

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INTERNATIONAL SPECIAL COMMITTEE ON RADIO INTERFERENCE (CISPR)

Guidance for users of the CISPR Standards

1 Introduction

This document has been prepared in order to provide guidance in the selection of appropriate CISPR EMC Standards applicable to your products, systems and installations. This document also gives an overview of the latest version of published CISPR Standards covering EMC aspects of products, systems and installations.

The document is regularly updated and expanded.

The Standards are divided into the following categories :

1.1 Basic Standards

Basic EMC Standards give the general and fundamental conditions or rules for the assessment of EMC and related performance of all products, systems or installations, and serve as reference documents for CISPR Generic and Product Standards. Basic Standards are general and hence are not dedicated to specific product families or products; they relate to general information, to the disturbing phenomena and to the measurement or testing techniques. They do not contain any prescribed limits or any product/system related performance specifications. However methods and guidance on how to generate appropriate limits for the protection of radio reception are given.

1.2 Generic Standards

Generic EMC Standards are Standards related to a particular environment, which specify the set of essential EMC requirements and test procedures, applicable to all the products or systems intended for operation in this environment, provided there do not exist any specific EMC Standards for a particular product family, product, system or installation. Limits are included, and reference is made to the test procedures.

1.3 Product Standards

Product Standards define specific EM requirements, test procedures and limits dedicated to particular products, systems or installations for which specific conditions must be considered.

2 List of available current CISPR Standards

2.1 General

This clause lists the CISPR standards available. It should be noted that CISPR 16 “Specification for radio disturbance and immunity measuring apparatus and methods” is published in multiple parts and sub-parts:

- Part 1: Specification for radio disturbance and immunity measuring apparatus and methods
- Part 2: Methods of measurement of disturbances and immunity
- Part 3: CISPR Technical Reports
- Part 4: Uncertainties, statistics and limit modelling

Note: for details of the latest issues of the following standards, please see the IEC Webstore : <http://webstore.iec.ch>

2.2 CISPR Basic EMC Standards

Publication	Description	Sub-Committee
CISPR 16-1-1	Part 1-1: Measuring apparatus	CIS/A
CISPR 16-1-2	Part 1-2: Coupling devices for conducted disturbance measurements	CIS/A
CISPR 16-1-3	Part 1-3: Ancillary equipment – Disturbance power	CIS/A
CISPR 16-1-4	Part 1-4: Antennas and test sites for radiated disturbance measurements	CIS/A
CISPR 16-1-5	Part 1-5: Antenna calibration sites and reference test sites for 5 MHz to 18 GHz	CIS/A
CISPR 16-1-6	Part 1-6: EMC antenna calibration	CIS/A
CISPR 16-2-1	Part 2-1: Conducted disturbance measurements	CIS/A
CISPR 16-2-2	Part 2-2: Measurement of disturbance power	CIS/A
CISPR 16-2-3	Part 2-3: Radiated disturbance measurements	CIS/A
CISPR 16-2-4	Part 2-4: Immunity measurements	CIS/A
CISPR 16-4-2	Part 4-2: Uncertainty in EMC measurements	CIS/A
CISPR 17	Methods of measurement of the suppression characteristics of passive radio interference filters and suppression components	CIS/A
IEC 61000-4-20	Testing and measurement techniques - Emission and immunity testing in transverse electromagnetic (TEM) waveguides	CIS/A & SC77B
IEC 61000-4-21	Testing and measurement techniques - Reverberation chamber test methods	CIS/A & SC77B
IEC 61000-4-22	Testing and measurement techniques - Radiated emissions and immunity measurements in fully anechoic rooms (FARs)	CIS/A

2.3 CISPR Generic EMC Standards

Publication	Description	Sub-Committee
IEC 61000-6-3 (see annex C.1)	Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments	CIS/H
IEC 61000-6-4 (see annex C.2)	Part 6-4: Generic standards - Emission standard for industrial environments	CIS/H

2.4 CISPR Product Standards

Publication	Description	Sub-Committee
CISPR 11 (see annex A.1)	Industrial, scientific and medical equipment – Radio-frequency disturbance characteristics – Limits and methods of measurement	CIS/B
CISPR 12 (see annex A.2)	Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of off-board receivers	CIS/D
CISPR 13 (will be withdrawn March 2017)	Sound and television broadcast receivers and associated equipment - Radio disturbance characteristics - Limits and methods of measurement	CIS/I
CISPR 14-1 (see annex A.3)	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 1: Emission	CIS/F
CISPR 14-2 (see annex A.4)	Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard	CIS/F
CISPR 15 (see annex A.5)	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment	CIS/F
CISPR 20 (see annex A.6)	Sound and television broadcast receivers and associated equipment - Immunity characteristics - Limits and methods of measurement	CIS/I
CISPR 22 (will be withdrawn March 2017)	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement	CIS/I
CISPR 24 (see annex 0)	Information technology equipment - Immunity characteristics - Limits and methods of measurement	CIS/I
CISPR 25 (see annex A.7)	Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers	CIS/D
CISPR 32 (see annex A.9)	EMC of multimedia equipment- emission requirements	CIS/I
CISPR 35 (see annex A.10)	EMC of multimedia equipment – Immunity requirements	CIS/I

2.5 CISPR Guidance documents

Guidance not for compliance testing.

