

BS EN 50498:2010



BSI Standards Publication

Electromagnetic compatibility (EMC) — Product family standard for aftermarket electronic equipment in vehicles

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National foreword

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ISBN 978 0 580 57798 7

ICS 33.100.01; 43.040.10

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2010

Amendments issued since publication

Date	Text affected
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ICS 33.100.01

English version

**Electromagnetic compatibility (EMC) -
Product family standard for aftermarket electronic equipment in vehicles**

Compatibilité électromagnétique (CEM) -
Norme de famille de produits
pour les équipements électroniques
destinés au marché des pièces
de rechange et accessoires
pour véhicules

Elektromagnetische Verträglichkeit
(EMV) -
Produktfamiliennorm für elektronische
Geräte die nachträglich in Fahrzeuge
eingebaut werden

This European Standard was approved by CENELEC on 2010-07-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

This European Standard was prepared by Working Group 8 of the Technical Committee CENELEC TC 210, Electromagnetic compatibility (EMC).

It was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50498 on 2010-07-01.

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

The following dates are proposed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2011-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2013-07-01

This European Standard has been prepared under Mandate M/359 given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 2004/108/EC. See Annex ZZ.

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1 Scope and objective

This European Standard specifies limits and methods of measurement for disturbance emissions and immunity characteristics of aftermarket equipment (ESAs) which are referenced by Automotive EMC Directive 2004/104/EC, Annex I, 3.2.9, and which are not related to immunity-related functions of vehicles as defined in Automotive EMC Directive 2004/104/EC, Annex I, 2.1.12.

Any equipment (or part of an ESA) which has a primary function of radio transmission and/or reception according to the ITU Radio Regulations are excluded from the scope of this publication.

This European Standard covers the frequency range 9 kHz to 400 GHz. To date, it specifies limits and methods of measurement for conducted and radiated disturbances from ESAs in the frequency range 30 MHz to 1 GHz and immunity requirements for conducted transients. The assessment of an ESA needs to be performed only in the frequency ranges where limits are defined.

The emission requirements have been selected so as to ensure that disturbances generated by ESAs operating normally do not exceed a level that could prevent the vehicle or apparatus external to the vehicle from operating as intended. Fault conditions are not taken into account. Not all disturbance phenomena have been included for testing purposes in this standard but only those considered as relevant for the equipment covered by this standard.

As ESAs covered by this standard are not related to immunity-related function, only the following electromagnetic disturbance phenomena are evaluated:

- broadband and narrowband radiated electromagnetic disturbances;
- conducted transient disturbances;
- conducted transient immunity.

Accessories that are not connected directly to the vehicle harness, but only via a special interface are normally excluded from vehicular EMC requirements.

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 7637-2:2004, *Road vehicles – Electrical disturbances from conduction and coupling – Part 2: Electrical transient conduction along supply lines only*

3 Terms and definitions

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

3.1

Electrical/Electronic Sub-Assembly (ESA)

electrical and/or electronic device or set(s) of devices intended to be part of a vehicle, together with any associated electrical connections and wiring, which performs one or more specialized functions

3.2

broadband emission

emission, which has a bandwidth greater than that of a particular measuring apparatus or receiver

3.3

narrowband emission

emission, which has a bandwidth less than that of a particular measuring apparatus or receiver

4 Abbreviations

For the purposes of this document, the following abbreviations apply:

DC	Direct Current
EM	ElectroMagnetic
EMC	ElectroMagnetic Compatibility
ESA	Electronic Sub Assembly
EUT	Equipment Under Test

5 Test configuration

Emission measurements shall be made in the operational mode(s) producing the largest emission in the frequency band being investigated consistent with normal applications.

The ESA shall be configured in a manner, which is representative for normal/typical operation, where practical. Accessories that are not connected directly to the vehicle harness, but only via a special interface are normally excluded from vehicular EMC requirements. In the case that accessory equipment may be connected to the ESA and may have an impact to the EMC performance of the ESA under testing, initial testing shall identify the relevant loads/accessories to be considered during testing and the rationale used for selecting such accessories shall be stated in the test report.

For specific types of apparatus for which specific EMC product (family) standards exist, the operating conditions and operational modes of the ESA shall be those defined by that specific standard, when applying this standard.

EXAMPLES

A broadcast receiver (radio/CD player) not intended for use in a vehicle would fall within the scope of EN 55013 and EN 55020. Therefore, for a car radio, the EUT configuration and operational mode(s) for emissions would be defined in EN 55013, and the EUT configuration and operational modes for immunity tests would be defined in EN 55020.

ITE equipment installed in vehicles, the EUT configuration and mode(s) defined in EN 55022 and EN 55024 apply.

The configuration and mode of operation during the tests shall be noted in the test report.

6 Applicability

The requirements of Automotive EMC Directive 2004/104/EC, Annex I, 6.5, 6.6, 6.8 and 6.9, shall be fulfilled.

An ESA shall meet these requirements in addition to the requirements of any other applicable harmonised European generic, product family or product EMC standards if it is intended for installation in motor vehicles.

7 Requirements

7.1 Broadband radiated disturbances

The broadband electromagnetic radiation generated by the ESA representative of its type shall be measured by the method described in Automotive EMC Directive 2004/104/EC, Annex I, 6.5.

