharge* (GB/T 19951-2005, ISO 10605:2001, IDT)

GB/T 21437.2, *Road vehicles - Test method of electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only* (GB/T 21437.2-2008, ISO 7637-2:2004, IDT)

a part of the system that enables the VAS to start working or stop working

3.8 warning device

a system component that alerts on alarm condition

3.9 panic warning device

a system component that enables the warning device to immediately enter the alarm condition regardless of whether the VAS is set or unset

3.10 status display

a system component that shows VAS status

3.11 immobilizer

a system component that prevents the use of the vehicle's own engine

3.12 perimeter protection

system functions designed to detect and warn of improper opening of doors, trunk lids, hoods, panic exits, cab tilt, and trailer decoupling or power loss

3.13 volumetric protection

system functions designed to detect intrusions into the cab/passenger compartment and actions inside

4 Requirements

4.1 System description

The VAS shall include one or more detectors/sensors, a control unit with means for setting/unsetting and triggering the alarm, power supply and alarm means.

The VAS shall include at least one audible warning device. It can also include light alarm or wireless warning device (wireless warning device shall comply with relevant regulations on the use and management of wireless equipment), or a combination of the above-mentioned alarms. It may also include light indicators that provide VAS status or status change information, immobilizer, and other equipment that meets the requirements of this Standard. Figure 1 is a schematic diagram of the required (solid lines) or recommended (dotted lines) components of the system and their connections.

g) The power is off.

All VAS components shall be compatible with each other and shall not affect the performance of the vehicle when the alarm is removed. Regardless of setting or unsetting the alarm, the status of the VAS cannot be changed at will. Do not operate or stop working under the influence of any other warning device. When a power outage occurs, the VAS must not change its status after power is restored. The failure of any sound and light warning device shall not affect the normal operation of the rest of the VAS. VAS components are designed, manufactured and installed to minimize the possibility of false alarms. All VASs shall prevent unauthorized users from easily and quickly entering or compromising the system.

4.2.2 Detection

VAS shall provide perimeter protection. Additional sensors can be installed to detect interference or intrusion into the vehicle. Additional sensors can be unset by the user, but only valid for one activation cycle of the VAS.

VAS can provide panic warning devices set from inside the vehicle. The driver can at least set the audible warning device regardless of whether the VAS is in the setting or unsetting status. The driver is at least able to set the audible warning device. It is also possible to set a light or wireless alarm or a combination of warning devices. The driver shall be able to unset the panic alarm. The operation of the panic alarm system shall not affect the starting or running of the vehicle engine. The duration of each active alarm must not be limited.

4.2.3 Control

The control unit shall provide an interface for receiving detector/sensor signals. When the VAS is in the alarm setting status, the control unit shall monitor the detectors/sensors. Output an alarm signal to the warning device within 1s of the alarm status appearing. When the alarm is unset, the VAS shall cancel the alarm status and alarm signal within 1s.

4.2.4 Alarm setting/unsetting

4.2.4.1 Overview

VAS can display VAS setting/unsetting alarm status information and setting/unsetting alarm status change information with light indicator signals. Light indication signals may also be generated by turn signals, interior lights or vehicle position lights (including all lamps connected to the circuit) or a combination thereof. The signal duration does not exceed 3s.

4.2.4.2 Setting

The VAS can set an alarm by an appropriate method. After the VAS start-up procedure

is completed, the perimeter protection shall enter the alarm setting status within 10s. The optional sensor shall enter the alarm setting status within 60s after the start-up procedure is completed.

4.2.4.3 Unsetting

No VAS component shall be marked with a VAS unsetting code or warning. The alarm shall be unset by one or more of the following methods:

a) Any type of mechanical key switch:

1) Integral key device or switch or both;

2) A door locking mechanism used in conjunction with a separate switch but cannot be unset by using the interior door locking mechanism.