Publication	Description	Sub-Committee
CISPR/TR 16-2-5	Specification for radio disturbance and immunity measuring apparatus and methods - Part 2-5: In situ measurements for disturbing emissions produced by physically large equipment	CIS/H
CISPR/TR 16-3	CISPR technical reports	CIS/A
CISPR/TR 16-4-1	Uncertainties in standardized EMC tests	CIS/A
CISPR/TR 16-4-3	Statistical considerations in the determination of EMC compliance of mass-produced products	CIS/A
CISPR/TR 16-4-4	Statistics of complaints and a model for the calculation of limits	CIS/H
CISPR/TR 16-4-5	Conditions for the use of alternative test methods	CIS/A
CISPR/TR 18-1 (see annex B.1)	Radio interference characteristics of overhead power lines and high voltage equipment. Part 1: Description of phenomena	CIS/B
CISPR/TR 18-2 (see annex B.2)	Radio interference characteristics of overhead power lines and high voltage equipment. Part 2: Methods of measurement and procedures for determining limits	CIS/B
CISPR/TR 18-3 (see annex B.3)	Radio interference characteristics of overhead power lines and high-voltage equipment - Part 3: Code of practice for minimizing the generation of radio noise	CIS/B
CISPR/TR 28	Industrial, scientific and medical equipment (ISM) - Guidelines for emission levels within the bands designated by the ITU	CIS/B
CISPR/TR 29	Television broadcast receivers and associated equipment - Immunity characteristics - Methods of objective picture assessment	CIS/I
CISPR/TR 30-1	Test method on electromagnetic emissions- Part 1: Electronic control gear for single- and double-capped fluorescent lamps	CIS/F
CISPR/TR 30-2	Test method on electromagnetic emissions - Part 2: Electronic control gear for discharge lamps excluding fluorescent lamps	CIS/F
CISPR/TR 31	Database on the characteristics of radio services	CIS/H
IEC PAS 62437	Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices - Limits and methods of measurement - Specifications for active antennas	CIS/D
IEC PAS 62825	Methods of measurement and limits for radiated disturbances from plasma display panel TVs in the frequency range 150 kHz to 30 MHz	CIS/I

3 Selection list of products and Standards to be applied

NOTE Product lists are available for this table from IEC etc.

Product	Applicable CISPR Standard(s)									Remarks
	11	12/25	14-1	14-2	15	20	24	32	35	
Accelerators (medical)	✓									
Agricultural machinery		✓								
Arc Welding equipment	✓									
Audio Amplifiers						✓		✓	✓	
Automatic Teller Machine							✓	✓	✓	
Battery Chargers - rectifier style	✓		✓	✓						
Battery Chargers – switch mode	✓		✓	✓						
Battery Chargers – wireless power transfer (WPT) mode	✓									
Battery powered floor finishing machines		✓								
Boats (<15m in length)		✓								
Cap lights for mines					✓					
Car radios		✓				✓		✓	✓	
CD / DVD Player						✓		✓	✓	
Centrifuges for laboratories	✓									
Character Reader							✓	✓	✓	
Compact fluorescent luminaires					✓					
Copying Machine							✓	✓	✓	
Data Display: CRT, plasma, LED, Liquid crystal							✓	✓	✓	
Data Input Device: Keyboard, mouse Magnetic card reader Optical character reader Image scanner, pen							✓	✓	✓	
Data Plotter							✓	✓	✓	
Data Printer: Dot matrix, laser, LED							✓	✓	✓	
Data Processing Equipment							✓	✓	✓	
Data Processor: Computer, calculator							✓	✓	✓	
Data Scanner							✓	✓	✓	
Data Storage Device							✓	✓	✓	
DC to DC convertor	✓									
Decoders NTSC, PAL, SECAM						✓		✓	✓	
Demultiplexers						✓		✓	✓	
Digital Still Camera							✓	✓	✓	Data processing + display + memory suggests ITE
Digital Video Camera							✓	✓	✓	
EDM equipment	✓									Electro-Discharge Machining equipment
Encoders NTSC, PAL, SECAM						✓		✓	✓	
Facsimile Machine							✓	✓	✓	
FAX Modem							✓	✓	✓	
FM sound receivers						✓		✓	✓	
FM tuners						✓		✓	✓	
Forestry Equipment		✓								
Gas analyser	✓									
Ice maker			✓	✓						

