



Innovation, Science and
Economic Development Canada

Innovation, Sciences et
Développement économique Canada

ICES-003
Issue 7
October 2020

Spectrum Management and Telecommunications

Interference-Causing Equipment Standard

Information Technology Equipment (including Digital Apparatus)

Preface

Interference-Causing Equipment Standard ICES-003, issue 7, *Information Technology Equipment (including Digital Apparatus)*, replaces ICES-003, issue 6, *Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement*, published in January 2016 and updated in April 2017 and in April 2019.

This issue of the ICES-003 standard will come into force upon its publication on the Innovation, Science, and Economic Development Canada (ISED) website. However, a transition period is provided, according to section 2.1, within which compliance with either issue 6 or issue 7 of ICES-003 is accepted.

Listed below are the changes:

1. changed title of the standard from *Information Technology Equipment (Including Digital Apparatus) — Limits and Methods of Measurement* to *Information Technology Equipment (including Digital Apparatus)*
2. added requirements for devices with wireless power transfer functionality (section 1.3)
3. removed requirements that are specified in ICES-Gen and referred to ICES-Gen for all general requirements (section 2.2)
4. removed the alternative limits (ICES-003 now has only one set of limits), while continuing to allow either the CISPR or ANSI test methods (section 3)

Inquiries may be submitted by one of the following methods:

- 1) Online, using the [General Inquiry](#) form (in the form, the Directorate of Regulatory Standards radio button should be selected and “ICES-003” should be specified in the General Inquiry field)
- 2) By mail to the following address:

Innovation, Science and Economic Development Canada
Engineering, Planning and Standards Branch
Attention: Regulatory Standards Directorate
235 Queen Street
Ottawa ON K1A 0H5
Canada

- 3) By email to ic.consultationradiostandards-consultationnormesradio.ic@canada.ca

Comments and suggestions for improving this standard may be submitted online using the [Standard Change Request](#) form, or by mail or email to the above addresses.

All spectrum and telecommunications related documents are available on ISED's [Spectrum Management and Telecommunications](#) website.

Issued under the authority of
the Minister of Innovation, Science and Industry

Martin Proulx
Director General
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1. Scope

This section defines the scope of this standard, including both the general scope as well as special considerations for specific equipment types.

1.1 General

This Interference-Causing Equipment Standard (ICES) sets out limits and methods of measurement of radio frequency emissions, as well as administrative requirements for information technology equipment (ITE), including digital apparatus. This includes devices or systems that generate and/or use timing signals or pulses having a rate of at least 9 kHz and employ digital techniques for purposes such as computation, display, control, data processing and storage.

1.2 External power supplies

This section defines the requirements specific to external power supplies.

1.2.1 Marketed in Canada

“Marketed” in Canada, as used in this standard, means any of the activities listed in subsection 4(3) of the [Radiocommunication Act](#), i.e. manufacture, importation, distribution, lease, offering for sale or sale.

1.2.2 Marketed together with the ITE or digital apparatus

An external switched mode power supply, or external semiconductor power converter, that is marketed together with the ITE or digital apparatus for the purpose of providing power to that ITE or digital apparatus shall be tested together with the corresponding ITE or digital apparatus and the combination shall comply with the requirements specified in this standard. However, the external power supply/converter does not need to be labeled as specified in section 4.2 (the labelling requirement is normative for the ITE or digital apparatus itself, but optional for the external power supply/converter that is marketed together with that ITE or digital apparatus).

1.2.3 Marketed separately

An external switched mode power supply or external semiconductor power converter, that is marketed separately is under the scope of ICES-001, [Industrial, Scientific and Medical \(ISM\) Equipment](#), and thus exempt from the scope of ICES-003. However, if such an external power supply/converter is intended exclusively for use with devices that are within the scope of this standard, it may be authorized under ICES-003 instead of ICES-001. In this case:

- a. the external power supply/converter will be exempt from compliance with ICES-001 and
- b. the external power supply/converter shall comply with all applicable requirements specified in this standard, including the labelling requirements in section 4.2

1.3 ITE or digital apparatus with wireless power transfer functionality

Products subject to this standard that include functionality for wireless power transfer shall meet the provisions and requirements of both this standard and RSS-216, [Wireless Power Transfer Devices](#).

