



Interference-Causing Equipment Standard

AC WIRE CARRIER CURRENT DEVICES (UNINTENTIONAL RADIATORS)

DRAFT

Aussi disponible en français NMB-006

**AC WIRE CARRIER CURRENT DEVICES
(UNINTENTIONAL RADIATORS)**

TABLE OF CONTENTS

1.	GENERAL	1
2.	DEFINITIONS	2
3.	INSTRUMENTATION	2
4.	LIMITS	3
5.	PROCEDURAL REQUIREMENTS	4
6.	REFERENCE PUBLICATIONS	4

Interference-Causing Equipment Standard

AC Wire Carrier Current Devices (Unintentional Radiators)

1. GENERAL

- 1.1 This interference-causing equipment Standard sets out the technical requirements relative to the conducted and radiated radio noise emissions from AC wire carrier current devices of a design for which any radiation of radio frequency energy is unintentional.
- 1.2.1 Subject to subsections 1.2.2 and 1.2.3, Sections 3 to 6 apply to every AC wire carrier current device used in Canada.
- 1.2.2 Sections 3 to 6 do not apply to AC wire carrier current devices:
- a) manufactured in or imported into Canada solely for export purposes;
 - b) used solely for demonstration and exhibition purposes; or
 - c) used as prototypes.
- 1.2.3 (1) Sections 3 to 6 do not apply to AC wire carrier current devices for which the manufacturer, importer or owner has been granted a special permission by the Minister.
- (2) The Minister may grant a special permission where:
- a) the manufacturer, importer or owner has presented a written application giving:
 - (i) the reasons for the request;
 - (ii) an analysis based on sound engineering principles showing that the AC wire carrier system will not pose a significant risk to radiocommunication;
 - (iii) a guarantee of compliance with all the conditions the Minister may set in the special permission; and,
 - b) the Minister is satisfied that the AC wire carrier current device will not pose a significant risk to radiocommunication.
- (3) The special permission is valid only if:
- a) the AC wire carrier current device bears a label stating that it is

operating under special permission and setting out the conditions of that special permission; and,

- b) the AC wire carrier current device complies with any conditions set out in the special permission.
- (4) The Minister may revoke or amend the special permission granted under subsection (2) at any time without prior notice.

2. DEFINITIONS

2.1 In this Standard,

"AC wire carrier current device" means a device that transmits radio frequency signals by conduction over electric power or other transmission lines, and is used in business and residential buildings.

AC wire carrier current devices are classified as:

- (a) Interference-Causing Equipment when both the excitor (transmitter) and the receiver are connected to the AC wireline, and any radiation of radio frequency energy is unintentional. These are subject to ICES-006.
- (b) AC wire carrier current devices operating in the AM broadcast band of 535-1705 kHz and intended for AM broadcast receivers. These are subject to Industry Canada technical standards for broadcast apparatus.
- (c) AC wire carrier current devices of the intentional radiator type, where the excitor is connected to the AC wireline but the receiver is not (e.g. a magnetic loop is used to pick up the receive signal). These are subject to Industry Canada technical standards for certification of low-power radiocommunication devices. (Document RSS-210)

3. INSTRUMENTATION

3.1 Line Impedance Stabilization Network

- 3.1.1 A line impedance stabilization network (LISN) shall be used for the measurement of conducted emissions. The specifications of the LISN shall be in accordance with publication (1) referred to in Section 6.1.

3.2 Radio Frequency Receiver

3.2.1 A radio frequency receiver whose specifications are in accordance with the publication referred to in Section 6.1 (2) shall be used for measurement of line conducted emissions.

4. LIMITS

4.1 Conducted limits

0 to 535 kHz: For devices having fundamental frequencies of 0 to 535 kHz, their harmonics and unwanted emission frequencies falling within 535-1705 kHz shall not exceed 1000 microvolts measured across a 50 ohm line impedance stabilization network (LISN); see Section 9.0 of the Industry Canada publication RSS-210, Issue 2, “Low Power Licence-Exempt Radiocommunication Devices” (the publication referenced in Section 6.1 (3)) for measurement.