Product	Applicable CISPR Standard(s)									Remarks
	11	12/25	14-1	14-2	15	20	24	32	35	
Induction cooking appliances			✓	✓						
Internal combustion engine devices: (electric generators, pumps, lawn mowers, garden tools, chain saws, etc.)		✓								
Kitchen machines			✓	✓						
LED luminaires					✓					
Local Area Network devices							✓	✓	✓	
Magnetic Tape Device							✓	✓	✓	
Magnetic Disk Device							✓	✓	✓	
Memory Device							✓	✓	✓	
Microwave oven	✓			✓						
Modem (all types)							✓	✓	✓	
MP3 player						✓	✓	✓	✓	Going by definition of product and scope of the std, CISPR 20 seems appropriate –AV equip.
Optical Disk Device: CD-ROM, DVD-ROM							✓	✓	✓	
PC TV Tuner Cards						✓		✓	✓	
PC AM / FM Radio Tuner cards						✓		✓	✓	
Record Players						✓		✓	✓	
Rectifier diode power supplies			✓	✓						
Point of Sale Terminal							✓	✓	✓	
Power Convertors	✓									
Power Supplies – wireless power transfer (WPT) mode	✓									
Power tools (including battery powered)			✓	✓						
RF amplifiers						✓		✓	✓	
RF converters						✓		✓	✓	
Road vehicles including passenger cars, trucks and busses powered by an internal combustion, an electric motor or hybrid technology		✓								
Satellite tuner units (1st IF)						✓		✓	✓	
Switch mode power supplies	✓		✓	✓						
Telecommunication Terminal							✓	✓	✓	
Television receivers						✓		✓	✓	
Telephone							✓	✓	✓	
TV set-top boxes (analog or digital)						✓		✓	✓	
Video projector						✓		✓	✓	
Video recorders						✓		✓	✓	

For other products not listed above and where a specific product standard does not exist, use the Generic EMC Emission standards IEC 61000-6-3 or IEC 61000-6-4 and Generic EMC Immunity standards IEC 61000-6-1 or IEC 61000-6-2.

Annex A CISPR Product Standards

Definitions of available current CISPR Standards referred to in Clause 2.4.

A.1 CISPR 11

CISPR 11	Industrial, scientific and medical equipment –Radio Frequency disturbance characteristics – Limits and methods of measurement
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CISPR 11 is applicable to all types of electrical equipment intended for use in industrial, scientific or medical applications which is operated at frequencies in the frequency range 0 Hz to 400 GHz. Its requirements apply to apparatus and systems in its scope which are intended for use in residential and in industrial environments or in laboratories. Furthermore it specifies emission requirements for any kind of ISM RF application (including those for domestic use) which is designed to generate and/or use locally radio frequency (RF) energy for purposes other than radio communications. Such purposes include, but are not limited to, the treatment of material, inspection/analysis of material and wireless power transfer (WPT) for instantaneous power supply or for the charging of power electronic equipment. The standard is suitable for compliance testing of apparatus and systems at standardised test sites as well as at the installation site of such equipment.

The scope of CISPR 11 comprises for example, but is not limited to

General purpose applications (Classes A or B, Group 1)

- Laboratory equipment
- Medical electrical equipment
- Scientific equipment
- Semiconductor-converters
- Industrial electroheating equipment with operating frequencies less than or equal to 9 kHz
- Machine tools
- Industrial process measurement and control equipment
- Semiconductor manufacturing equipment

ISM RF applications (Classes A or B, Group 2)

- Microwave-powered UV irradiating apparatus
- Microwave lighting apparatus
- Industrial induction heating equipment operating at frequencies above 9 kHz
- Inductive charging equipment
- Dielectric heating equipment
- Industrial microwave heating equipment
- Microwave ovens
- Medical electrical equipment
- Electric welding equipment
- Electro-discharge machining (EDM) equipment
- Demonstration models for education and training

Excluded from the scope are apparatus for which emission requirements are explicitly formulated in other CISPR standards.

To fully cover all EMC aspects and phenomena that are considered applicable to equipment in the scope of CISPR 11 the following other EMC related standards may apply in their own right:

- IEC 61000-6-1 *Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments*
- IEC 61000-6-2 *Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage*

supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection

- IEC 61000-3-11 *Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection*
- IEC 61000-3-12 *Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase*

NOTE: IEC 61000-3-2, IEC 61000-3-3, IEC 61000-3-11 and IEC 61000-3-12 are applicable in some regions for equipment that is intended to be connected to a public low-voltage network.

A.2 CISPR 12

CISPR 12	Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of off-board receivers
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The limits in CISPR 12 are designed to provide protection for broadcast receivers in the frequency range of 30 MHz to 1000 MHz when used in the residential environment. Compliance with CISPR 12 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: Experience has shown that compliance with CISPR 12 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.

CISPR 12 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;
- b) motorboats propelled by an internal combustion engine, electrical means or both;
- c) devices equipped with spark-ignited internal combustion engines;
- d) battery powered self-propelled floor finishing machines.

CISPR 12 contains a flow chart to assist in determining which products are covered by the standard.

CISPR 12 includes limits and test methods for both broadband and narrowband emissions.

CISPR 12 does not apply to aircraft, traction systems (railway, tramway and trolley bus), or to incomplete vehicles.