In particular, while the product is in its primary (main) operating mode, ICES-003 shall apply, and while in wireless power transfer mode (e.g. battery charging mode), RSS-216 shall apply. A reference to the corresponding RSS-216 report within the ICES-003 report will fulfil this requirement for the purpose of this standard.

The emissions from the wireless power transfer portion of the product under test shall not be considered when evaluating the compliance with the limits specified in ICES-003: see ICES-Gen, [General Requirements for Compliance of Interference-Causing Equipment](#).

1.4 ITE or digital apparatus that incorporates radio modules

Products subject to this standard that include functionality for radiocommunication shall meet the provisions and requirements of both this standard and relevant [Radio Standard Specifications](#) (RSSs), as applicable to the specific radiocommunication technology. A reference to the corresponding RSS report within the ICES-003 report will fulfil this requirement for the purpose of this standard.

However, where the radio functionality is achieved by integrating an already certified radio module, there is no need for a reference to the corresponding RSS report. Instead, the ICES-003 report shall demonstrate the product's compliance with the requirements applicable to the host of an already certified radio module, in accordance with Radio Standards Procedure RSP-100, [Certification of Radio Apparatus and Broadcasting Equipment](#), and RSS-Gen, [General Requirements for Compliance of Radio Apparatus](#). These requirements include compliance with RSS-102, [Radio Frequency \(RF\) Exposure Compliance of Radiocommunication Apparatus \(All Frequency Bands\)](#), for RF exposure, and specific labelling requirements for the host product.

The emissions from the radio transmitter shall not be considered when evaluating the compliance with the limits specified in ICES-003: see ICES-Gen.

1.5 Exemptions from the scope of ICES-003

This section defines the exemptions from the scope of ICES-003.

1.5.1 General exemptions

ICES-003 does not apply to the following types of equipment:

- a. ITE or digital apparatus factory-installed in vehicles, boats or devices equipped with internal combustion engines, traction batteries or both (subject to [ICES-002](#)). ITE or digital apparatus not factory-installed in vehicles, boats or devices equipped with internal combustion engines, traction batteries or both do not qualify for this exemption. “Factory-installed” means that the ITE or digital apparatus is installed in the vehicle/boat/device at the factory, before the vehicle/boat/device is placed on the market. “Placed on the market” in Canada means any of the activities listed in subsection 4(3) of the [Radiocommunication Act](#), i.e. manufacture, importation, distribution, lease, offering for sale or sale.
- b. ITE or digital apparatus intended exclusively for use inside an aircraft.
- c. ITE or digital apparatus used exclusively as an electronic control or power system either by a public utility, in a dedicated building/facility owned or leased by the utility and which is not the subscriber facility, or in an industrial plant/factory.
- d. ITE or digital apparatus used exclusively as industrial, scientific or medical equipment (such equipment is subject to [ICES-001](#)).
- e. ITE or digital apparatus intended exclusively for installation inside an appliance or electrical machinery that does not use radio-frequency (i.e. 9 kHz or greater) to perform its main function (e.g. dishwasher, clothes dryer or air conditioner, central or window), and where the ITE or digital apparatus directly controls the main function of the appliance or electrical machinery. Thus, the following types of ITE or digital apparatus do not qualify for this exemption and have to be compliant with all requirements stated in ICES-003:
 - i. ITE or digital apparatus that is not contained within the appliance (e.g. an external thermostat for a furnace or air conditioner).
 - ii. ITE or digital apparatus that is contained within the appliance but is not directly related to its main function (e.g. electronic display screen on the outside of a refrigerator’s door, or digital payment and electronic display subassemblies of a vending machine).
- f. ITE or digital apparatus that has a maximum power consumption of 6 nW.
- g. Joystick controllers or similar devices, such as a mouse, used with ITE or digital apparatus but which contain only non-digital circuitry or a simple circuit to convert the signal to the format required. These are considered passive add-on devices.
- h. ITE or digital apparatus in which both the highest frequency generated and the highest frequency used are less than 1.705 MHz and which neither operates from, nor contains provision for operation while directly or indirectly connected to the AC mains power network.
- i. ITE or digital apparatus used exclusively in central office telephone equipment operated by a telecommunications common carrier in a central office.