Carrier current devices intended for residential and office buildings are permitted the output voltages listed in the table below, when measured, in turn, with 5 ohms and 50 ohms resistive loads. If the duty cycle is not determined by the manufacturer of the device (i.e. duty cycle is system dependent), then the user manual shall provide clear instructions to the system designer about how to compute the permissible output voltage of the system, based on the table.

Permissible Carrier Current Output Voltages for Installation in Residential and Office Buildings

Below 9 kHz :	No limits;
9 to 95 kHz (see Note 1) :	15.0 volts pk-pk (or 5.3 volts rms);
105 to 185 kHz (see Note 1) :	15.0 volts pk-pk (or 5.3 volts rms);
185-535 kHz :	0.45(B/D) ^{1/2} volts pk-pk for devices intended for connection to 120 VAC lines and 0.90(B/D) ^{1/2} volts pk-pk for devices intended for connection to 240 VAC lines, or 15 volts pk-pk, whichever is the lesser voltage. B = bandwidth in kHz (-6 dB points, i.e. when the spectral density has decreased by 6 dB). D = duty cycle, e.g. D = 1.0 for continuous transmission. When B is less than 4.8 kHz, B = 4.8 may be used.

Note 1: The frequency table above does not include 100 kHz because it is a restricted

frequency; it is the LORAN C time signal frequency. Carrier current devices using the band 95-105 kHz, or spread spectrum systems that include this band, may do so subject to section 2.4 of the publication referenced in Section 6.1 (3) and cease operation if found to cause interference.

Notwithstanding the above, if the aggregate interference in any area or city is found to cause unacceptable interference to the authorized users (see section 2.4 of the publication referenced in Section 6.1 (3) for definition), Industry Canada will review the permissible voltage levels. Therefore, manufacturers should limit the duty cycle (transmission on-time) of their devices wherever possible.

The frequencies: 260; 262; 450 and 455 kHz are being investigated by the carrier current industry in collaboration with NAVCANADA (for approval by Industry Canada), for possible use of higher output voltages for carrier current devices in some geographical areas. Effects on the A.M. broadcast receiver I.F. frequency of 455 kHz are also being studied. Other frequencies can also be investigated by the carrier current industry in collaboration with NAVCANADA.

535-1705 kHz: The level of the fundamental or harmonics falling within this band shall not exceed 1000 microvolts when measured across a 50 ohm LISN except for transmissions intended for AM broadcast receivers in which case see Section 2.1 (b) above.

Above 1705 kHz: **Limits and methods of measurement for Carrier current devices operating above 1705 kHz are under consideration.** Household AC wiring has been found to radiate like an antenna farm for frequencies above 1.7 MHz. Those who intend to use the band 1.7-30 MHz for carrier current devices shall demonstrate to Industry Canada that their devices will not have a cumulative effect that can cause harmful interference to the authorized users of the band. (Authorized users are listed in the Canadian Table of Frequency Allocations.)

5. PROCEDURAL REQUIREMENTS

- 5.1 A record of the measurement method and results shall be retained by the manufacturer or importer for a period of at least five years and made available for examination on request by the Department.
- 5.2 A written notice indicating compliance must accompany the AC wire carrier current device to the end user. The notice "**complies with IC: ICES - 006; en conformité avec IC: NMB - 006**" shall be in the form of a label that is affixed to the main control unit. When size does not permit this, the notice may be abbreviated to "**IC: ICES/ NMB - 006**" with the full notice printed in the user manual.

6. REFERENCE PUBLICATIONS

6.1 This Standard refers to the following Publications and where such reference is made it shall be to the editions listed below.

- (1) CSA Standard C108.1.5, Line Impedance Stabilization Network (LISN);
- (2) CSA Standard C108.1.1-1977, Electromagnetic Interference Measuring Instrument-C.I.S.P.R. Type.
- (3) Industry Canada Radio Standard Specification RSS-210, Issue 3: Low Power Licence-Exempt Radiocommunication Devices

Issued under the authority of the
Minister of Industry Canada

Robert McCaughern
Director General
Spectrum Engineering