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

The following examples of products covered by CISPR 12 (note: this list is not all inclusive):

- Road vehicles (passenger cars, trucks, busses, trailers) regardless of propulsion means
- Agricultural equipment
- Forestry equipment
- Landscaping equipment (Lawn mowers (mains powered mowers excluded), garden tillers, etc.)
- Internal combustion engine driven electric generators
- Internal combustion engine driven pumps
- Self-propelled floor finishing equipment, excluding robotic vacuum carpet sweepers

A.3 CISPR 14-1

CISPR 14-1	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission
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CISPR 14-1 is applicable to electrical apparatus whose main functions are performed by motors and switching or regulating devices, or by r.f. generators used in induction cooking appliances including e.g.:

- Electrical Household equipment and Portable Tools;
- Agricultural equipment such as electric fences, milking machines, etc;
- Electric toys such as toys running on tracks, etc;
- Electronic regulating controls;
- Motor-driven electro-medical apparatus;
- Cine and slide projectors;
- Dispensing Machines, Entertainment Machines and similar appliances;
- "Single components", such as heating thermostats, etc;
- Separate parts: such as: motors, switching devices (e.g. power or protective relays).

The Standard is **not** applicable to:

- Equipment for lighting purposes;
- equipment for generation and use of radio frequency energy for heating (other than induction cooking) and therapeutic purposes;
- Apparatus for heavy industrial purposes;
- Apparatus being part of fixed electrical installations of buildings;
- Apparatus for use in environments with special EM conditions;
- Radio & TV receivers, Audio & Video apparatus & electronic music instruments;
- Radio transmitters, transceivers and receivers;
- Medical Electrical Equipment and Information Technology Equipment;
- Apparatus for use exclusively in vehicles;
- Electronic regulating controls with current >25 A per phase;
- Stand-alone power supplies;
- Apparatus for which emission requirements are explicitly formulated in other IEC or CISPR Standards.

Multifunction equipment which is subjected simultaneously to different clauses of CISPR 14-1 and/or other Standards shall meet the provisions of each Clause/Standard with the relevant functions in operation.

The comparable immunity Standard is CISPR 14-2.

To fully cover all EMC phenomena that are considered applicable to the equipment under the scope of CISPR 14-1 the following Standards are in most cases also applicable:

- CISPR 14-2 *Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity - Product family standard*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

NOTE: IEC 61000-3-2 and IEC 61000-3-3 are applicable in some regions for equipment that is intended to be connected to a public low-voltage network.

A.4 CISPR 14-2

CISPR 14-2	Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 2: Immunity
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CISPR 14-2 is applicable to electrical apparatus for household and similar purposes, as well as electric toys and electric tools, with rated voltage being not more than 250 V (single phase) or 480 V (multi phase) including:

- Electrical Household equipment and Portable Tools;
- Agricultural equipment such as electric fences, milking machines, etc;
- Electric toys such as toys running on tracks, etc;
- Electronic regulating controls;
- "Single components", such as heating thermostats, etc;
- Microwave ovens for domestic use and catering;
- RF cooking hobs and ovens and induction cooking appliances;
- UV & IR radiators for personal care.

Apparatus not intended for household use, such as intended to be used by laymen in shops, light industry and on farms, are within the scope of this Standard, as far as they are included in CISPR 14-1.

The Standard is **not** applicable to:

- Equipment for lighting purposes;
- Apparatus for heavy industrial purposes;
- Apparatus being part of fixed electrical installations of buildings;
- Apparatus for use in environments with special EM conditions;
- Radio & TV receivers, Audio & Video apparatus, Radio transmitters & electronic music instruments;
- Medical Electrical Equipment and Information Technology Equipment;
- Apparatus for use exclusively in vehicles;
- Apparatus for which immunity requirements are explicitly formulated in other IEC or CISPR Standards.

Multifunction equipment which is subjected simultaneously to different clauses of this Standard and/or other Standards shall meet the provisions of each Clause/Standard with the relevant functions in operation.

The comparable emission Standard is CISPR 14-1 *Electromagnetic compatibility – Requirements for household appliances, electric tools and similar apparatus – Part 1: Emission.*

A.5 CISPR 15

CISPR 15	Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment
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CISPR 15 applies to the (radiated and conducted) emission and to the immunity of radio frequency disturbances of:

- all lighting equipment with a primary function of generating and/or distributing light intended for illumination purposes, and intended either for connection to the low voltage electricity supply or for battery operation;
- the lighting part of multi-function equipment where one of the primary functions is illumination;
- independent auxiliaries exclusively for use with lighting equipment;
- UV and IR radiation equipment;
- neon advertising signs;
- street/flood lighting intended for outdoor use only;
- transport lighting (installed in buses, trains, etc.).

CISPR 15 is **not** applicable to:

- auxiliaries intended to be built into lighting equipment,
- lighting equipment operating in the ISM frequency bands (as defined in resolution 63 (1979) of the ITU Regulation),
- lighting equipment for aircraft and airports,
- equipment for which EMC requirements are explicitly formulated in other IEC or CISPR Standards, such as photocopiers, slide projectors , built-in lighting devices such as scale illumination.

To fully cover all EMC phenomena that are considered applicable to the equipment under the scope of CISPR 15 the following Standards are in most cases also applicable:

- IEC 61547 *Equipment for general lighting purposes - EMC immunity requirements*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

NOTE: IEC 61000-3-2 and IEC 61000-3-3 are applicable in some regions for equipment that is intended to be connected to a public low-voltage network.