1.5.2 Broadcasting equipment

Some categories of broadcasting equipment are subject to ISED's broadcasting equipment technical standards (BETS). ITE or digital apparatus used exclusively inside broadcasting transmitter or receiver equipment is exempt from ICES-003 unless the ITE or digital apparatus can be used separately from the broadcasting function of that equipment. In the latter case, the ITE or digital apparatus does not qualify for this exemption and shall comply with ICES-003; however, in this case, the labelling requirements in section 4.2 are optional, while the labelling requirements of the corresponding BETS shall apply.

1.5.3 Multiunit and multifunction equipment

Multiunit ITE or digital apparatus, made of two or more devices, is only exempt from ICES-003 if all of its individual devices (components) qualify for exemption, in accordance with sections 1.5.1 and/or 1.5.2. Otherwise, the multiunit ITE or digital apparatus shall comply with the requirements specified in this standard. In the latter case, for testing the multiunit ITE or digital apparatus, all individual devices (components) that do not qualify for an exemption shall be configured, active and operated as in normal use.

Multifunction ITE or digital apparatus is only exempt from ICES-003 if all its functions qualify for exemption in accordance with sections 1.5.1 and/or 1.5.2.

2. General requirements and references

This section defines the general requirements related to this standard, including the transition period, compliance with ICES-Gen, and the list of normative references.

2.1 Transition period

A transition period of one year, ending on October 15, 2021, is provided, within which compliance with either issue 6 or issue 7 of ICES-003 is accepted. A copy of issue 6 of ICES-003 may be requested by [email](#).

After the expiry of this transition period all products subject to this standard that continue to be manufactured, imported, distributed, leased, offered for sale, or sold in Canada shall comply with issue 7 of ICES-003.

2.2 ICES-Gen compliance

In addition to this standard, the requirements of ICES-Gen shall apply, except where a requirement in ICES-Gen contradicts a requirement in this standard, in which case this standard shall take precedence. However, where a requirement in one of the normative references specified in section 2.3 contradicts a requirement in ICES-Gen, then ICES-Gen shall take precedence (unless otherwise stated in this standard).

2.3 Normative references

This ICES refers to the following publications and, where such references are made, they shall be to the editions listed below. Where a requirement in one of the normative references contradicts a requirement in ICES-003, then ICES-003 shall take precedence.

Not all normative references necessarily apply to a specific product subject to ICES-003. Section 3 specifies the normative reference(s) that apply to the specific product under test.

- CAN/CSA-CISPR 32:17, *Electromagnetic compatibility of multimedia equipment – Emission requirements* (IEC CISPR 32:2015, MOD)
- ANSI C63.4, *American National Standard for Methods of Measurement of Radio Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz*

The CAN/CSA standard listed above can be purchased [online](#).

The ANSI standard listed above can be purchased [online](#). The edition of ANSI C63.4 adopted by ISED shall be used, as posted on the [Normative Test Standards and Acceptable Alternate Procedures](#) website.

3. Technical requirements

This section defines the technical requirements applicable to products subject to this standard.

3.1 Test facility, measurement instrumentation and measurement methods

The test facility, measurement instrumentation and measurement methods used for verifying the compliance of ITE or digital apparatus with ICES-003 shall comply either with the requirements in CAN/CSA-CISPR 32:17 or with those in ANSI C63.4.

All the required measurements (as per this standard) on the ITE or digital apparatus under test shall be performed using only one of the two referenced specifications: either CAN/CSA-CISPR 32:17 or ANSI C63.4. However, for outdoor units of home satellite receiving systems, regardless of which one of the two referenced specifications is used, the requirements in Annex H of CAN/CSA-CISPR 32:17 shall be applied.

3.2 Limits

This section defines the limits applicable to products subject to this standard.

3.2.1 Conducted emission limits

The ITE or digital apparatus shall comply with the conducted emission limits specified in [table 1](#) at its AC mains power terminals. The product under test shall comply with both the quasi-peak and the average limits.

Where the product under test is powered through an external device (for example, through an external power supply, or by means of a device providing power over Ethernet to the product under test), the conducted emission limits apply at the AC mains power terminals of the external device, while this is powering the product under test: see ICES-Gen.