The key switch protrusion shall not exceed 1mm of the housing. The protrusions shall be conical or convex. The connection between the protrusion and the shell shall be able to withstand at least 600N tensile force. Both shall be able to bear the moment of 25N·m alone. The key switch shall have a cylindrical bayonet. Key profile shall have at least 1000 valid combinations. The key switch cannot be opened even if only one tooth profile is different from the original key. The key socket of the external key switch shall be covered or waterproof and dustproof in other ways.

b) Code key switch: Shall be installed inside the vehicle with a limited opening time. The time to unset the alarm is not less than 5s, not more than 15s. It shall meet the requirements of a), otherwise the code switch shall have no less than 10,000 combinations.

c) Electrical or electronic devices [except for switches specified in b)]: For example, the remote-control switches, shall use at least 50000 valid combinations of codes to transmit signals. The minimum scan time for every 5000 variables is 24h, otherwise there shall be a rolling code. The probability of obtaining the correct code within 24 hours is no more than 4%.

d) If the mechanical key switch or electrical/electronic device is installed in the cab/passenger compartment with time limit control, the alarm shall be unset within 5s~15s after the door is opened.

4.2.5 Alarm signal

4.2.5.1 Overview

Alarm status shall be alerted by audible warning device. It can also be alerted by light alarm signal, wireless signal or a combination of both. Audible warning signals must not cause confusion about the cause of the alarm and must not sound the same as other road traffic signals (for example, panic service vehicles).

4.2.7 Power supply

4.2.7.1 Main power

The main power source of the VAS is the vehicle battery. The supply voltage within the ambient temperature range of 4.2.8 shall meet the following requirements:

- For 12V system, it is 9V~15V;
- For 24V system, it is 18V~32V.

The VAS (including all its sensors) must not consume more than 10mA (average) of current in the alarm setting status at nominal voltage.

4.2.7.2 VAS backup power supply (optional)

If the VAS has a backup power source, it can include rechargeable batteries and chargers or high-performance chemical batteries. The capacity of the VAS backup power supply shall ensure that the VAS can work for at least 120h in a static status. Work at least 300s in alarm status.

4.2.7.3 Self-powered sound device (optional)

If equipped with a self-powered sounder, it shall operate from a rechargeable battery and charger or high-performance chemical battery. The battery capacity shall be sufficient to operate the speaker for at least 300s. If the main power supply is cut off or used up or the sounder connection is cut off, the sounder shall be able to work automatically.

4.2.8 Installation environment

The VAS and its components are designed, manufactured and installed to withstand the in-vehicle environment. There are two specified ranges for ambient temperature:

- a) The temperature range for components installed in the passenger compartment or trunk is $(-40\pm 2)^{\circ}\text{C}\sim(+85\pm 2)^{\circ}\text{C}$;
- b) Unless otherwise specified, the temperature range of components installed in the engine compartment is $(-40\pm 2)^{\circ}\text{C}\sim(+125\pm 2)^{\circ}\text{C}$.

According to ISO 20653, the following protection levels shall be achieved:

- For components installed in the passenger compartment or trunk, it shall reach IP40;
- For components installed in a fully covered environment, it shall reach IP5K4;
- For components installed in an uncovered environment, it shall reach IP6K7.

working.

5.3 Basic test

The basic test shall be carried out after the completion of each test procedure. It is carried out according to the following steps:

- a) Check whether the VAS is in the alarm unsetting status;
- b) Put the VAS in the alarm setting status;
- c) If an immobilizer is installed, output a signal to the immobilizer circuit to check whether it starts within 1s;
- d) Manipulate sensors/detectors to generate alarm status;
- e) Output signal to the warning device circuit to check whether the start-up alarm condition is consistent with 4.2.3;
- f) Put the VAS in the alarm unsetting status;
- g) If an immobilizer is installed, check that the output to the immobilizer circuit is cut off;
- h) Check that the output to the warning device has been cut off.

During the test, no status change shall occur regardless of whether the VAS is in the set or unset status. Nor shall it cause any warning device to work or stop working.

5.4 Electrical test

5.4.1 Lamps

The following tests are not required when the vehicle light signal is used as a light warning device.

5.4.2 Overvoltage

5.4.2.1 Make VAS subjected to the following overvoltage tests with the alarm set and unset:

- a) For 12V system, it is $(18 \pm 0.2)V$ for 1h;
- b) For 24V system, it is $(36 \pm 0.5)V$ for 1h.

After the test, the VAS shall meet the requirements of the basic test (see 5.3).