A.6 CISPR 20

CISPR 20	Sound and television broadcast receivers and associated equipment – Immunity characteristics – Limits and methods of measurement
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At the time of publication of this document, CISPR 35 may be applied instead of CISPR 20. CISPR 35 will replace CISPR 20 at a future date yet to be defined.

CISPR 20 is applicable to sound and television receivers for the reception of broadcast and similar services for terrestrial, cable and satellite transmissions and associated equipment, including e.g.:

- FM sound receivers;
- Car radios;
- Television receivers;
- Associated equipment with RF modulator;
- FM tuners;
- Tuners units at the first satellite intermediate frequency;
- Frequency converters;
- Radio-frequency amplifiers;
- Equalisers;
- Demodulators;
- Decoders for NTSC, PAL or SECAM;
- Encoders for NTSC, PAL or SECAM;
- Demultiplexers;
- D/A converters;
- Audio amplifiers;
- Active loudspeaker units;
- Record players;
- Compact disc players;
- Audio magnetic recording and playback equipment;
- Video recorders;
- Electronic organs.

The Standards is **not** applicable to:

- Equipment included in CATV distribution networks;
- Information Technology Equipment (ITE);
- Professional receivers;
- Amateur receivers and transmitters;
- Telecommunication receivers;
- Telecommunication cordless transceivers;
- Radiofrequency remote control appliances;
- Apparatus for which immunity requirements are explicitly formulated in other IEC or CISPR Standards.

The comparable emission Standard is CISPR 32.

To fully cover all EMC phenomena that are considered applicable to the equipment under the scope of CISPR 20 the following Standards are in most cases also applicable:

- CISPR 32 *EMC of multimedia equipment- emission requirements*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection.*

NOTE: IEC 61000-3-2 and IEC 61000-3-3 are applicable in some regions for equipment that is intended to be connected to a public low-voltage network.

CISPR 24

CISPR 24	Information technology equipment – Immunity characteristics – Limits and methods of measurement
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At the time of publication of this document, CISPR 35 may be applied instead of CISPR 24. CISPR 35 will replace CISPR 24 at a future date yet to be defined.

CISPR 24 is applicable to the radiated and conducted immunity of Information technology equipment (ITE), examples of which include the following:

- Telecommunication Terminal
- Telephone
- Facsimile Machine
- Data Processing Equipment
- Data Display
- CRT, plasma, LED
- Liquid crystal
- Data Input Device
- Keyboard, mouse
- Magnetic card reader
- Optical character reader
- Image scanner, pen
- Data Printer
- Dot matrix, laser, LED
- Data Plotter
- Data Processor
- Computer, calculator
- Local Area Network
- Data Storage Device
- Data Scanner
- Character Reader
- Copying Machine
- Automatic Teller Machine
- Point of Sale Terminal
- Magnetic Tape Device
- Magnetic Disk Device
- Optical Disk Device
- CD-ROM, DVD-ROM
- Memory Device
- FAX Modem
- Modem

To fully cover all EMC phenomena that are considered applicable to the equipment under the scope of CISPR 24 the following Standards are in most cases also applicable:

- CISPR 32 *EMC of multimedia equipment- emission requirements*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

NOTE: IEC 61000-3-2 and IEC 61000-3-3 are applicable in some regions for equipment that is intended to be connected to a public low-voltage network.

A.7 CISPR 25

CISPR 25	Vehicles, boats and internal combustion engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers
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CISPR 25 contains limits and procedures for the measurement of radio disturbances in the frequency range of 150 kHz to 1000 MHz. Only a complete vehicle test can be used to determine the component compatibility with respect to a vehicle's limit.

It applies to the suppression of on-board radio disturbances for motor vehicles, devices and working machinery, to achieve acceptable radio reception with on-board radio receivers. The standard applies to any electronic/electrical component intended for use in vehicles and large devices. The limits are intended to provide protection for receivers installed in a vehicle from disturbances produced by components/modules in the same vehicle. Adjacent vehicles can be expected to be protected in most situations. Vehicles include (but are not limited to) passenger cars, trucks, agricultural tractors and snowmobiles.

On-board radio disturbance suppression reduces the radio disturbance energy which is applied by electrical equipment within the vehicle to the on-board power supply of a vehicle. Disturbances can also be coupled from vehicle wiring to the receiving antenna on the vehicle. The receiver types to be protected are: sound and television receivers, land mobile radio, radio telephone, amateur and citizens' radio. Adequate television protection will result from compliance with the levels at the mobile service frequencies.

The limits in CISPR 25 are recommended and subject to modification as agreed between the vehicle manufacturer and the component supplier. CISPR 25 shall also be applied by manufacturers and suppliers of components and equipment which are to be added and connected to the vehicle harness or to an onboard power connector after delivery of the vehicle.

CISPR 25 does not include protection of electronic control systems from radio frequency emissions, or from transient or pulse type voltage fluctuations. These subjects are covered by ISO publications, e.g. ISO 7637, ISO 11451, ISO 11452.

