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SWEDISH STANDARDS INSTITUTE

Vägfordon – Elstörningar från smalbandsemission av elektromagnetisk energi – Provningsmetoder för komponenter – Del 9: Portabla sändare (ISO 11452-9:2012, IDT)

Road vehicles – Component test methods for electrical disturbances from narrowband radiated electromagnetic energy – Part 9: Portable transmitters (ISO 11452-9:2012, IDT)

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Den internationella standarden ISO 11452-9:2012 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 11452-9:2012.

The International Standard ISO 11452-9:2012 has the status of a Swedish Standard. This document contains the official version of ISO 11452-9:2012.

Denna standard är framtagen av kommittén för Elstörningar i fordon, SIS/TK 240/AG 3.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 11452-9 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

ISO 11452 consists of the following parts, under the general title *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy*:

— *Part 1: General principles and terminology*

— *Part 2: Absorber-lined shielded enclosure*

— *Part 3: Transverse electromagnetic mode (TEM) cell*

— *Part 4: Harness excitation methods*

— *Part 5: Stripline*

— *Part 7: Direct radio frequency (RF) power injection*

— *Part 8: Immunity to magnetic fields*

— *Part 9: Portable transmitters*

— *Part 10: Immunity to conducted disturbances in the extended audio frequency range*

— *Part 11: Reverberation chamber*

Introduction

Immunity measurements of complete road vehicles can generally only be carried out by the vehicle manufacturer, owing to, for example, high costs of absorber-lined shielded enclosures, the desire to preserve the secrecy of prototypes or a large number of different vehicle models.

For research, development and quality control, a laboratory measuring method can be used by both vehicle manufacturers and equipment suppliers to test electronic components.

Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy —

Part 9: Portable transmitters

1 Scope

This part of ISO 11452 specifies test methods and procedures for testing electromagnetic immunity to portable transmitters of electronic components for passenger cars and commercial vehicles, regardless of the propulsion system (e.g. spark-ignition engine, diesel engine, electric motor). The device under test (DUT), together with the wiring harness (prototype or standard test harness), is subjected to an electromagnetic disturbance generated by portable transmitters inside an absorber-lined shielded enclosure, with peripheral devices either inside or outside the enclosure. The electromagnetic disturbances considered are limited to continuous narrowband electromagnetic fields.

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.

ISO 11452-1, *Road vehicles — Component test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 1: General principles and terminology*

Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz). International Commission on Non-Ionizing Radiation Protection (ICNIRP)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11452-1 apply.

4 Test conditions

The applicable frequency range of the test method is 26 MHz to 5,85 GHz.

The user of this International Standard shall specify the test severity level or levels over the frequency bands. The test severity level shall take into account

— typical portable transmitter characteristics (frequency bands, power level and modulation), given in Annex A, and

— the characteristics of the antenna(s) used for this test.

NOTE Users of this International Standard are advised that Annex A is for information only and cannot be considered as an exhaustive description of various portable transmitters available in all countries.

Standard test conditions are given in ISO 11452-1 for the following:

— test temperature;

— supply voltage;

— dwell time;

— test signal quality.

5 Test location

The purpose of such an enclosure is to create an isolated electromagnetic compatibility test facility which simulates open field testing. Basically, an absorber-lined shielded enclosure consists of a shielded room with absorbing material on its internal reflective surfaces, optionally excluding the floor. The design objective is to attenuate the reflected energy in the test area by at least 10 dB compared with the direct energy.

6 Test instrumentation

6.1 General

The field-generating device can be

— commercial portable transmitters with integral antennas, or

— simulated portable transmitters, with an antenna used as described in 6.3.4 and an amplifier.

To reduce test error, the operation of the DUT is usually monitored by fibre-optic couplers.

Test personnel shall be protected in accordance with ICNIRP Guidelines.

NOTE National or other regulations can apply.

6.2 Commercial portable transmitters

Commercial portable transmitters having an integral antenna are a convenient and readily available field-generating device.

6.3 Simulated portable transmitters

6.3.1 General

Simulated portable transmitters consist of

— radio frequency (RF) signal generating equipment, and

— RF power monitoring equipment and antennas.

6.3.2 RF signal generating equipment

Signal sources with internal or external modulation capability.

Power amplifier(s): multiple RF amplifiers may be required to cover the range of test frequencies.

6.3.3 RF power monitoring equipment

An in-line power meter is required when using simulated portable transmitters for measuring power to the antenna. Both forward and reverse power shall be measured and recorded.

6.3.4 Antennas

Unless otherwise specified, the simulated portable transmitter antenna characteristics shall be a passive antenna as detailed in B.2. Examples of other antennas which may be used are presented in Annex B.

All antennas should be tuned for a minimum voltage standing wave ratio (VSWR) of typically less than 4:1 unless otherwise specified in the test plan. The resulting VSWR has to be compatible with the design of the RF source. As a minimum, the VSWR value shall be recorded at the lower and upper band edges and at middle frequency.

6.4 Stimulation and monitoring of the DUT

The DUT shall be operated in accordance with the test plan by actuators which have a minimum effect on the electromagnetic characteristics.

EXAMPLE Plastic blocks on the push-buttons, pneumatic actuators with plastic tubes.

Connections to equipment monitoring electromagnetic interference reactions of the DUT may be accomplished by using fibre-optics or high-resistance leads. Other types of leads may be used but require extreme care to minimize interactions. The orientation, length and location of such leads shall be carefully documented to ensure repeatability of test results.

CAUTION — Any electrical connection of monitoring equipment to the DUT could cause malfunctions of the DUT. Extreme care shall be taken to avoid such an effect.

7 Test set-up

7.1 Ground plane

7.1.1 General

The ground plane shall be made of 0,5 mm thick (minimum) copper, brass or galvanized steel.

The minimum width of the ground plane shall be 1 000 mm. The minimum length of the ground plane shall be 2 000 mm, or the underneath of the entire equipment plus 200 mm, whichever is larger.

The height of the ground plane (test bench) shall be (900 ± 100) mm above the floor.

The ground plane shall be bonded to the shielded enclosure such that the DC resistance does not exceed 2,5 mΩ. In addition, the bond straps shall be placed no greater than 0,3 m apart.

7.2 Power supply and artificial networks

Each DUT power supply lead shall be connected to the power supply through an artificial network (AN).

Power supply is assumed to be negative ground. If the DUT utilizes positive ground then the test set-up shown in Figures D.1 and D.2 need to be adapted accordingly. Power shall be applied to the DUT via a 5 µH/50 Ω AN. Whether two ANs or only one is required depends on the intended DUT installation in the vehicle:

— for remotely grounded DUTs (vehicle power return line longer than 200 mm), two ANs are required — one for the positive supply line and the other for the power return line (see Annex D);

— for locally grounded DUTs (vehicle power return line 200 mm or shorter), only one AN is required, for the positive supply (see Annex D).

The AN(s) shall be mounted directly on the ground plane. AN cases shall be bonded to the ground plane.

The power supply return shall be connected to the ground plane, between the power supply and the AN(s).

The measuring port of each AN shall be terminated with a 50 Ω load.