5.4.2.2 For 12V system only, the VAS can withstand overvoltage of $24V \pm 0.2V$ for 1min in two status of setting alarm and unsetting. After the test, the VAS shall perform the

5.5 Temperature/humidity accelerated aging test

5.5.1 The VAS shall perform basic test and meet its requirements under the following test conditions (see 5.3).

5.5.2 Except for batteries, components whose design ambient temperature is between $-40^{\circ}\text{C}\sim 85^{\circ}\text{C}$ shall be tested at $+85^{\circ}\text{C}$. Components whose design ambient temperature is between $-40^{\circ}\text{C}\sim +125^{\circ}\text{C}$ shall be performed at $+125^{\circ}\text{C}$.

5.5.3 For components tested at $+125^{\circ}\text{C}$, the test shall be carried out according to e)~h) of 5.5.5 using the test temperature level of $+125^{\circ}\text{C}$. Then load it into the VAS system. Use the test temperature of $+85^{\circ}\text{C}$ to carry out the procedure in 5.5.5.

5.5.4 The test consists of 10 cycles. Each cycle is 24h. Carry out according to the following test sequence (as shown in Figure 2).

5.5.5 The test cycle is as follows:

- a) The temperature of the test room is kept at $t_c=23^{\circ}\text{C}\pm 5^{\circ}\text{C}$. The relative humidity (RH) is between 45%~75%. Keep 4h.
- b) Raise the temperature t_c to $55^{\circ}\text{C}\pm 2^{\circ}\text{C}$ within 0.5h. The relative humidity (RH) is 95%~99%.
- c) Keep t_c at $55^{\circ}\text{C}\pm 2^{\circ}\text{C}$. The relative humidity (RH) is 95%~99%. Keep 10h.
- d) Reduce the temperature t_c to $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ within 2.5h.
- e) Keep at $-40^{\circ}\text{C}\pm 2^{\circ}\text{C}$ for 2h.
- f) Within 1.5h, according to the conditions of 4.2.8 and Table 2, increase t_c to the test temperature used.
- g) According to the conditions of 4.2.8 and Table 2, keep t_c at the adopted test temperature for 2h.
- h) Recover t_c to $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$ within 1.5h.

5.5.6 The last cycle shall stop when the dew point is reached. After the test, the VAS shall meet the requirements of the basic test (see 5.3).

NOTE: In the d), e), f), g), h) stages of 5.5.5, the relative humidity is not controlled.

5.5.7 If it takes more than 1.5h for the laboratory to reach the specified test temperature level, the time in 5.5.5f) can be extended accordingly, and the time in a) can be shortened.

5.5.8 The test can be interrupted at the end of a cycle. During the test interruption, the test sample shall be kept at $23^{\circ}\text{C}\pm 5^{\circ}\text{C}$ and 45%~75% relative humidity. Note the

interruption time in the test report.

5.5.9 The test temperatures provided above may not be the maximum temperatures that components will experience when installed in an engine compartment. When parts are intended to be installed under the hood close to the engine, the test temperature shall be 140°C.

5.6 Salt spray corrosion test

The components installed outside the passenger compartment shall be subjected to a corrosion test for 144 hours in accordance with the provisions of GB 2423.17. The test shall be carried out under power-off conditions. After the test, it shall perform the basic test for the VAS and meet its requirements (see 5.3).

5.7 Vibration test

Conduct a sinusoidal vibration test on the component/VAS under the following conditions. After the test, it shall perform the basic test for the VAS and meet its requirements (see 5.3).

- a) For Category 1 components [components installed in the interior of the vehicle (cab)]

The maximum amplitude of the 10Hz~50Hz sweep frequency range is 0.5mm.
The maximum acceleration of 50Hz~500Hz is 50m/s²;

- b) For Category 2 components (components mounted on the engine)

The maximum amplitude of 20Hz~62Hz sweep frequency range is 2mm. The maximum acceleration of 62Hz~300Hz is 300m/s²;

- c) For Category 3 components (components mounted on the chassis)

The maximum amplitude of the 5Hz~16Hz sweep frequency range is 10mm. The maximum acceleration of 16Hz~500Hz is 100m/s².

In each case, the frequency change rate is 1 octave/min, and the number of cycles is 10 (tests are performed along the three vertical axes). Vibration shall be carried out at low and high frequencies at the maximum stable vibration amplitude.

NOTE: According to the negotiation between the supplier and the buyer, the parameters of GB/T 28046.3 can be used for testing.

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