The method and limits for a complete vehicle are described in Clause 5 of CISPR 25. The requirements contained herein specify the maximum permissible disturbance voltage at the antenna of the radio receiver in the frequency range of 150 kHz to 1000 MHz.

The method and limits for components/modules are described in Clause 6 of CISPR 25. The requirements contained herein specify the maximum permissible voltage, current and field strengths in the frequency range of 150 kHz to 1000 MHz. Since the mounting location, vehicle body construction and harness design can affect the coupling of radio disturbances to the on-board radio, Clause 6 of CISPR 25 defines multiple limit levels. The level class to be used (as a function of frequency band) shall be agreed upon between the vehicle manufacturer and the component supplier.

The World Administrative Radiocommunications Conference (WARC) lower frequency limit in region 1 was reduced to 148,5 kHz in 1979. For vehicular purposes, tests at 150 kHz are considered adequate. For the purposes of CISPR 25, test frequency ranges have been generalized to cover radio services in various parts of the world. Protection of radio reception at adjacent frequencies can be expected in most cases.

It is assumed that protection of services operating on frequencies below 30 MHz will most likely be provided if the limits for services above 30 MHz are observed.

Note: See the information for CISPR 12 for a list of end products for which CISPR 25 applies to the components thereof. Components/modules which have no inherent capability to emit RF energy are excluded from testing.

A.8 CISPR 32

CISPR 32	EMC of multimedia equipment- emission requirements
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CISPR 32 applies to multimedia equipment (MME) as defined in 3.1.24 and having a rated r.m.s. AC or DC supply voltage not exceeding 600 V.

Equipment within the scope of CISPR 13 or CISPR 22 is within the scope of CISPR 32.

MME intended primarily for professional use is within the scope of CISPR 32.

The radiated emission requirements in CISPR 32 are not intended to be applicable to the intentional transmissions from a radio transmitter as defined by the ITU, nor to any spurious emissions related to these intentional transmissions.

Equipment, for which emission requirements in the frequency range covered by CISPR 32 are explicitly formulated in other CISPR publications (except CISPR 13 and CISPR 22), are excluded from the scope of this publication.

The standard does not contain requirements for in-situ assessment.

The standard covers two classes of MME (Class A and Class B). The MME classes are specified in Clause 4.

The objectives of the standard publication are:

1. to establish requirements which provide an adequate level of protection of the radio spectrum, allowing radio services to operate as intended in the frequency range 9 kHz to 400 GHz;
2. to specify procedures to ensure the reproducibility of measurement and the repeatability of results.

At the time of publication of this document, CISPR 32 may be applied instead of CISPR 13 and/or CISPR 22. CISPR 32 will replace CISPR 13 and CISPR 22 in 2017.

To fully cover all EMC phenomena that are considered applicable to the equipment under the scope of CISPR 32 the following Standards are in most cases also applicable:

- CISPR 20 Sound and television broadcast receivers and associated equipment – Immunity characteristics – Limits and methods of measurement
- CISPR 24 *Information technology equipment – Immunity characteristics – Limits and methods of measurement*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

NOTE: IEC 61000-3-2 and IEC 61000-3-3 are applicable in some regions for equipment that is intended to be connected to a public low-voltage network.

A.9 CISPR 35

CISPR 35	EMC of multimedia equipment- immunity requirements
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CISPR 35 applies to multimedia equipment (MME) as defined in 3.1.24 and having a rated AC or DC supply voltage not exceeding 600 V.

MME within the scope of CISPR 20 or CISPR 24 is within the scope of CISPR 35.

MME with a broadcast reception function is within the scope of CISPR 35, see Annex A.

MME with non-broadcast wireless interfaces is also within the scope of CISPR 35, however, compliance with CISPR 35 does not require the assessment of the performance of these interfaces.

MME intended primarily for professional use is within the scope of CISPR 35.

MME for which immunity requirements in the frequency range covered by CISPR 35 are explicitly formulated in other CISPR documents (except CISPR 20 and CISPR 24) are excluded from the scope of CISPR 35.

The objectives of CISPR 35 are:

- to establish requirements which provide an adequate level of intrinsic immunity so that the MME will operate as intended in its environment in the frequency range 0 kHz to 400 GHz;
- to specify procedures to ensure the reproducibility of tests and the repeatability of results.

Due to technology convergence of the functions of MME, the performance criteria have been determined on a function-orientated basis rather than on an equipment-orientated basis.

At the time of publication of this document, CISPR 35 may be applied instead of CISPR 20 and/or CISPR 24. CISPR 35 will replace CISPR 20 and CISPR 24 at a future date yet to be defined.

To fully cover all EMC phenomena that are considered applicable to the equipment under the scope of CISPR 35 the following Standards are in most cases also applicable:

- CISPR 32 *EMC of multimedia equipment- emission requirements*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

NOTE: IEC 61000-3-2 and IEC 61000-3-3 are applicable in some regions for equipment that is intended to be connected to a public low-voltage network.

Annex B CISPR Guidance documents

Definitions of available current CISPR documents referred to in Clause 2.5.

