## **INTERNATIONAL STANDARD**

## ISO 11451-2

Fourth edition 2015-06-01

# R f **Road vehicles — Vehicle test methods** for electrical disturbances from narrowband radiated electromagnetic energy —

## Part 2: **Off-vehicle radiation sources**

Véhicules routiers — Méthodes d'essai d'un véhicule soumis à des perturbations électriques par rayonnement d'énergie électromagnétique en bande étroite —

Partie 2: Sources de rayonnement hors du véhicule

Reference number ISO 11451-2:2015(E)



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see <a href="https://www.iso.org/directives">www.iso.org/directives</a>).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see <a href="https://www.iso.org/patents">www.iso.org/patents</a>).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword – Supplementary information

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

Annex A of this part of ISO 11451 is for information only.

This fourth edition cancels and replaces the third edition (ISO 11451-2:2005) which has been technically revised.

ISO 11451 consists of the following parts, under the general title *Road vehicles* — *Vehicle test methods for electrical disturbances from narrowband radiated electromagnetic energy*:

- Part 1: General principles and terminology
- Part 2: Off-vehicle radiation sources
- Part 3: On-board transmitter simulation
- Part 4: Bulk current injection (BCI)

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

## Part 2: Off-vehicle radiation sources

### 1 Scope

This part of ISO 11451 specifies a method for testing the immunity of passenger cars and commercial vehicles to electrical disturbances from off-vehicle radiation sources, regardless of the vehicle propulsion system (e.g. spark ignition engine, diesel engine, electric motor).

The electromagnetic disturbances considered are limited to narrowband electromagnetic fields.

While this standard refers specifically to passenger cars and commercial vehicles, generalized as "vehicle(s)", it can readily be applied to other types of vehicles.

ISO 11451-1 specifies general test conditions, definitions, practical use, and basic principles of the test procedure.

Function performance status classification guidelines for immunity to electromagnetic radiation from an off-vehicle radiation source are given in <u>Annex A</u>.

#### 2 Normative references

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

ISO 11451-1, Road vehicles — Vehicle test methods for electrical disturbances from narrowband radiated electromagnetic energy — Part 1: General principles and terminology

#### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11451-1 apply.

### 4 Test conditions

The applicable frequency range of this test method is 0,01 MHz to 18 000 MHz. Testing over the full frequency range could require different field-generating devices, but this does not imply that testing of overlapping frequency ranges is required.

The user shall specify the test severity level or levels over the frequency range. Suggested test severity levels are given in <u>Annex A</u> of this International Standard.

Standard test conditions are given in ISO 11451-1 for the following:

- test temperature;
- supply voltage;

- modulation;
- dwell time;
- frequency step sizes;
- definition of test severity levels;
- test signal quality.

## 5 Test location

The test should be performed in an absorber-lined shielded enclosure.

The aim of using an absorber-lined shielded enclosure is to create an indoor electromagnetic compatibility testing facility that simulates open field testing.

The size, shape, and construction of the enclosure can vary considerably. Typically, the floor is not covered with absorbing material, but such covering is allowed. Measurements in enclosures with or without floor absorbers can lead to different results. The minimum size of the shielded enclosure is determined by the size of the test region needed, the size of the field generation device or devices, the needed clearances between these and the largest vehicle to be tested, and the characteristics of the absorbing material. To create the test region, the absorber, field generation system and enclosure shape are selected such that the amount of extraneous energy in the test region is reduced to below a minimum value that will give the desired measurement accuracy. The design objective is to reduce the reflected energy in the test region to -10 dB or less over the test frequency range (not applicable to transmission line system (TLS) field generation systems). An example of a rectangular shielded enclosure is shown in Figure 1.

The test may alternatively be performed at an outdoor test site. The test facility shall comply with (national) legal requirements regarding the emission of electromagnetic fields.



#### Key

- 1 absorber-lined shielded enclosure
- 2 RF absorber material
- 3 vehicle dynamometer on turntable<sup>a</sup>
- 4 antenna
- 5 amplifier room
- 6 control room
- <sup>a</sup> Turntable shown rotatable through ±180° with two pairs of variable wheelbase rollers to accommodate all vehicle sizes and functions.

#### Figure 1 — Example of absorber-lined shielded enclosure