Table 1: Conducted emissions limits (AC mains power terminals)

Frequency range (MHz)	Class A Quasi-peak (dB μ V)	Class A Average (dB μ V)	Class B Quasi-peak (dB μ V)	Class B Average (dB μ V)
0.15 – 0.5	79	66	66 to 56 ⁱ	56 to 46 ⁱ
0.5 – 5	73	60	56	46
5 – 30	73	60	60	50

Note: The more stringent limit applies at transition frequencies.

i. The limit level in dB μ V decreases linearly with the logarithm of frequency.

3.2.2 Radiated emission limits

The quasi-peak limits for the electric component of the radiated field strength emitted from ITE or digital apparatus, within 30 MHz to 1 GHz, for a measurement distance of 3 m or 10 m, are presented in [table 2](#).

Table 2: Radiated emissions limits (30 MHz to 1 GHz)

Frequency range (MHz)	Class A (3 m) Quasi-peak (dB μ V/m)	Class A (10 m) Quasi-peak (dB μ V/m)	Class B (3 m) Quasi-peak (dB μ V/m)	Class B (10 m) Quasi-peak (dB μ V/m)
30 – 88	50.0	40.0	40.0	30.0
88 – 216	54.0	43.5	43.5	33.1
216 – 230	56.9	46.4	46.0	35.6
230 – 960	57.0	47.0	47.0	37.0
960 – 1000	60.0	49.5	54.0	43.5

Note: The more stringent limit applies at transition frequencies.

At and above 1 GHz, except for outdoor units of home satellite receiving systems, the ITE or digital apparatus shall comply with the limits specified in [table 4](#) up to the frequency F_M , which shall be determined as per [table 3](#). The product under test shall comply with both the average and the peak limits.

Table 3: Required highest measurement frequency for radiated emissions

Highest internal frequency (F_X) ⁱ	Highest measurement frequency (F_M)
$F_X \leq 108$ MHz	1 GHz
108 MHz $< F_X \leq 500$ MHz	2 GHz
500 MHz $< F_X \leq 1$ GHz	5 GHz
$F_X > 1$ GHz	$5 \times F_X$ up to a maximum of 40 GHz
i. F_X is the highest fundamental frequency generated and/or used in the ITE or digital apparatus under test.	

Table 4: Radiated emission limits at 3 m distance (at and above 1 GHz)

Frequency range (GHz) ⁱ	Class A ^{ii, iii, iv}	Class A ^{ii, iii, iv}	Class B ^{ii, iii, iv}	Class B ^{ii, iii, iv}
	Average dB(μ V/m)	Peak dB(μ V/m)	Average dB(μ V/m)	Peak dB(μ V/m)
$1 - F_M$	60	80	54	74
i. The highest measurement frequency, F_M , in GHz, shall be determined as per table 3 . ii. The measurement bandwidth shall be 1 MHz or greater. iii. These limit levels apply for a measurement distance of 3 m. If using a different measurement distance, the measured levels shall be extrapolated to the 3 m limit distance using a factor of 20 dB per decade of distance. The measurement distance shall place the measurement antenna in the far field of the ITE or digital apparatus under test. iv. The test site shall have been validated at the distance used for radiated emission measurements on the ITE or digital apparatus under test.				

At and above 1 GHz, if the ITE or digital apparatus is an outdoor unit of home satellite receiving systems, it shall comply with the limits in Table A.7 in clause A.2 of CAN/CSA-CISPR 32:17 (in Annex A therein). For these types of ITE or digital apparatus, the highest measurement frequency shall be 18 GHz.

4. Administrative requirements

This section defines the administrative requirements related to this standard, such as reporting and labelling requirements.

4.1 Test report

The requirements specified in ICES-Gen shall apply. Additionally, the chosen measurement procedure (CAN/CSA-CISPR 32:17 or ANSI C63.4) shall be specified in the test report.

4.2 Labelling and user manual requirements

The requirements specified in ICES-Gen shall apply. An example ISED compliance label, to be placed on each unit of an equipment model (or in the user manual, if allowed), is given below:

CAN ICES-003(*) / NMB-003(*)

* Insert either "A" or "B", but not both, to identify the applicable Class of the device used for compliance verification.

The above label is only an example. The specific format is left to the manufacturer to decide, as long as the label includes the required information, in accordance with ICES-Gen.