ESAs shall meet the limits in Table 1 for broadband radiated disturbances.

Table 1 – Limits for broadband radiated disturbances

Frequency range F MHz	Limits Quasi peak dB μ V/m
30 to 75	62 – 52 ^a
75 to 400	52 – 63 ^b
400 to 1 000	63
^a Decreasing linearly with the log of the frequency. ^b Increasing linearly with the log of the frequency.	

7.2 Narrowband disturbances

The narrowband electromagnetic radiation generated by the ESA representative of its type shall be measured by the method described in Automotive EMC Directive 2004/104/EC, Annex I, 6.6.

ESAs shall meet the limits in Table 2 for narrowband radiated disturbances.

Table 2 – Limits for narrowband radiated disturbances of ESAs

Frequency range F MHz	Limits Average dB μ V/m
30 to 75	52 – 42 ^a
75 to 400	42 – 53 ^b
400 to 1 000	53
^a Decreasing linearly with the log of the frequency. ^b Increasing linearly with the log of the frequency.	

7.3 Conducted transient disturbances

The conducted transients emitted on the power cables of the ESA representative of its type shall be measured according to the method described in Automotive EMC Directive 2004/104/EC, Annex I, 6.9, on supply lines as well as to other connections of ESAs which may be operationally connected to supply lines.

The test does not have to be carried out on ESAs that are not switched, contain no switches or do not include inductive loads.

The limits of the transient disturbances shall be in accordance with those indicated in Table 3.

Table 3 – Limits of transient disturbances

Polarity of pulse amplitude	Maximum allowed pulse amplitude for	
	vehicles with 12 V systems	vehicles with 24 V systems
Positive	+ 75	+ 150
Negative	- 100	- 450

7.4 Conducted transient immunity

The immunity of ESA representative of its type shall be tested by the method described in Automotive EMC Directive 2004/104/EC, Annex I, 6.8.

Apply the test pulses 1, 2a, 2b, 3a, 3b and 4 according to ISO 7637-2 to the supply lines as well as to other connections of ESAs which may be operationally connected to supply lines.

If the ESA is indirectly connected to the vehicle supply line via a DC adapter, then the test pulses shall be applied to the DC adapter.

The test levels and functional status shall be in accordance with those indicated in Table 4.

Table 4 – Immunity test levels and functional status

Test pulse number	Immunity test level	Functional status
1	III	D
2a	III	D
2b	III	D
3a/3b	III	D
4	III	D

Functional status D is where one or more functions of the ESA do not perform as designed during and after exposure and do not return to normal operation until exposure is removed and the ESA is reset by simple “operator/use” action.

8 Test plan

Testing shall be performed according to a test plan, which shall be included in the test report and shall include:

- the size of the ESA;
- representative operating conditions of the ESA;
- the type(s) of test facility used;
- the type(s) of antennas used;
- the frequency steps sizes;
- a description of the ESA exercising method.

9 Test report

The test results shall be documented in a comprehensive test report with sufficient detail to provide for test repeatability.

The test report shall contain the following minimum information:

- EUT description and identification;
- identification of the test equipment used;
- the set up for each test;
- any specific conditions necessary to enable the test to be performed;
- performance level defined by the manufacturer;
- the test plan as described in Clause 8;
- test data and results including any effects on the EUT observed during or after application of the test disturbance, and the duration for which these effects exist;
- the actual parameters used where the referenced standard provides a choice.

Annex ZZ (informative)

Coverage of Essential Requirements of EC Directives

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers protection requirements of Annex I Article 1 of the EC Directive 2004/108/EC for aftermarket equipment (ESAs) which are referenced by Automotive EMC Directive 2004/104/EC, Annex I, 3.2.9, and which are not related to immunity-related functions of vehicles as defined in Automotive EMC Directive 2004/104/EC, Annex I, 2.1.12.

Compliance with this standard provides presumption of conformity with the specified essential requirements of the Directives concerned.

WARNING: Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.

Bibliography

Commission Directive 2004/104/EC of 14 October 2004 adapting to technical progress Council Directive 72/245/EEC relating to the radio interference (electromagnetic compatibility) of vehicles and amending Directive 70/156/EEC on the approximation of the laws of the Member States relating to the type-approval of motor vehicles and their trailers, OJ L 337, 13.11.2004, p. 13-58

Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC, OJ L 390, 31.12.2004, p. 24-37

EN 13309, Construction machinery – Electromagnetic compatibility of machines with internal electrical power supply

EN 55013, Sound and television broadcast receivers and associated equipment – Radio disturbance characteristics – Limits and methods of measurement (CISPR 13, mod.)

EN 55020, Sound and television broadcast receivers and associated equipment – Immunity characteristics – Limits and methods of measurement (CISPR 20)

EN 55022, Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement (CISPR 22, mod.)

EN 55024, Information technology equipment – Immunity characteristics – Limits and methods of measurement (CISPR 24, mod.)

EN ISO 14982, Agricultural and forestry machinery – Electromagnetic compatibility – Test methods and acceptance criteria (ISO 14982)

IEC 60050-161, International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility

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BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Tel +44 (0)20 8996 9001

Fax +44 (0)20 8996 7001

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