B.1 CISPR TR 18-1

CISPR TR 18-1	Radio interference characteristics of overhead power lines and high-voltage equipment. Part 1: Description of phenomena
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CISPR TR 18-1 contains the description of generation of radio noise from overhead power lines and equipment operating at 1 kV and above, which may cause interference to radio reception in the frequency range 0, 15 MHz to 300 MHz, including e.g. :

- characteristics of radio noise in the frequency range 0,15 MHz to 30 MHz (AM sound broadcasting) generated by a.c. power lines and equipment;
- characteristics of radio noise in the frequency range 30 MHz to 300 MHz (FM sound broadcasting and television) generated by a.c. power lines and equipment;
- spark discharges due to bad contacts;
- information on interference due to d.c. overhead lines for which corona discharge and interference conditions are different from those of a.c. power lines;
- interference protection of reception for sound and television radio broadcasting;
- general procedure to establish the limits of the radio noise field from the power lines and equipment, together with typical values as examples;
- methods of radio noise field measurement.

The Report does not deal with:

- fields and interference from power line carrier signals;
- interference due to the current collecting equipment of overhead railway traction systems;
- level of noise at frequencies higher than 300 MHz.

Methods of measurement for emission measurements in the field or in the laboratory, predetermination formulae for the radio noise and profiles of the radio noise field from typical HV overhead power lines are found in CISPR TR 18-2.

A code of good engineering practice for reduction of the radio noise level and for maintenance of HV overhead power line is found in CISPR TR 18-3.

B.2 CISPR TR 18-2:

CISPR TR 18-2	Radio interference characteristics of overhead power lines and high-voltage equipment. Part 2: Methods of measurement and procedure for determining limits
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CISPR TR 18-2 contains the methods of measurement and general procedures for determining appropriate limits of radio noise from overhead power lines and equipment operating at 1 kV and above, which may cause interference to radio reception in the frequency range 0,15 MHz to 300 MHz, including e.g. :

- radio noise on-site measurements in the frequency range 0,15 MHz to 30 MHz;
- recommendations for determination of appropriate limits for the protection of sound and television radio broadcasting services from radio noise generated by high-voltage a.c. and d.c. overhead power lines and substations;
- radio noise laboratory measurements;
- procedures to determine appropriate limits for radio noise from insulator chains.
- statistical estimates of radio noise level from overhead power lines;
- significance of CISPR limits for power lines and high-voltage equipment;
- reception protection at the edges of the recognized radio service areas of the appropriate transmitters in the long, medium and short wave radio frequency bands;
- recommendations on the design and maintenance of high-voltage power lines and equipment to minimize interference.

The methods of measurement recommended in the Report are also applicable for investigation of interference problems caused by high-voltage d.c. converting substations and the power lines (a.c. and d.c. ones) connected to them, including e.g.:

- main electromagnetic noise sources within high-voltage d.c. converting substations and similar installations (static reactive power compensating units of SVC type, etc.);
- fields generated by current rectifying units;
- interference conveyed by transmission lines;
- general criteria to establish noise limits.

To date the Report does not deal with:

- protection of radio reception in the frequency range 30 MHz to 300 MHz;
- level of noise at frequencies higher than 300 MHz.
- procedures to determine the limits for radio noise produced by other elements of power lines and substations other than the insulator chains.

The description of generation of radio noise by high-voltage overhead power lines and substations is found in CISPR TR 18-1.

A code of good engineering practice for reduction of the radio noise level and for maintenance of high voltage overhead power line is found in CISPR TR 18-3.

For suitable test instrumentation and further information on methods of measurement the Report also refers to the respective CISPR Basic Standards.

B.3 CISPR TR 18-3

CISPR TR 18-3	Radio interference characteristics of overhead power lines and high voltage equipment. Part 3: Code of practice for minimizing the generation of radio noise
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CISPR TR 18-3 contains a code of good engineering practice for reduction of the radio noise from overhead power lines and high voltage equipment, liable to cause radio interference problems, including for example:

- power line and high-voltage equipment design, considering their possible electromagnetic impact on sound and television radio reception;
- corona discharge on metallic components of high-voltage installations;
- discharges on insulator surface;
- electric arcs and sparks due to bad contact areas;
- noise sources in abnormal operating conditions;
- computing methods for the base noise level of an overhead transmission line;
- detecting and locating the bad contact areas and possible remedies regarding the resulting noise level.

It is also applicable to radio noise generated by tubular conductors and bundled conductors with a large number of sub-conductors (more than four sub-conductors per phase) , including e.g. :

- high-voltage a.c. installations;
- fundamental principles of bundled conductor and tubular conductor electromagnetic noise generation;
- computation of radio noise level caused by bundled conductor corona discharge;
- computation of radio noise level caused by tubular conductor corona discharge;
- radio noise patterns for different overhead line configurations, equipped with bundled- or tubular conductors.

The Report does not contain information regarding:

- high-voltage a.c. installations with single conductors per phase;
- high-voltage d.c. installations.
- fields from power line carrier signals.

