

Svenska Elektriska Kommissionen, SEK

Fastställt	Utgåva	Sida	Ingår i
2002-05-22	1	1 (1+53)	SEK Område EMC

© Copyright SEK. Reproduction in any form without permission is prohibited.

**Motorfordon, motorbåtar och
förbränningsmotordrivna anordningar –
Radiostörningar –
Gränsvärden och mätmetoder avseende
störningar på radiomottagare andra än
sådana monterade i motorfordon, motorbåtar eller på
förbränningsmotordrivna anordningar**

*Vehicles, boats and internal combustion engine driven devices –
Radio disturbance characteristics –
Limits and methods of measurement for the protection of receivers
except those installed in the vehicle/boat/device itself
or in adjacent vehicles/boats/devices*

Som svensk standard gäller europastandarden EN 55012:2002. Den svenska standarden innehåller den officiella engelska språkversionen av EN 55012:2002.

Nationellt förord

Europastandarden EN 55012:2002

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **CISPR 12, Fifth edition, 2001 - Vehicles, boats and internal combustion engine driven devices - Radio disturbance characteristics - Limits and methods of measurement for the protection of receivers except those installed in the vehicle/boat/device itself or in adjacent vehicles/boats/devices**

utarbetad inom International Electrotechnical Commission, IEC

ICS 27.020; 33.100.10

Denna standard är fastställd av Svenska Elektriska Kommissionen, SEK, som också kan lämna upplysningar om **sakinnehållet** i standarden.
Postadress: SEK, Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00. Telefax: 08 - 444 14 30
E-post: sek@sekom.se. Internet: www.sekom.se

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

Svenska Elektriska Kommissionen, SEK, svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK

Box 1284
164 29 Kista
Tel 08-444 14 00
www.sekom.se

**Vehicles, boats and internal combustion engine driven devices -
Radio disturbance characteristics -
Limits and methods of measurement for the protection of receivers
except those installed in the vehicle/boat/device itself
or in adjacent vehicles/boats/devices
(CISPR 12:2001)**

Véhicules, bateaux et engins entraînés
par des moteurs à combustion interne -
Caractéristiques de perturbation
radioélectrique -
Limites et méthodes de mesure
pour la protection des récepteurs
à l'exception de ceux installés dans
les véhicules/bateaux/engins eux-mêmes
ou dans des véhicules/bateaux/engins
proches
(CISPR 12:2001)

Fahrzeuge, Boote und von Verbrennungs-
motoren angetriebene Geräte -
Funkstöreigenschaften -
Grenzwerte und Messverfahren
zum Schutz von Empfängern
mit Ausnahme derer,
die in den Fahrzeugen, Booten, Geräten
selbst oder in benachbarten Fahrzeugen,
Booten, Geräten installiert sind
(CISPR 12:2001)

This European Standard was approved by CENELEC on 2002-02-01. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document CISPR/D/255/FDIS, future edition 5 of CISPR 12, prepared by CISPR SC D, Electromagnetic disturbances related to electric/electronic equipment on vehicles and internal combustion engine powered devices, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 55012 on 2002-02-01.

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2002-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-02-01

The standard is applicable to vehicles, boats and other devices equipped with combustion engines, as well as their electrical means.

In the European Union, the EMC requirements for this kind of "vehicles" are regulated in the following directives:

- 95/54/EC on motor vehicles;
- 97/24/EC on two- or three-wheel motor vehicles;
- 2000/2/EC on agricultural or forestry tractors.

Vehicles and other combustion engine powered devices not covered by these directives (e.g. pleasure motor boats) have to fulfil the requirements of the directive 89/336/EC on EMC. The r.f. emission requirements are specified in this standard.

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A, H and ZA are normative and annexes B to G are informative.

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard CISPR 12:2001 was approved by CENELEC as a European Standard without any modification.

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-161	- ¹⁾	International Electrotechnical Vocabulary (IEV) - Chapter 161: Electromagnetic compatibility	-	-
CISPR 16-1	- ¹⁾	Specification for radio disturbance and immunity measuring apparatus and methods Part 1: Radio disturbance and immunity measuring apparatus	-	-
CISPR 25	- ¹⁾	Limits and methods of measurement of radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices	-	-

¹⁾ Undated reference.

CONTENTS

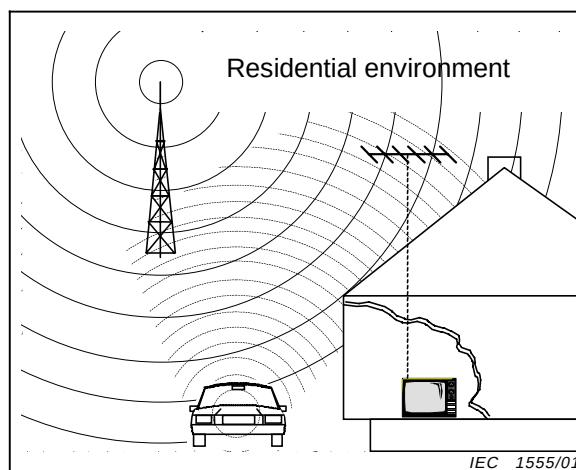
1	Scope	9
2	Normative references.....	11
3	Definitions.....	11
4	Limits of disturbance	15
4.1	Determination of the appropriate limit level	15
4.2	Broadband emissions.....	17
4.3	Narrowband emissions.....	17
5	Methods of measurement.....	19
5.1	Measuring apparatus requirements	19
5.2	Measuring location requirements	25
5.3	Test object conditions	35
5.4	Test frequencies	37
5.5	Data collection.....	37
6	Methods of checking for compliance with CISPR requirements	39
6.1	General.....	39
6.2	Application of limit curves	39
6.3	Evaluation (general).....	39
6.4	Type approval test	39
6.5	Surveillance (quality audit) of series production	41
6.6	Quick prototype check for development testing (broadband emissions only)	41
	Annex A (normative) Statistical analysis of the results of measurements	43
	Annex B (informative) Rod antenna (monopole) performance equations and characterization of the rod antenna matching amplifier – The equivalent capacitance substitution method	47
	Annex C (informative) Antenna and transmission line maintenance and characterization.....	55
	Annex D (informative) Construction features of motor vehicles affecting the emission of ignition noise	65
	Annex E (informative) Measurement of the insertion loss of ignition noise suppressors	67
	Annex F (informative) Methods of measurement to determine the attenuation characteristics of ignition noise suppressors for high-tension ignition systems	81
	Annex G (informative) Flow chart for checking the applicability of CISPR 12	99
	Annex H (normative) Procedure to determine an alternative emission limit for measurements at 3 m antenna distance	101
	Figure 1 – Example method of determination of conformance of radiated disturbance	15
	Figure 2 – Limits of disturbance (broadband) at 10 m antenna distance	17
	Figure 3 – Limits of disturbance (narrowband) at 10 m antenna distance	19
	Figure 4 – Measuring site (OATS) for vehicles and devices	27
	Figure 5 – Measuring site (OATS) for boats.....	29

Figure 6 – Antenna position to measure emissions – Vertical polarization	31
Figure 7 – Antenna position to measure emissions – Horizontal polarization	33
Figure B.1 – Example of mounting capacitor in dummy antenna	49
Figure B.2 – Measurement of 1 m monopole antenna factor	53
Figure C.1 – Alternate antenna factor determination (10 m test distance)	63
Figure E.1 – Test circuit	71
Figure E.2 – General arrangement of the test box	73
Figure E.3 – Details of the test-box lid.....	75
Figure E.4 – Details of the test box	75
Figure E.5 – Straight spark-plug ignition noise suppressor (screened or unscreened)	77
Figure E.6 – Right-angle spark-plug ignition noise suppressor (screened or unscreened)	77
Figure E.7 – Noise suppression spark plug.....	77
Figure E.8 – Resistive distributor brush.....	77
Figure E.9 – Noise suppressor in distributor cap	79
Figure E.10 – Noise suppression distributor rotor	79
Figure E.11 – Noise suppression ignition cable (resistive or reactive).....	79
Figure F.1 – Test set-up, side view.....	85
Figure F.2 – Test set-up, top view	87
Figure F.3 – Pressure chamber with ventilation	89
Figure F.4 – Top view of the set-up of a right-angle ignition noise suppressor for distributors	91
Figure F.5 – Side view of the test set-up for the distributor rotors.....	93
Figure F.6 – Top view of the test set-up for distributor rotors.....	95
Figure F.7 – Side view of the test set-up for ready-to-use resistive ignition cables	97
Figure H.1 – Determination of the maximum antenna angle.....	101
Figure H.2 – Calculation of the resulting gain reduction a	103
Table 1 – Minimum scan time	21
Table 2 – Recommended measuring instrument bandwidth (6 dB).....	21
Table 3 – Internal combustion engine operating speeds	35
Table A.1 – Statistical factors.....	43
Table A.2 – Example of frequency sub-bands.....	45
Table F.1 – Limits.....	81

**VEHICLES, BOATS, AND INTERNAL COMBUSTION
ENGINE DRIVEN DEVICES –
RADIO DISTURBANCE CHARACTERISTICS –
LIMITS AND METHODS OF MEASUREMENT FOR THE PROTECTION OF
RECEIVERS EXCEPT THOSE INSTALLED IN THE VEHICLE/BOAT/DEVICE
ITSELF OR IN ADJACENT VEHICLES/BOATS/DEVICES**

1 Scope

The limits in this International Standard are designed to provide protection for broadcast receivers in the frequency range of 30 MHz to 1 000 MHz when used in the residential environment. Compliance with this standard may not provide adequate protection for new types of radio transmissions or receivers used in the residential environment nearer than 10 m to the vehicle or device.



NOTE 1 Experience has shown that compliance with this standard may provide satisfactory protection for receivers of other types of transmissions when used in the residential environment, including radio transmissions in frequency ranges other than that specified.

This standard applies to the emission of broadband and narrowband electromagnetic energy which may cause interference to radio reception and which is emitted from

- a) vehicles propelled by an internal combustion engine, electrical means or both (see 3.1);
- b) boats propelled by an internal combustion engine, electrical means or both (see 3.2). Boats are to be tested in the same manner as vehicles except where they have unique characteristics as explicitly stated in this standard;
- c) devices equipped with internal combustion engines (see 3.3).

This standard includes limits and test methods for both broadband and narrowband emissions.

This standard does not apply to aircraft, traction systems (railway, tramway and trolley bus), or to incomplete vehicles.

NOTE 2 Protection of receivers used on board the same vehicle as the disturbance source(s) are covered by CISPR 25.

The measurement of electromagnetic disturbances while the vehicle is connected to power mains for charging is not covered in this standard. The user is referred to appropriate IEC and CISPR standards which define measurement techniques and limits for this condition.