Methods of measurement for emission measurements in the field or in the laboratory, predetermination formulae for the radio noise and profiles of the radio noise field from typical HV overhead power lines are found in CISPR TR 18-2.

A code of good engineering practice for reduction of the radio noise level and for maintenance of HV overhead power line is found in CISPR TR 18-3.

Annex C CISPR Generic EMC Standards

C.1 IEC 61000-6-3

IEC 61000-6-3	Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
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IEC 61000-6-3 provides EMC emission requirements applicable to electrical and electronic apparatus intended for use in residential, commercial and light-industrial environments.

Emission requirements in the frequency range 0 Hz to 400 GHz are covered. No measurement needs to be performed at frequencies where no requirement is specified.

This generic EMC emission standard is applicable only if no product or product-family EMC emission standard exists.

IEC 61000-6-3 applies to apparatus intended to be directly connected to a low-voltage public mains network or connected to a dedicated DC power source, which is intended to interface between the apparatus and the low-voltage public mains network. IEC 61000-6-3 applies also to apparatus which is battery operated or is powered by a non-public, but non-industrial, low-voltage power distribution system if this apparatus is intended to be used in the locations described below.

The environments encompassed by IEC 61000-6-3 are residential, commercial and light-industrial locations, both indoor and outdoor. The following list, although not comprehensive, gives an indication of locations that are included:

- residential properties, for example houses, apartments;
- retail outlets, for example shops, supermarkets;
- business premises, for example offices, banks;
- areas of public entertainment, for example cinemas, public bars, dance halls;
- outdoor locations, for example petrol stations, car parks, amusement and sports centres;
- light-industrial locations, for example workshops, laboratories, service centres.

Locations that are characterised by being supplied directly at low voltage from the public mains network are considered to be residential, commercial or light-industrial.

The object of IEC 61000-6-3 is to define the emission test requirements for apparatus defined in the scope in relation to continuous and transient, conducted and radiated disturbances.

The emission requirements have been selected so as to ensure that disturbances generated by apparatus operating normally in residential, commercial and light-industrial locations do not exceed a level which could prevent other apparatus from operating as intended. Fault conditions of apparatus are not taken into account. Not all disturbance phenomena have been included for testing purposes in IEC 61000-6-3 but only those considered as relevant for the equipment covered by IEC 61000-6-3. These requirements represent essential electromagnetic compatibility emission requirements.

To fully cover all EMC phenomena the following other EMC related standards may apply:

- IEC 61000-6-1 *Electromagnetic compatibility (EMC) - Part 6-1: Generic standards - Immunity standard for residential, commercial and light-industrial environments*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

- IEC 61000-3-11 *Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection*
- IEC 61000-3-12 *Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase*

C.2 IEC 61000-6-4

IEC 61000-6-4	Part 6-4: Generic standards - Emission standard for industrial environments
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IEC 61000-6-4 provides EMC emission requirements applicable to electrical and electronic apparatus intended for use in industrial environments as described below.

Emission requirements in the frequency range 0 Hz to 400 GHz are covered. No measurement needs to be performed at frequencies where no requirement is specified.

This generic EMC emission standard is applicable only if no product or product-family EMC emission standard exists.

IEC 61000-6-4 applies to a apparatus intended to be connected to a power network supplied from a high or medium voltage transformer dedicated to the supply of an installation feeding manufacturing or similar plant, and intended to operate in or in proximity to industrial locations, as described below. IEC 61000-6-4 applies also to apparatus, which is battery operated and intended to be used in industrial locations.

The environments encompassed by this standard are industrial, both indoor and outdoor.

Industrial locations are in addition characterised by the existence of one or more of the following examples:

- industrial, scientific and medical (ISM¹⁾) apparatus;
- heavy inductive or capacitive loads that are frequently switched;
- high currents and associated magnetic fields.

The object of IEC 61000-6-4 is to define the emission test requirements for apparatus defined in the scope in relation to continuous and transient, conducted and radiated disturbances.

The emission requirements have been selected so as to ensure that disturbances generated by apparatus operating normally in industrial locations do not exceed a level that could prevent other apparatus from operating as intended. Fault conditions of apparatus are not taken into account. Not all disturbance phenomena have been included for testing purposes in IEC 61000-6-4 but only those considered as relevant for the equipment covered by IEC 61000-6-4. These requirements represent essential electromagnetic compatibility emission requirements.

Requirements are specified for each port considered.

NOTE 1 Safety considerations are not covered by IEC 61000-6-4.

NOTE 2 In special cases, situations will arise where the levels specified in IEC 61000-6-4 will not offer adequate protection; for example where a sensitive receiver is used in close proximity to an apparatus. In these instances, special mitigation measures may have to be employed.

To fully cover all EMC phenomena the following other EMC related standards may apply:

- IEC 61000-6-2 *Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments*
- IEC 61000-3-2 *Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)*
- IEC 61000-3-3 *Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection*

¹⁾ As defined in CISPR 11.

- IEC 61000-3-11 *Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low- voltage supply systems - Equipment with rated current ≤ 75 A and subject to conditional connection*
- IEC 61000-3-12 *Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase*